YWCA
NEW ORLEANS
Celebrating 100 Years of Service

YWCA of New Orleans
New Daycare, Education and Counseling Building

601-605 Norman C. Francis Parkway (aka S. Jefferson Davis Parkway), New Orleans, Louisiana 70119

Project Manual
Specifications

Owner
YWCA of New Orleans

Architect
Trapolin-Peer Architects, A Professional Corporation
850 Tchoupitoulas Street
New Orleans, Louisiana 70130

ISSUE DATE: 7/12/2023
AS AMENDED 11/12/2024 & 06/18/2025

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SECTION 00100

INVITATION TO BIDDERS

Landmark Consulting is seeking bids from qualified General Contractors for the following project:

YWCA of Greater New Orleans
New Daycare, Education and Counseling Building
601 S. Norman C. Francis Parkway (aka S. Jefferson Davis Parkway)
New Orleans, LA 70119
Project Number: CN09418

All bids are due on or before July 22, 2025 at 2:00pm CDT.

In accordance with LA RS 38: 2212.E(6), bids for this project must be submitted electronically via upload to CENTERLINE BidConnect (www.centerlinebidconnect.com). Each bid shall be accompanied by a bid security in the form of a bid bond equal to **5% of the amount of the bid** submitted as evidence of good faith of the Bidder. If a scanned copy of a Bid Bond is uploaded, the original notarized bid bond must be produced "on-demand" per the Owner's request.

Questions about this procedure should be directed to CENTERLINE (phone 504-291-5738, email: bidconnect@centerline.co).

Complete Bidding Documents for this project are being distributed in electronic form on behalf of the Owner by CENTERLINE BidConnect. They may be obtained without charge and without deposit from the Public Plan Room at www.centerlinebidconnect.com . Printed copies are not available from the Owner or Designer but arrangements can be made to obtain them through most reprographic firms. Plan holders are responsible for their own reproduction costs.

A NON MANDATORY PRE-BID MEETING WILL BE HELD
AT 2:00PM CDT ON JULY 01, 2025 VIA ZOOM WEB CONFERENCE

Join Zoom Meeting
https://us06web.zoom.us/j/82808550949?pwd=wXT3sW9zeUc3xLg8FSLnbbCP4o2tfg.1

Meeting ID: 828 0855 0949
Passcode: 815689

Bids shall be accepted from Contractors who are licensed under L.A. R.S. 37:2150-2163 for the classification of **BUILDING CONSTRUCTION.** Bidder is required to comply with provisions and requirements of LA R.S.38:2212 (A)(1)(c). No bid may be withdrawn for a period of ninety days (90) days after receipt of bids, except under the provisions of LA. R.S. 38:2214.

YWCA of Greater New Orleans reserves the right to reject any and all bids for just cause. In accordance with LA. R.S. 38:2212 (A)(1)(b), the provisions and requirements of this Section, those stated in the advertisement bids, and those required on the bid form shall not be considered as informalities and shall not be waived by any public entity.

Attention of Bidders is called particularly to the requirements for conditions of employment to be observed and minimum wages rates to be paid under the Contract (Davis-Bacon Act), Section 3

(Low Income Resident Participation) of the Housing and Urban Development Act of 1968, Section 109 (Non-Discrimination) of Housing and Community Development Act of 1974, Section 503 (Non-Discrimination Against Employees with Disabilities) and Section 504 (Non-Discrimination Against Individuals with Disabilities) of the Rehabilitation Act of 1973, Segregated Facilities, Executive Order 11246, and all applicable laws and regulations of the Federal government and State of Louisiana and bonding and insurance requirements.

Minority owned firms, small businesses, and/or Section 3 businesses are encouraged to participate.

YWCA Greater New Orleans is an equal opportunity employer.

Any person with disabilities required special accommodations must contact the YWCA Greater New Orleans no later than seven (7) days prior to bid opening.

Successful bidder must have an active Unique Entity ID (UEI), as verified on www.sam.gov, prior of award of contract.

SECTION 00200

INSTRUCTIONS TO BIDDERS

COMPLETION TIME:

The Bidder shall agree to substantially complete the contract within, three hundred sixty five (__365_____) consecutive calendar days, subject to such extensions as may be granted under Paragraph 8.3, in the General Conditions and the Supplementary Conditions, and acknowledges that this construction time will start on or before the date specified in the written "Notice to Proceed" from the Owner. Completion date will be enforced by a liquidated damages clause. Bidders are to allow for the average number of rain days in their bid. Weather delays above the average will be allowed.

LIQUIDATED DAMAGES:

The Bidder shall agree to pay as Liquidated Damages the amount of (One Thousand five hundred) Dollars ($ 1500.00) for each consecutive calendar day for which the work is not complete, beginning with the first day beyond the completion date stated on the "Notice to Proceed".

ARTICLE 1

DEFINITIONS

1.1 The Bidding Documents include the following:

Invitation to bidders
Instructions to Bidders
Bid Form
Bid Bond
Standard form of agreement between Owner and Contractor
Amendment A and Exhibit C, D & E
Exhibit B- CDBG Compliance Requirements
Exhibits C, D & E
General Conditions of the Contract for Construction, AIA Document A201, 2017 Edition
Supplementary Conditions
Performance and Payment Bond
Non-Collusion Affidavit
Attestation Affidavit
Notice of Construction Contract
Notice of Termination of Work
Contactor's conditional waiver of lien form
Contractor's unconditional waiver of lien form
Roofing guarantee r-1
Roofing guarantee r-2
Roofing guarantee r-3

Change order form
Davis bacon wage list for Orleans Parish
Payroll Reporting
Disadvantaged Business Enterprise (DBE)
Wage list for contactor
Substitution form (during bidding)
Submittal transmittal form
Subcontractors and material suppliers list
Substitution form (after bidding)
Request for interpretation form
Punch list form
Recommendation of Acceptance
Certificate of Compliance with ADA and ABAAG
Specifications & Drawings
Addenda issued during the bid period and
acknowledged in the Bid Form

1.2 All definitions set forth in the General Conditions of the Contract for Construction, AIA Document A201, or in other Contract Documents are applicable to the Bidding Documents.

1.3 Addenda are written and/or graphic instruments issued by the Architect prior to the opening of bids which modify or interpret the Bidding Documents by additions, deletions, clarifications, corrections and prior approvals.

1.4 A bid is a complete and properly signed proposal to do the work or designated portion thereof for the sums stipulated therein supported by data called for by the Bidding Documents.

1.5 Base bid is the sum stated in the bid for which the Bidder offers to perform the work described as the base, to which work may be added, or deleted for sums stated in alternate bids.

1.6 An alternate bid (or alternate) is an amount stated in the bid to be added to the amount of the base bid if the corresponding change in project scope or materials or methods of construction described in the Bidding Documents is accepted.

1.7 A Bidder is one who submits a bid for a prime Contract with the Owner for the work described in the proposed Contract Documents.

1.8 A Sub-bidder is one who submits a bid to a Bidder for materials and/or labor for a portion of the work.

1.9 Where the word "Architect" is used in any of the documents, it shall refer to the Prime Designer of the project, regardless of discipline

ARTICLE 2

PRE-BID CONFERENCE

2.1 A Pre-Bid Conference shall be held via web conference at least **10 days before the date** for receipt for bids. The Owner's Project Manager shall coordinate the setting of the date, time and place for the Pre-Bid Conference with the User Agency and shall invite in writing the Owner, User Agency, and all who have received sets of the Bidding Documents to attend.

2.1 A Pre-Bid Conference shall be held via Zoom at 2:00pm CDT on July 1, 2025.

To Join the Prebid Zoom Meeting:
https://us06web.zoom.us/j/82808550949?pwd=wXT3sW9zeUc3xLg8FSLnbbCP4o2tfg.1

Meeting ID: 828 0855 0949
Passcode: 815689

The purpose of the Pre-Bid Conference is to familiarize Bidders with the requirements of the Project and the intent of the Contract Documents, and to receive comments and information from interested Bidders. The Pre-Bid Conference is stated in the Advertisement for Bids to be a Non-Mandatory Pre-Bid Conference.

2.2 Any revision of the Bidding Documents made as a result of the Pre-Bid Conference shall not be valid unless included in an addendum.

ARTICLE 3

BIDDER'S REPRESENTATION

3.1 Each Bidder by making his bid represents that:

3.1.1 He has read and understands the Bidding Documents and his bid is made in accordance therewith.

3.1.2 He has visited the site and has familiarized himself with the local conditions under which the work is to be performed.

3.1.3 His bid is based solely upon the materials, systems and equipment described in the Bidding Documents as advertised and as modified by addenda.

3.1.4 His bid is not based on any verbal instructions contrary to the Contract Documents and addenda.

3.2 The Bidder must be fully qualified under any State or local licensing law for Contractors in effect at the time and at the location of the work before submitting his bid. In the State of Louisiana, Revised Statutes 37:2150, et seq. will be considered, if applicable.

The Contractor shall be responsible for determining that all of his Sub-bidders or prospective Subcontractors are duly licensed in accordance with law.

ARTICLE 4

BIDDING DOCUMENTS

4.1 Copies

4.1.1 Bidding Documents are being distributed in electronic form on behalf of the Owner by CENTERLINE BidConnect. They may be obtained without charge and without deposit from the Public Plan Room at www.centerlinebidconnect.com . Printed copies are not available from the Owner or Designer but arrangements can be made to obtain them through most reprographic firms. Plan holders are responsible for their own reproduction costs. Questions about this procedure shall be directed to: CENTERLINE. Phone: 504-291-5738, Email: bidconnect@centerline.co.

4.1.2 Complete sets of Bidding Documents shall be used in preparing bids; neither the Owner nor the Architect assume any responsibility for errors or misinterpretations resulting from the use of incomplete sets of Bidding Documents.

4.1.3 The Owner or Architect in making copies of the Bidding Documents available on the above terms, do so only for the purpose of obtaining bids on the work and do not confer a license or grant for any other use.

4.2 Interpretation or Correction of Bidding Documents

4.2.1 Bidders shall promptly notify the Architect of any ambiguity, inconsistency or error which they may discover upon examination of the Bidding Documents or of the site and local conditions.

4.2.2 Bidders requiring clarification or interpretation of the Bidding Documents shall make a formal request to the Architect, to reach him at least seven days prior to the date for receipt of bids.

4.2.3 Any interpretation, correction or change of the Bidding Documents will be made by addendum. Interpretations, corrections or changes of the Bidding Documents made in any other manner will not be binding, and Bidders shall not rely upon such interpretations, corrections and changes.

4.3 Substitutions

4.3.1 The materials, products and equipment described in the Bidding Documents establish a standard of required function, dimension, appearance and quality to be met by any proposed substitution. No substitution shall be allowed after building.

4.3.2 No substitution will be considered unless written request for approval has been submitted by the Proposer and has been received by the Architect at least seven (7) working days prior to the date for receipt of bids. (RS38:2295C) Each such request shall include the name of the material or equipment for which it is to be substituted and a complete description of the proposed substitute including model numbers, drawings, cuts, performance and test data and any other information necessary for an evaluation. A statement setting forth any changes in other materials, equipment of work that incorporation of the substitute would require shall be included. It shall be the responsibility of the proposer to include in his proposal all changes required of the Contract Documents if the proposed product is used. Prior approval is given contingent upon supplier being responsible for any costs which may be necessary to modify the space or facilities needed to accommodate the materials and equipment approved.

4.3.3 If the Architect approves any proposed substitution, such approval will be set forth in an addendum. Bidders shall not rely upon approvals made in any other manner.

4.4 Addenda

4.4.1 Addenda will be delivered via CENTERLINE BidConnect to all registered Plan Holders.

4.4.2 Copies of addenda will be made available for inspection wherever Bidding Documents are on file for that purpose.

4.4.3 Except as described herein, addenda shall not be issued within a period of seventy-two (72) hours prior to the advertised time for the opening of bids, excluding Saturdays, Sundays, and any other legal holidays. If the necessity arises of issuing an addendum modifying plans and specifications within the seventy-two (72) hour period prior to the advertised time for the opening of bids, then the opening of bids may be extended as determined by the Architect or Owner.

4.4.4 Each Bidder shall ascertain from the Architect prior to submitting his bid that he has received all addenda issued, and he shall acknowledge their receipt on the Bid Form.

4.4.5 The Owner shall have the right to extend the bid date by up to (30) thirty days. Any such extension shall be made by addendum issued by the Architect.

ARTICLE 5

BIDDING PROCEDURE

5.1 Form and Style of Bids

5.1.1 Bids shall be submitted on the forms provided by the Architect.

5.1.2 All blanks on the Bid Form shall be filled in by typewriter or manually in ink.

5.1.3 Bid sums shall be expressed in both words and figures, and in case of discrepancy between the two, the written words shall govern.

5.1.4 Any interlineation, alteration or erasure must be initialed by the signer of the bid or his authorized representative.

5.1.5 Bidders are cautioned to complete all alternates should such be required in the Bid Form.

5.1.6 Bidder shall make no additional stipulations on the Bid Form nor qualify his bid in any other manner.

5.1.7 The bid shall include the legal name of Bidder and shall be signed by the person or persons legally authorized to bind the Bidder to a Contract.
The authority of the signature of the person submitting the bid shall be deemed sufficient and acceptable under any of the following conditions:
(a) Signature on bid is that of any corporate officer or member of a partnership or partnership in commendam listed on most current annual report on file with Secretary of State.
(b) Signature on bid is that of authorized representative of corporation, partnership, or other legal entity and bid is accompanied by corporate resolution, certification as to the corporate principal, or other documents indicating authority.
(c) Corporation, partnership, or other legal entity has filed in the records of the Secretary of State, an affidavit, resolution or other acknowledged or authentic document indicating the names of all parties authorized to submit bids for public contracts. A bid submitted by an agency shall have a current Power of Attorney attached certifying agent's authority to bind Bidder. The name and license number on the envelope shall be the same as on the Bid Form.

5.1.8 On any bid in excess of fifty thousand dollars ($50,000.00), the Contractor shall certify that he is licensed under R.S. 37: 2150-2173 and show his license number on the bid above his signature or his duly authorized representative.

5.2 Bid Security

Bid Security: Attached is the bid security equal to 5% of the amount of the bid and must be in the form of a cashier’s check or certified check. The bid security is to become the property of the Owner in the event the Contract and Bond are not executed within the time set forth, as Liquidated Damages for the delay and additional work caused thereby. If the bid security attached to this proposal is a Bond, then such Bond shall be submitted on the Bid Bond Form in this addendum, and Surety shall meet the qualifications set forth therein.

If the bid security attached to this proposal is a Bond, then such Bond shall be submitted on the Bid Bond Form included in this addendum, and Surety shall meet the qualifications set forth therein.

5.3 Submission of Bids

5.3.1 In accordance with LA RS 38: 2212.E(6), bids for this project must be submitted electronically via upload to CENTERLINE BidConnect (www.centerlinebidconnect.com). CENTERLINE BidConnect provides a time-stamped receipt email to Bidders upon successful completion of the bid submission, along with a time-stamped, logged entry on the site displaying the bid submission.

5.3.2 Bids shall be uploaded to CENTERLINE BidConnect prior to the time on the date for receipt of bids indicated in the Advertisement for Bids, or any extension thereof made by addendum.

5.3.3 Bidder shall assume full responsibility for timely upload of all Bid Documents for receipt of bids.

5.3.4 Oral, telephonic or telegraphic bids are invalid and shall not receive consideration. Owner shall not consider notations written on outside of bid envelope which have the effect of amending the bid. Written modifications enclosed in the bid envelope, and signed or initialed by the Contractor or his representative, shall be accepted.

5.4 Modification or Withdrawal of Bid

5.4.1 A bid may not be modified, withdrawn or canceled by the Bidder during the time stipulated in the Advertisement for Bids, for the period following the time and bid date designated for the receipt of bids, and Bidder so agrees in submitting his bid, except in accordance with R.S. 38:2214 which states, in part, "Bids containing patently obvious mechanical, clerical or mathematical errors may be withdrawn by the Contractor if clear and convincing sworn, written evidence of such errors is furnished to the owner within forty-eight hours of the Bid Opening excluding Saturdays, Sundays and legal holidays".

5.4.2 Prior to the time and date designated for receipt of bids, bids submitted early may be modified or withdrawn only by notice to the party receiving bids at the place and prior to the time designated for receipt of bids.

5.4.3 Withdrawn bids may be resubmitted up to the time designated for the receipt of bids provided that they are then fully in conformance with these Instructions to Bidders.

5.4.4 Bid Security shall be in an amount sufficient for the bid as modified or resubmitted.

ARTICLE 6

CONSIDERATION OF BIDS

6.2 Rejection of Bids

6.2.1 Owner will select proposal most advantageous to them from the standpoints of time and money. He reserves the right to reject all bids and waive all formalities if such is in his interest, including selecting a bid not necessarily the lowest. The Owner shall have the right to reject any or all bids and in particular to reject a bid not accompanied by a required bid security or data required by the Bidding Documents or a bid in any way incomplete or irregular.

6.3 Acceptance of Bid

6.3.2 It is the intent of the Owner, if he accepts any alternates, to accept them in the order in which they are listed in the Bid Form. Determination of the Low Bidder shall be on the basis of the sum of the base bid and the alternates accepted. However, the Owner shall reserve the right to accept alternates in any order which does not affect determination of the Low Bidder.

ARTICLE 7

POST-BID INFORMATION

7.1 Submissions
7.1.1 At the Pre-Construction Conference, the Contractor shall submit the following information to the Architect.

7.1.1.1 A designation of the work to be performed by the Contractor with his own forces.

7.1.1.2 An acceptable breakdown of the Contract cost attributable to each item listed in the Schedule of Values Form (attached). No payments will be made to the Contractor until this is received.

7.1.1.3 The proprietary names and the suppliers of principal items or systems of material and equipment proposed for the work.

7.1.1.4 A list of names and business domiciles of all Subcontractors, or other persons or organizations for the principal portions of the work. It is the preference of the Owner that, to the greatest extent possible or practical, the Contractor utilize Louisiana Subcontractors and labor.

7.1.2 The Contractor will be required to establish to the satisfaction of the Architect the reliability and responsibility of the proposed Subcontractors to furnish and perform the work described in the sections of the Specifications pertaining to such proposed Subcontractor's respective trades. The General Contractor shall be responsible for actions or inactions of Subcontractors and/or material suppliers.

The General Contractor is totally responsible for any lost time or extra expense incurred due to a Subcontractor's failure to perform. Failure to perform includes, but is not limited to, a Subcontractor's financial failure, abandonment of the project, failure to make prompt delivery, or

failure to do work up to standard. Under no circumstances shall the Owner mitigate the General Contractor's losses or reimburse the General Contractor for losses caused by these events.

7.1.3 Subcontractors and other persons and organizations selected by the Bidder must be used on the work for which they were proposed and shall not be changed except with the written approval of the Owner and the Architect.

7.1.4 The lowest responsive and responsible bidder shall submit to the Owner's Project Manager and the Owner within ten days after the bid opening a letter/letters from the manufacturer stating that the manufacturer will issue the roof system guarantee complying with the requirements of the Young Women's Christian Association (YWCA) Greater New Orleans based on the specified roof system and include the name of the applicator acceptable to the manufacturer at the highest level of certification for installing the specified roof system. This manufacturer shall be one that has received prior approval or is named in the specifications.

In accordance with La. R.S. 38:2227, La. R.S. 38:2212.10 and La. R.S. 23:1726(B) each bidder on this project must submit the completed Attestations Affidavit (Past Criminal Convictions of Bidders, Verification of Employees and Certification Regarding Unpaid Workers Compensation Insurance) form found within this bid package. The Attestations Affidavit form shall be submitted to Landmark Consulting, 525 St. Charles Avenue, Suite 330, New Orleans, LA 70130, within 10 days after the opening of bids.

ARTICLE 8

PERFORMANCE AND PAYMENT BOND

8.1 Bond Required

8.1.1 The Contractor shall furnish and pay for a Performance and Payment Bond written by a company licensed to do business in Louisiana, which shall be signed by the surety's agent or attorney-in-fact, in an amount equal to 100% of the Contract amount. Surety must be listed currently on the U. S. Department of Treasury Financial Management Service List (Treasury List) as approved for an amount equal to or greater than the contract amount. The Bond shall be signed by the surety's agent or attorney-in-fact. The Bond shall be in favor of YWCA Greater New Orleans.

8.2 Time of Delivery and Form of Bond

8.2.1 The Bidder shall deliver the required bond to the Owner simultaneous with the execution of the Contract.

8.2.2 Bond shall be in the form furnished by YWCA Greater New Orleans, entitled CONTRACT BETWEEN OWNER AND CONTRACTOR AND PERFORMANCE AND PAYMENT BOND, a copy of which is included in the Contract Documents.

8.2.3 The Bidder shall require the Attorney-in-Fact who executes the required bond on behalf of the surety to affix thereto a certified and current copy of his power of Attorney.

ARTICLE 9

FORM OF AGREEMENT BETWEEN OWNER AND CONTRACTOR

9.1 Form to be Used

9.1.1 Form of the Contract to be used shall be the AIA Document A101 - 2017, Standard Form of Agreement Between Owner and Contractor where the Basis of Payment is a STIPULATED SUM, a copy of which is included in the Bidding Documents.

9.2 Award

9.2.1 Before award of the Contract, the successful Bidder shall furnish to the Owner a copy of a Disclosure of Ownership Affidavit stamped by the Secretary of State, a certified copy of the minutes of the corporation or partnership meeting which authorized the party executing the bid to sign on behalf of the Contractor.

9.2.2 In accordance with Louisiana Law, when the Contract is awarded, the successful Bidder shall, at the time of the signing of the Contract, execute the Non-Collusion Affidavit included in the Contract Documents

9.2.3 Contract to be recorded with City of New Orleans

LOUISIANA UNIFORM PUBLIC WORK BID FORM

TO: Landmark Consulting, LLC
525 St. Charles Ave, Suite 330
New Orleans, LA 70130
C/O Keely Thibodeaux

YWCA Greater New Orleans
601-605 Norman C Francis Parkway
(Aka 601-605 South Jefferson Davis)
New Orleans, LA 70119
Project Number CN09418

BID FOR: YWCA Daycare, Education and Counseling Building

The undersigned bidder hereby declares and represents that she/he: a) has carefully examined and understands the Bidding Documents, b) has not received, relied on, or based his bid on any verbal instructions contrary to the Bidding Documents or any addenda, c) has personally inspected and is familiar with the project site, and hereby proposes to provide all labor, materials, tools, appliances and facilities as required to perform, in a workmanlike manner, all work and services for the construction and completion of the referenced project, all in strict accordance with the Bidding Documents prepared by: **Trapolin-Peer Architects** and dated: 7/12/2023 (as amended 11/12/2024 & 06/18/2025)_____
(Owner to provide name of entity preparing bidding documents.)

Bidders must acknowledge all addenda. The Bidder acknowledges receipt of the following **ADDENDA:** (Enter the number the Designer has assigned to each of the addenda that the Bidder is acknowledging) _____ .

TOTAL BASE BID: Price includes the cost for materials and labor for ***Daycare, Education and Counseling Building and Playground Storage Building*** (including any and all unit prices designated "Base Bid" * but not alternates) the sum of:

_____ Dollars ($ _____)

ALTERNATES: For any and all work required by the Bidding Documents for Alternates including any and all unit prices designated as alternates in the unit price description.

Alternate No. 1 *price includes the cost for materials and labor for* ***Storm Water Management*** *as indicated in the Drawings* for the *additive* lump sum of:

_____ Dollars ($ _____)

Alternate No. 2 *price includes the cost for materials and labor for* ***the Parking Lot, Playground & Trellises, Landscaping, Site Elements, Folding Partition, Flooring Upgrades, Classroom/Lounge Sinks and Food Equipment*** *as indicated in the Drawings* for the *additive* lump sum of:

_____ Dollars ($ _____)

Alternate No. 3 *price includes the cost for materials and labor for* ***Drop off site work and Canopy*** *as indicated in the Drawings* for The *additive* lump sum of:

_____ Dollars ($_____)

NAME OF BIDDER: _____

ADDRESS OF BIDDER: _____

_____

LOUISIANA CONTRACTOR'S LICENSE NUMBER: _____

NAME OF AUTHORIZED SIGNATORY OF BIDDER: _____

TITLE OF AUTHORIZED SIGNATORY OF BIDDER: _____

SIGNATURE OF AUTHORIZED SIGNATORY OF BIDDER **: _____

DATE: _____

THE FOLLOWING ITEMS ARE TO BE INCLUDED WITH THE SUBMISSION OF THIS LOUISIANA UNIFORM PUBLIC WORK BID FORM:

* The Unit Price Form shall be used if the contract includes unit prices. Otherwise it is not required and need not be included with the form. The number of unit prices that may be included is not limited and additional sheets may be included if needed.

**** A CORPORATE RESOLUTION OR WRITTEN EVIDENCE** of the authority of the person signing the bid for the public work as prescribed by LA R.S. 38:2212(B)(5).

BID SECURITY in the form of a bid bond, certified check or cashier's check as prescribed by LA R.S. 38:2218(A) attached to and made a part of this bid.

BID BOND
FOR
YWCA Greater New Orleans

Date:_____

KNOW ALL MEN BY THESE PRESENTS:

That _____of
, as Principal, and_____, as Surety, are held and firmly bound unto YWCA Greater New Orleans (Obligee), in the full and just sum of five (5%) percent of the total amount of this proposal, including all alternates, lawful money of the United States, for payment of which sum, well and truly be made, we bind ourselves, our heirs, executors, administrators, successors and assigns, jointly and severally firmly by these presents.

Surety represents that it is listed on the current U.S. Department of the Treasury Financial Management Service list of approved bonding companies as approved for an amount equal to or greater that the amount for which it obligates itself in this instrument or that it is a Louisiana domiciled insurance company with at least an A-rating in the latest printing of the A.M. Best's Key Rating Guide. If surety qualifies by virtue of its Best's listing, the Bond amount may not exceed ten percent of policyholders' surplus as shown in the latest A.M. Best's Key Rating Guide.

Surety further represents that it is licensed to do business in the State of Louisiana and that this Bond is signed by surety's agent or attorney-in-fact. This Bid Bond is accompanied by appropriate power of attorney.

THE CONDITION OF THIS OBLIGATION IS SUCH that, whereas said Principal shall, within such time as may be specified, enter into the Contract in writing and give a good and sufficient bond to secure the performance of the terms and conditions of the Contract with surety acceptable to the Obligee, then this obligation shall be void; otherwise this obligation shall become due and payable.

_____

PRINCIPAL (BIDDER) SURETY

BY:_____ BY:_____
AUTHORIZED OFFICER-OWNER-PARTNER AGENT OR
ATTORNEY-IN-FACT(SEAL)

DRAFT

AIA® Document A101® – 2017

Standard Form of Agreement Between Owner and Contractor

where the basis of payment is a Stipulated Sum

AGREEMENT made as of the « » day of «» in the year Two Thousand Twenty-three»
(In words, indicate day, month and year.)

BETWEEN the Owner:
(Name, legal status, address and other information)

YWCA Greater New Orleans
601- 605 South Norman C. Francis Parkway
New Orleans, LA 70119
« »
« »

and the Contractor:
(Name, legal status, address and other information)

« »
« »
« »

for the following Project:
(Name, location and detailed description)

«YWCA Greater New Orleans»
«New Orleans, LA»
601-605 South Norman C. Francis Parkway
New Orleans, LA 70119
»

The Architect:
(Name, legal status, address and other information)

«Trapolin-Peer Architects»«, Professional Corporation»
«850 Tchoupitoulas Street
New Orleans, LA 70130»
«Telephone Number: 504-523-2772»
«Fax Number: 504-523-3081»

The Owner and Contractor agree as follows.

ADDITIONS AND DELETIONS: The author of this document has added information needed for its completion. The author may also have revised the text of the original AIA standard form. An *Additions and Deletions Report* that notes added information as well as revisions to the standard form text is available from the author and should be reviewed.

This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

The parties should complete A101®–2017, Exhibit A, Insurance and Bonds, contemporaneously with this Agreement. AIA Document A201®–2017, General Conditions of the Contract for Construction, is adopted in this document by reference. Do not use with other general conditions unless this document is modified.

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ARTICLE 1 THE CONTRACT DOCUMENTS

The Contract Documents consist of this Agreement, Conditions of the Contract (General, Supplementary, and other Conditions), Drawings, Specifications, Addenda issued prior to execution of this Agreement, other documents listed in this Agreement, and Modifications issued after execution of this Agreement, all of which form the Contract, and are as fully a part of the Contract as if attached to this Agreement or repeated herein. The Contract represents the entire and integrated agreement between the parties hereto and supersedes prior negotiations, representations, or agreements, either written or oral. An enumeration of the Contract Documents, other than a Modification, appears in Article 9.

ARTICLE 2 THE WORK OF THIS CONTRACT

The Contractor shall fully execute the Work described in the Contract Documents, except as specifically indicated in the Contract Documents to be the responsibility of others.

ARTICLE 3 DATE OF COMMENCEMENT AND SUBSTANTIAL COMPLETION

§ 3.1 The date of commencement of the Work shall be:
(Check one of the following boxes.)

[« »] The date of this Agreement.

[« »] A date set forth in a notice to proceed issued by the Owner.

[« X »] Established as follows:
(Insert a date or a means to determine the date of commencement of the Work.)

Notwithstanding any other provisions in any of the Contract Documents, the date of commencement of the Work shall be the date set forth in a written notice to proceed issued by Owner to Contractor on or before TBD. If no notice to proceed is issued by Owner to Contractor on or before TBD, then the Contract shall automatically terminate, and neither Owner nor Contractor shall have any obligation to the other under the Contract. Contractor acknowledges and agrees that Owner may decline to issue a notice to proceed for any reason or no reason in its sole discretion. In light of the foregoing, Contractor shall not enter into any subcontracts or purchase orders or otherwise incur any costs related to the Work or the Project unless and until Owner issues a written notice to proceed to Contractor. Contractor further acknowledges and agrees that Owner may decide, for any reason or no reason, to terminate the Contract for convenience without cause as set forth in Article 14.4 of the General Conditions of the Contract for Construction (AIA Document A201-2017), as amended by the

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Supplementary Conditions Document 00 73 00, prior to issuing a notice to proceed, and in that case, Owner shall not owe Contractor any payment or termination fee as no Work will be executed prior to issuance of a notice to proceed.

If a date of commencement of the Work is not selected, then the date of commencement shall be the date of this Agreement.

§ 3.2 The Contract Time shall be measured from the date of commencement of the Work.

§ 3.3 Substantial Completion

§ 3.3.1 Subject to adjustments of the Contract Time as provided in the Contract Documents, the Contractor shall achieve Substantial Completion of the entire Work:
(Check one of the following boxes and complete the necessary information.)

[« »] Not later than « » (« ») calendar days from the date of commencement of the Work.

[« »] By the following date: TBD

§ 3.3.2 Subject to adjustments of the Contract Time as provided in the Contract Documents, if portions of the Work are to be completed prior to Substantial Completion of the entire Work, the Contractor shall achieve Substantial Completion of such portions by the following dates:

Portion of Work	Substantial Completion Date

§ 3.3.3 If the Contractor fails to achieve Substantial Completion as provided in this Section 3.3, liquidated damages, if any, shall be assessed as set forth in Section 4.5.

ARTICLE 4 CONTRACT SUM

§ 4.1 The Owner shall pay the Contractor the Contract Sum in current funds for the Contractor's performance of the Contract. The Contract Sum shall be « » ($ «»), subject to additions and deductions as provided in the Contract Documents.

§ 4.2 Alternates

§ 4.2.1 Alternates, if any, included in the Contract Sum:

Item	Price
Alternate #1, #2. #3	

§ 4.2.2 Subject to the conditions noted below, the following alternates may be accepted by the Owner following execution of this Agreement. Upon acceptance, the Owner shall issue a Modification to this Agreement.
(Insert below each alternate and the conditions that must be met for the Owner to accept the alternate.)

Item	Price	Conditions for Acceptance

§ 4.3 Allowances, if any, included in the Contract Sum:
(Identify each allowance.)

Item	Price

§ 4.4 Unit prices, if any:
(Identify the item and state the unit price and quantity limitations, if any, to which the unit price will be applicable.)

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Item	Units and Limitations	Price per Unit ($0.00)

§ 4.5 Liquidated damages, if any:
(Insert terms and conditions for liquidated damages, if any.)

Contractor shall pay as stipulated damages the amount of $1,500.00 (one thousand five hundred dollars) for each consecutive calendar day, including Saturdays, Sundays and holidays, for which the Work is not Substantially Complete after TBD.

§ 4.6 Other:
(Insert provisions for bonus or other incentives, if any, that might result in a change to the Contract Sum.)

« »

ARTICLE 5 PAYMENTS

§ 5.1 Progress Payments

§ 5.1.1 Based upon Applications for Payment submitted to the Architect by the Contractor and Certificates for Payment issued by the Architect, the Owner shall make progress payments on account of the Contract Sum to the Contractor as provided below and elsewhere in the Contract Documents.

§ 5.1.2 The period covered by each Application for Payment shall be one calendar month ending on the last day of the month, or as follows:

« »

§ 5.1.3 Provided that an Application for Payment is received by the Architect not later than the « 15th » day of a month, the Owner shall make payment of the amount certified to the Contractor not later than the « 30th » day of the « the following » month. If an Application for Payment is received by the Architect after the application date fixed above, payment of the amount certified shall be made by the Owner not later than «Sixty » («60 ») days after the Architect receives the Application for Payment.
(Federal, state or local laws may require payment within a certain period of time.)

§ 5.1.4 Each Application for Payment shall be based on the most recent schedule of values submitted by the Contractor in accordance with the Contract Documents. The schedule of values shall allocate the entire Contract Sum among the various portions of the Work. The schedule of values shall be prepared in such form, and supported by such data to substantiate its accuracy, as the Architect may require. This schedule of values shall be used as a basis for reviewing the Contractor's Applications for Payment.

§ 5.1.5 Applications for Payment shall show the percentage of completion of each portion of the Work as of the end of the period covered by the Application for Payment.

§ 5.1.6 In accordance with AIA Document A201™–2017, General Conditions of the Contract for Construction, and subject to other provisions of the Contract Documents, the amount of each progress payment shall be computed as follows:

§ 5.1.6.1 The amount of each progress payment shall first include:

.1 That portion of the Contract Sum properly allocable to completed Work;

.2 That portion of the Contract Sum properly allocable to materials and equipment delivered and suitably stored at the site for subsequent incorporation in the completed construction, or, if approved in advance by the Owner, suitably stored off the site at a location agreed upon in writing; and

.3 That portion of Construction Change Directives that the Architect determines, in the Architect's professional judgment, to be reasonably justified.

§ 5.1.6.2 The amount of each progress payment shall then be reduced by:

.1 The aggregate of any amounts previously paid by the Owner;

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.2 The amount, if any, for Work that remains uncorrected and for which the Architect has previously withheld a Certificate for Payment as provided in Article 9 of AIA Document A201–2017;

.3 Any amount for which the Contractor does not intend to pay a Subcontractor or material supplier, unless the Work has been performed by others the Contractor intends to pay;

.4 For Work performed or defects discovered since the last payment application, any amount for which the Architect may withhold payment, or nullify a Certificate of Payment in whole or in part, as provided in Article 9 of AIA Document A201–2017; and

.5 Retainage withheld pursuant to Section 5.1.7.

§ 5.1.7 Retainage

§ 5.1.7.1 For each progress payment made prior to Substantial Completion of the Work, the Owner may withhold the following amount, as retainage, from the payment otherwise due:
(Insert a percentage or amount to be withheld as retainage from each Application for Payment. The amount of retainage may be limited by governing law.)

« » 10%

§ 5.1.7.1.1 The following items are not subject to retainage:
(Insert any items not subject to the withholding of retainage, such as general conditions, insurance, etc.)

« »

§ 5.1.7.2 Reduction or limitation of retainage, if any, shall be as follows:
(If the retainage established in Section 5.1.7.1 is to be modified prior to Substantial Completion of the entire Work, including modifications for Substantial Completion of portions of the Work as provided in Section 3.3.2, insert provisions for such modifications.)

« »

§ 5.1.7.3 Except as set forth in this Section 5.1.7.3, upon Substantial Completion of the Work, the Contractor may submit an Application for Payment that includes the retainage withheld from prior Applications for Payment pursuant to this Section 5.1.7. The Application for Payment submitted at Substantial Completion shall not include retainage as follows:
(Insert any other conditions for release of retainage upon Substantial Completion.)

« »

§ 5.1.8 If final completion of the Work is materially delayed through no fault of the Contractor, the Owner shall pay the Contractor any additional amounts in accordance with Article 9 of AIA Document A201–2017.

§ 5.1.9 Except with the Owner's prior approval, the Contractor shall not make advance payments to suppliers for materials or equipment which have not been delivered and stored at the site.

§ 5.2 Final Payment

§ 5.2.1 Final payment, constituting the entire unpaid balance of the Contract Sum, shall be made by the Owner to the Contractor when

.1 the Contractor has fully performed the Contract except for the Contractor's responsibility to correct Work as provided in Article 12 of AIA Document A201–2017, and to satisfy other requirements, if any, which extend beyond final payment; and

.2 a final Certificate for Payment has been issued by the Architect.

§ 5.2.2 The Owner's final payment to the Contractor shall be made no later than 30 days after the issuance of the Architect's final Certificate for Payment, or as follows:

60 days after (1) issuance of Architect's final Certificate for Payment, (2) Contractor has provided a certificate demonstrating that no liens have been filed, (3) Contractor and any subcontractors have provided all lien waivers requested by Owner, (4) the period for filing of construction liens has expired, if permitted by law, (5) a Certificate

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of Occupancy has been obtained from the City of New Orleans, and (6) Owner's lender has inspected the Work and found it was completed in a good and workmanlike manner.

§ 5.3 Interest

Payments due and unpaid under the Contract shall bear interest from the date payment is due at the rate stated below, or in the absence thereof, at the legal rate prevailing from time to time at the place where the Project is located.

(Insert rate of interest agreed upon, if any.)

« 0 » % « zero »

ARTICLE 6 DISPUTE RESOLUTION

§ 6.1 Initial Decision Maker

The Architect will serve as the Initial Decision Maker pursuant to Article 15 of AIA Document A201–2017, unless the parties appoint below another individual, not a party to this Agreement, to serve as the Initial Decision Maker.

(If the parties mutually agree, insert the name, address and other contact information of the Initial Decision Maker, if other than the Architect.)

« »
« »
« »
« »

§ 6.2 Binding Dispute Resolution

For any Claim subject to, but not resolved by, mediation pursuant to Article 15 of AIA Document A201–2017, the method of binding dispute resolution shall be as follows:

(Check the appropriate box.)

[« X »] Arbitration pursuant to Section 15.4 of AIA Document A201–2017

[« »] Litigation in a court of competent jurisdiction

[« »] Other *(Specify)*

« »

If the Owner and Contractor do not select a method of binding dispute resolution, or do not subsequently agree in writing to a binding dispute resolution method other than litigation, Claims will be resolved by litigation in a court of competent jurisdiction.

ARTICLE 7 TERMINATION OR SUSPENSION

§ 7.1 The Contract may be terminated by the Owner or the Contractor as provided in Article 14 of AIA Document A201–2017.

§ 7.1.1 If the Contract is terminated for the Owner's convenience in accordance with Article 14 of AIA Document A201–2017, then the Owner shall pay the Contractor a termination fee as follows:

(Insert the amount of, or method for determining, the fee, if any, payable to the Contractor following a termination for the Owner's convenience.)

$0.00 (no termination fee shall be due if the Contract is terminated for the Owner's convenience in accordance with Article 14 of AIA Document A201–2017)

§ 7.2 The Work may be suspended by the Owner as provided in Article 14 of AIA Document A201–2017.

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ARTICLE 8 MISCELLANEOUS PROVISIONS

§ 8.1 Where reference is made in this Agreement to a provision of AIA Document A201–2017 or another Contract Document, the reference refers to that provision as amended or supplemented by other provisions of the Contract Documents.

§ 8.2 The Owner's representative:
(Name, address, email address, and other information)

« »Keely Thibodeaux
Landmark Consulting LLC
525 St. Charles Avenue, Suite 330
New Orleans, LA 70130
« »
« »
« »
« »

§ 8.3 The Contractor's representative:
(Name, address, email address, and other information)

« »

« »
« »
« »
« »
« »

§ 8.4 Neither the Owner's nor the Contractor's representative shall be changed without ten days' prior notice to the other party.

§ 8.5 Insurance and Bonds

§ 8.5.1 The Owner and the Contractor shall purchase and maintain insurance as set forth in AIA Document A101™–2017, Standard Form of Agreement Between Owner and Contractor where the basis of payment is a Stipulated Sum, Exhibit A, Insurance and Bonds, and elsewhere in the Contract Documents.

§ 8.5.2 The Contractor shall provide bonds as set forth in AIA Document A101™–2017 Exhibit A, and elsewhere in the Contract Documents.

§ 8.6 Notice in electronic format, pursuant to Article 1 of AIA Document A201–2017, may be given in accordance with AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, if completed, or as otherwise set forth below:
(If other than in accordance with AIA Document E203–2013, insert requirements for delivering notice in electronic format such as name, title, and email address of the recipient and whether and how the system will be required to generate a read receipt for the transmission.)

« »

§ 8.7 Other provisions:

« »

ARTICLE 9 ENUMERATION OF CONTRACT DOCUMENTS

§ 9.1 This Agreement is comprised of the following documents:

.1 AIA Document A101™–2017, Standard Form of Agreement Between Owner and Contractor
.2 AIA Document A101™–2017, Exhibit A, Insurance and Bonds
.3 AIA Document A201™–2017, General Conditions of the Contract for Construction

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« »

.5 Drawings

Number	Title	Date
See Exhibit "F"		

.6 Specifications

Section	Title	Date	Pages
See Exhibit "F"			

.7 Addenda, if any:

Number	Date	Pages
See Exhibit "F"		

Portions of Addenda relating to bidding or proposal requirements are not part of the Contract Documents unless the bidding or proposal requirements are also enumerated in this Article 9.

.8 Other Exhibits:
(Check all boxes that apply and include appropriate information identifying the exhibit where required.)

[« »] AIA Document E204™–2017, Sustainable Projects Exhibit, dated as indicated below:
(Insert the date of the E204-2017 incorporated into this Agreement.)

« »

[« »] The Sustainability Plan:

Title	Date	Pages

[« X »] Supplementary and other Conditions of the Contract:

Document	Title	Date	Pages
007300	Supplemental Conditions	7/12/2023	13

.9 Other documents, if any, listed below:
(List here any additional documents that are intended to form part of the Contract Documents. AIA Document A201™–2017 provides that the advertisement or invitation to bid, Instructions to Bidders, sample forms, the Contractor's bid or proposal, portions of Addenda relating to bidding or proposal requirements, and other information furnished by the Owner in anticipation of receiving bids or proposals, are not part of the Contract Documents unless enumerated in this Agreement. Any such documents should be listed here only if intended to be part of the Contract Documents.)

«Amendment "A" Standard Form of Agreement between Owner and Contractor AIA document A101-2017

Exhibit "A" Insurance and Bonds

Exhibit "B" CDBG Compliance provisions for Construction Contracts

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Exhibit “C” FEMA Addendum

Exhibit “D” Contractor Limited Statement of Assurances

Exhibit “E” Appendix A, C.F.R. Part 18- Certification regarding Lobbying »

Exhibit “F” Drawings and Specifications by Trapolin-Peer Architects for Project No. CN09418, dated July 12, 2023, including Architectural Drawings A-0.00-A-6.51, Landscape Drawings L1.00-L3.04, Civil Drawings C-0.0-C-8.1, Structural Drawings S1.0A-S3.0, Kitchen Drawing FS-1, Mechanical Drawing M001-M301, Plumbing Drawings P001-P203, Electrical Drawings E001-E501, and Project Specifications including Bidding Requirements and Contract Forms, Division 1-General Requirements, Division 2-Site Construction, Division 3-Concrete, Division 4-Masonry, Division 5-Metals, Division 6- Woods and Plastics, Division 7-Thermal and Moisture Protection, Division 8-Doors and Windows, Division 9-Finishes, Division 10-Specialties, Division 11- Equipment, Division 12- Furnishings, Division 13- Special Construction, Division 14-Conveying Systems, Division 15-Mechanical, Division 16-Electrical, Division 22-Plumbing, Division 31-Earthwork, Division 32-Exterior Improvements, and Addendums XX.

This Agreement entered into as of the day and year first written above.

OWNER *(Signature)*	**CONTRACTOR** *(Signature)*
« »« »	« »« »
(Printed name and title)	*(Printed name and title)*

DRAFT

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AMENDMENT A

AMENDMENT "A"
TBD

STANDARD FORM OF AGREEMENT
BETWEEN OWNER AND CONTRACTOR
AIA DOCUMENT A101 -2017 (TBD)

Owner: YWCA Greater New Orleans
Contractor: TBD

ARTICLE 3

DATE OF COMMENCEMENT AND SUBSTANTIAL COMPLETION

3.1 **Delete the following sentence at end of section:**

If a date of commencement of the Work is not selected, then the date of commencement shall be the date of this Agreement.

ARTICLE 9

ENUMERATION OF CONTRACT DOCUMENTS

9.9.1 Add the following paragraph:

Equal Employment Opportunity

During the performance of this contract and to the extent applicable, Contractor agrees as follows:

9.9.1(1) Contractor will not discriminate against any employee or applicant for employment because of race, color, religion, sex, sexual orientation, gender identity, or national origin. Contractor will take affirmative action to ensure that applicants are employed, and that employees are treated during employment without regard to their race, color, religion, sex, sexual orientation, gender identity, or national origin. Such action shall include, but not be limited to the following:

> Employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. Contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided setting forth the provisions of this nondiscrimination clause.

9.9.1(2) To the extent applicable, Contractor will, in all solicitations or advertisements for

Contractor _____Owner _____

employees placed by or on behalf of the Contractor, state that all qualified applicants will receive consideration for employment without regard to race, color, religion, sex, sexual orientation, gender identity, or national origin.

9.9.1(3) Contractor will not discharge or in any other manner discriminate against any employee or applicant for employment because such employee or applicant has inquired about, discussed, or disclosed the compensation of the employee or applicant or another employee or applicant. This provision shall not apply to instances in which an employee who has access to the compensation information of other employees or applicants as a part of such employee's essential job functions discloses the compensation of such other employees or applicants to individuals who do not otherwise have access to such information, unless such disclosure is in response to a formal complaint or charge, in furtherance of an investigation, proceeding, hearing, or action, including an investigation conducted by the employer, or is consistent with Contractor's legal duty to furnish information.

9.9.1(4) To the extent applicable, Contractor will send to each labor union or representative of workers with which he has a collective bargaining agreement or other contract or understanding, a notice to be provided advising the said labor union or workers' representatives of Contractor's commitments under this section, and shall post copies of the notice in conspicuous places available to employees and applicants for employment.

9.9.1(5) Contractor will comply with all provisions of Executive Order 11246 of September 24, 1965, and of the rules, regulations, and relevant orders of the Secretary of Labor.

9.9.1(6) To the extent applicable, Contractor will furnish all information and reports required by Executive Order 11246 of September 24, 1965, and by rules, regulations, and orders of the Secretary of Labor, or pursuant thereto, and will permit access to his books, records, and accounts by the administering agency and the Secretary of Labor for purposes of investigation to ascertain compliance with such rules, regulations, and orders.

9.9.1(7) In the event of the Contractor's noncompliance with the nondiscrimination clauses of this contract or with any of the said rules, regulations, or orders, this contract may be canceled, terminated, or suspended in whole or in part and Contractor may be declared ineligible for further Government contracts or federally assisted construction contracts in accordance with procedures authorized in Executive Order 11246 of September 24, 1965, and such other sanctions may be imposed and remedies invoked as provided in Executive Order 11246 of September 24, 1965, or by rule, regulation, or order of the Secretary of Labor, or as otherwise provided by law.

9.9.1(8) To the extent applicable, Contractor will include the portion of the sentence immediately preceding paragraph (1) and the provisions of paragraphs (1) through (8) in every subcontract or purchase order unless exempted by rules, regulations, or orders of the Secretary of Labor issued pursuant to section 204 of Executive Order 11246 of September 24, 1965, so that such provisions will be binding upon each subcontractor or vendor. To the extent applicable, Contractor will take such action with respect to any subcontract or purchase order as the administering agency may direct as a means of enforcing such provisions, including sanctions for noncompliance:

Contractor _____Owner _____

Provided, however, that in the event Contractor becomes involved in, or is threatened with, litigation with a subcontractor or vendor as a result of such direction by the administering agency, Contractor may request the United States to enter into such litigation to protect the interests of the United States.

The applicant further agrees that it will be bound by the above equal opportunity clause with respect to its own employment practices when it participates in federally assisted construction work: *Provided,* that if the applicant so participating is a State or local government, the above equal opportunity clause is not applicable to any agency, instrumentality or subdivision of such government which does not participate in work on or under the contract.

The applicant agrees that it will assist and cooperate actively with the administering agency and the Secretary of Labor in obtaining the compliance of contractors and subcontractors with the equal opportunity clause and the rules, regulations, and relevant orders of the Secretary of Labor, that it will furnish the administering agency and the Secretary of Labor such information as they may require for the supervision of such compliance, and that it will otherwise assist the administering agency in the discharge of the agency's primary responsibility for securing compliance.

The applicant further agrees that it will refrain from entering into any contract or contract modification subject to Executive Order 11246 of September 24, 1965, with a contractor debarred from, or who has not demonstrated eligibility for, Government contracts and federally assisted construction contracts pursuant to the Executive Order and will carry out such sanctions and penalties for violation of the equal opportunity clause as may be imposed upon contractors and subcontractors by the administering agency or the Secretary of Labor pursuant to Part II, Subpart D of the Executive Order. In addition, the applicant agrees that if it fails or refuses to comply with these undertakings, the administering agency may take any or all of the following actions: Cancel, terminate, or suspend in whole or in part this grant (contract, loan, insurance, guarantee); refrain from extending any further assistance to the applicant under the program with respect to which the failure or refund occurred until satisfactory assurance of future compliance has been received from such applicant; and refer the case to the Department of Justice for appropriate legal proceedings.

9.9.2 Add the following paragraph:

Byrd Anti-Lobbying Amendment, 31 U.S.C. §1352 (as amended).

During the performance of this contract and to the extent applicable, Contractor agrees as follows:

9.9.2(1) Contractor, and any who apply or bid for this Project for an award of $100,000 or more, shall sign and submit the required certification - APPENDIX A, 44 C.F.R. PART 18 – CERTIFICATION REGARDING LOBBYING – attached and incorporated herein as

Exhibit "E". Further, each tier certifies to the tier above that it will not and has not used Federal appropriated funds to pay any person or organization for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, officer or employee of Congress, or an employee of a Member of Congress in connection with obtaining any Federal contract, grant, or any other award covered by 31 U.S.C. § 1352. Each tier shall also disclose any lobbying with non-Federal funds that takes place in connection with obtaining any Federal award. Such disclosures are forwarded from tier to tier up to the recipient who in turn will forward the certification(s) to the awarding agency.

9.9.3 Add the following paragraph:

Disbarment and Suspension

9.9.3(1) This contract is a covered transaction for purposes of 2 C.F.R. pt. 180 and 2 C.F.R. pt. 3000. As such, Contractor is required to verify that none of Contractor's principals (defined at 2 C.F.R. § 180.995) or its affiliates (defined at 2 C.F.R. § 180.905) are excluded (defined at 2 C.F.R. § 180.940) or disqualified (defined at 2 C.F.R. § 180.935).

9.9.3(2) Contractor must comply with 2 C.F.R. pt. 180, subpart C and 2 C.F.R. pt. 3000, subpart C, and must include a requirement to comply with these regulations in any lower tier covered transaction it enters into.

9.9.3(3) This certification is a material representation of fact relied upon by Owner. If it is later determined that Contractor did not comply with 2 C.F.R. pt. 180, subpart C and 2 C.F.R. pt. 3000, subpart C, in addition to remedies available to Owner, the Federal Government may pursue available remedies, including but not limited to suspension and/or debarment.

9.9.3(4) The bidder or proposer agrees to comply with the requirements of 2 C.F.R. pt. 180, subpart C and 2 C.F.R. pt. 3000, subpart C while this offer is valid and throughout the period of any contract that may arise from this offer. The bidder or proposer further agrees to include a provision requiring such compliance in its lower tier covered transactions.

EXHIBIT B

CDBG COMPLIANCE PROVISIONS

EXHIBIT B

COMMUNITY DEVELOPMENT BLOCK GRANT PROGRAM
DISASTER RECOVERY RIDER
&
CDBG COMPLIANCE PROVISIONS FOR CONSTRUCTION CONTRACTS
&
DAVIS-BACON DOCUMENTS
&
CDBG SECTION 3 REQUIREMENTS

Section 01000 – Community Development Block Grant Program Disaster Recovery Rider and CDBG Compliance Provisions for Construction Contracts

Section 01010 – Federal Wage Decision

Section 01011 – Davis-Bacon and Labor Standards Contractor Guide Addendum

Section 01020 – Section 3 General Information

Section 01021 – Section 3 Frequently Asked Questions

Section 01022 – Certification of **Prime Contractor** Regarding Section 3 and Segregated Facilities

Section 01023 – Certification of **Subcontractor** Regarding Section 3 and Segregated Facilities

Section 01024 – Contractor Section 3 Plan

Section 01025 – Section 3 Worker Self Certification

Section 01026 – Section 3 Worker Employer Certification Form

Section 01027 – Section 3 Business Concern Contractor/Subcontractor Certification

Section 01028 – Section 3 Activity and Good Faith Efforts Quarterly Report

Section 01029 - Section 3 Utilization Final Report

SECTION 01000

COMMUNITY DEVELOPMENT BLOCK GRANT PROGRAM DISASTER RECOVERY RIDER

YWCA Greater New Orleans
New Daycare, Education & Counseling Building

Community Development Block Grant Program Disaster Recovery Rider
&
CDBG Compliance Provisions For Construction Contracts

This Community Development Block Grant Program Rider contains supplementary general conditions for use with procurement contracts and subrecipient agreements that are funded in whole or in part by the U.S. Department of Housing and Urban Development ("HUD") under Title I of the Housing and Community Development Act of 1974 (Pub. L. 93-383) as amended.

For all procurement contracts and subrecipient agreements funded fully or in part by the Community Development Block Grant Disaster Recovery ("CDBG-DR") Program by and between the *YWCA Greater New Orleans*, State of Louisiana, acting herein by Loyce Pierce Wright, President of the Board of Directors, YWCA Greater New Orleans hereunto duly authorized, and [*contractor*], a [*type of business (partnership, corporation)*] organized under the laws of the State of Louisiana, acting herein by [*name*], [Chief Executive Officer or appointed representative], hereunto duly authorized; this CDBG Rider will serve as a universal addendum to each of those contracts and/or agreements.

This Rider must be signed separately as a stand-alone document, and the terms and provisions outlined herein will be applicable to all contracts and agreements between *YWCA Greater New Orleans*, and [*Contractor*] in which CDBG-DR grant funds are a funding source.

FEDERAL REGISTER NOTICES

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT

Federal Register Notices applicable to the use of CDBG-DR Funds for all associated grants are available on the HUD Web site at:
https://www.hudexchange.info/programs/cdbg-dr/cdbg-dr-laws-regulations-and-federal-register-notices/

CDBG COMPLIANCE PROVISIONS

for

CONSTRUCTION CONTRACTS

(These provisions must be included in all construction contracts)

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44. AUTHORIZATION

1. EQUAL EMPLOYMENT OPPORTUNITY (Equal Opportunity Clause)
(Applicable to contracts and subcontracts above $10,000)

During the performance of this contract, the Contractor agrees as follows:

A. The Contractor will not discriminate against any employee or applicant for employment because of race, color, religion, sex, or national origin. The Contractor will take affirmative action to ensure that applicants are employed, and that employees are treated during employment, without regard to their race, color, religion, sex, sexual orientation, gender identity or national origin. Such action shall include, but not be limited to, the following:

Employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. The Contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided setting forth the provisions of this nondiscrimination clause.

B. The Contractor will, in all solicitations or advertisements for employees placed by or on behalf of the Contractor, state that all qualified applicants will receive consideration for employment without regard to race, color, religion, sex, sexual orientation, gender identity, or national origin.

C. The contractor will not discharge or in any other manner discriminate against any employee or applicant for employment because such employee or applicant has inquired about, discussed, or disclosed the compensation of the employee or applicant or another employee or applicant. This provision shall not apply to instances in which an employee who has access to the compensation information of other employees or applicants as a part of such employee's essential job functions discloses the compensation of such other employees or applicants to individuals who do not otherwise have access to such information, unless such disclosure is in response to a formal complaint or charge, in furtherance of an investigation, proceeding, hearing, or action, including an investigation conducted by the employer, or is consistent with the contractor's legal duty to furnish information.

D. The Contractor will send to each labor union or representative of workers with which he has a collective bargaining agreement or other contract or understanding, a notice to be provided advising the said labor union or workers' representatives of the Contractor's commitment under this section, and shall post copies of the notice in conspicuous places available to employees and applicants for employment.

E. The Contractor will comply with all provisions of Executive Order 11246 of September 24, 1965, as amended, and the rules, regulations, and relevant orders of the Secretary of Labor.

F. The Contractor will furnish all information and reports required by Executive Order 11246 of September 24, 1965, as amended, and by rules, regulations, and orders of the Secretary of Labor, or pursuant thereto, and will permit access to his books, records, and accounts by the administering agency and the Secretary of Labor for purposes of investigation to ascertain compliance with such rules, regulations, and others.

G. In the event of the Contractor's noncompliance with the non-discrimination clauses of this contract or with any of the said rules, regulations, or orders, this contract may be cancelled, terminated, or suspended in whole or in part and the Contractor may be declared ineligible for

further Government contracts or federally assisted construction contracts in accordance with procedures authorized in Executive Order 11246 of September 24, 1965, and such other sanctions may be imposed and remedies invoked as provided in Executive Order 11246 of September 24, 1965, or by rule, regulation, or by rule, regulation, or order of the Secretary of Labor, or as otherwise provided by law.

H. The Contractor will include the provisions of the sentence immediately preceding paragraph A and the provisions of paragraphs A through H in every subcontract or purchase order unless exempted by rules, regulations, or orders of the Secretary of Labor issued pursuant to Section 204 of Executive Order 11246 of September 24, 1965, so that such provisions will be binding upon each subcontractor or vendor. The Contractor will take such action with respect to any subcontract or purchase order as administering agency may be direct as a means of enforcing such provisions, including sanctions for noncompliance:

Provided, however, that in the event a contractor becomes involved in, or is threatened with, litigation with a subcontractor or vendor as a result of such direction by the administering agency, the Contractor may request the United States to enter into such litigation to protect the interest of the United States.

2. <u>STANDARD FEDERAL EQUAL EMPLOYMENT OPPORTUNITY CONSTRUCTION CONTRACT SPECIFICATIONS</u>

(Applicable to contracts and subcontracts above $10,000)

A. As used in these specifications:

(1) "Covered area" means the geographical area described in the solicitation from which this contract resulted;

(2) "Director" means Director, Office of Federal Contract Compliance Programs, United States Department of Labor, or any person to whom the Director delegates authority;

(3) "Employer identification number" means the Federal Social Security number used on the Employer's Quarterly Federal Tax Return, U.S. Treasury Department Form 941.

(4) "Minority" includes:

(a) Black (all persons having origins in any of the Black African racial groups not of Hispanic origin);

(b) Hispanic (all persons of Mexican, Puerto Rican, Cuban, Central or South America or other Spanish Culture or origin, regardless of race);

(c) Asian and Pacific Islander (all persons having origins in any of the original people of the Far East, Southeast Asia, the Indian Subcontinent, or the Pacific Islands); and

(d) American Indian or Alaskan Native (all persons having origins in any of the original peoples of North America and maintaining identifiable tribal affiliations through membership and participation or community identification).

B. When the Contractor, or any subcontractor, at any tier, subcontracts a portion of the work involving any construction trade, it shall physically include in each subcontract, in excess of $10,000, the provisions of these specifications and the Notice which contains the applicable goals for minority and female participation and which is set forth in the solicitations from which this contract resulted.

C. If the Contractor is participating (pursuant to 41 CFR 60-4.5) in a Hometown Plan approved by the U.S. Department of Labor in the covered area either individually or through an association, its affirmative action obligations on all work in the Plan area (including goals and timetables) shall be in accordance with that Plan for those trades which have unions participating in the Plan. Contractors must be able to demonstrate their participation in compliance with the provisions of any such Hometown Plan. Each Contractor or subcontractor participating in an approved Plan is individually required to comply with its obligations under the EEO clause, and to make a good faith effort to achieve each goal under the Plan in each trade in which it has employees. The overall good faith performance by other Contractors or subcontractors toward a goal in an approved Plan does not excuse any covered Contractor's or subcontractor's failure to take good faith efforts to achieve the Plan goals and timetables.

D. The Contractor shall implement the specific affirmative action standards provided in paragraphs G(1) through G(16) of these specifications. The goals set forth in the solicitation from which this contract resulted are expressed as percentages of the total hours of employment and training of minority and female utilization the Contractor should reasonably be able to achieve in each construction trade in which it has employees in the covered area. Covered construction contractors performing contracts in geographical areas where they do not have a federal or federally-assisted construction contract shall apply the minority and female goals established for the geographic area where the contract is being performed. Goals are published periodically in the Federal Register in notice form and such notices may be obtained from any Office of Federal Contract Compliance Programs office or from Federal procurement contracting officers. The Contractor is expected to make substantially uniform progress in meeting its goals in each craft during the period specified.

E. Neither the provisions of any collective bargaining agreement, nor the failure by a union with whom the Contractor has a collective bargaining agreement, to refer either minorities or women shall excuse the Contractor's obligations under these specifications, Executive Order 11246, or the regulations promulgated pursuant thereto.

F. In order for the non-working training hours of apprentices and trainees to be counted in meeting the goals, such apprentices and trainees must be employed by the Contractor during the training period, and the Contractor must have made a commitment to employ the apprentices and trainees at the completion of their training, subject to the availability of employment opportunities. Trainees must be trained pursuant to training programs approved by the U.S. Department of Labor.

G. The Contractor shall take specific affirmative action to ensure equal employment opportunity. The evaluation of the Contractor's compliance with these specifications shall be based upon its effort to achieve maximum results from its actions. The Contractor shall document these efforts fully, and shall implement affirmative action steps at least as extensive as the following:

(1) Ensure and maintain a working environment free of harassment, intimidation, and coercion at all sites, and in all facilities at which the Contractor's employees are assigned to

work. The Contractor, where possible, will assign two or more women to each construction project. The Contractor shall specifically ensure that all foremen, superintendents and other on-site supervisory personnel are aware of and carry out the Contractor's obligation to maintain such a working environment, with specific attention to minority or female individuals working at such sites or in such facilities.

(2) Establish and maintain a current list of minority and female recruitment sources, provide written notification to minority and female recruitment sources and to community organizations when the Contractor or its unions have employment opportunities available, and maintain a record of the organization's responses.

(3) Maintain a current file of the names, addresses, and telephone numbers of each minority and female off-the-street applicant and minority or female referral from a union, a recruitment source, or community organization and of what action was taken with respect to each such individual. If such individual was sent to the union hiring hall for referral and was not referred back to the Contractor by the union or, if referred, not employed by the Contractor, this shall be documented in the file with the reason therefore, along with whatever additional actions the Contractor may have taken.

(4) Provide immediate written notification to the Director when the union or unions with which the Contractor has a collective bargaining agreement have not referred to the Contractor a minority person or woman sent by the Contractor, or when the Contractor has other information that the union referral process has impeded the Contractor's efforts to meet its obligations.

(5) Develop on-the-job training opportunities and/or participate in training programs for the area which expressly includes minorities and women, including upgrading programs and apprenticeship and trainee programs relevant to the Contractor's employment needs, especially those programs funded or approved by the Department of Labor. The Contractor shall provide notice of these programs to the sources compiled under G(2) above.

(6) Disseminate the Contractor's EEO policy by providing notice of the policy to unions and training programs and requesting their cooperation in assisting the Contractor in meeting its EEO obligations; by including it in any policy manual and collective bargaining agreement; by publicizing it in the company newspaper, annual report, etc.; by specific review of the policy with all management personnel and with all minority and female employees at least once a year; and by posting the company EEO policy on a bulletin board accessible to all employees at each location where construction work is performed.

(7) Review, at least annually, the company's EEO policy and affirmative action obligations under these specifications with all employees having any responsibility for hiring, assignment, layoff, termination, or other employment decisions including specific review of these items with on-site supervisory personnel such as Superintendents, General Foreman, etc., prior to the initiation of construction work at any job site. A written record shall be made and maintained identifying the time and place of these meetings, persons attending, subject matter discussed, and disposition of the subject matter.

(8) Disseminate the Contractor's EEO policy externally by including it in any advertising in the news media, specifically including minority and female news media, and providing written

notification to and discussing the Contractor's EEO policy with other Contractors and Subcontractors with whom the Contractor does or anticipates doing business.

(9) Direct its recruitment efforts, both oral and written, to minority, female and community organizations, to schools with minority and female students and to minority and female recruitment and training organizations serving the Contractor's recruitment area and employment needs. Not later than one month prior to the date for acceptance of applications for apprenticeship or other training by any recruitment source, the Contractor shall send written notification to organizations such as the above, describing the openings, screening procedures, and tests to be used in the selection process.

(10) Encourage present minority and female employees to recruit other minority persons and women and, where reasonable, provide after school, summer, and vacation employment to minority and female youth both on the site and in other areas of a Contractor's work force.

(11) Validate all tests and other selection requirements where there is an obligation to do so under 41 CFR Part 60-3.

(12) Conduct, at least annually, an inventory and evaluation of all minority and female personnel for promotional opportunities and encourage these employees to seek or to prepare for, through appropriate training, etc., such opportunities.

(13) Ensure that seniority practices, job classifications, work assignments and other personnel practices, do not have a discriminatory effect by continually monitoring all personnel and employment related activities to ensure that the EEO policy and the Contractor's obligations under these specifications are being carried out.

(14) Ensure that all facilities and company activities are nonsegregated except that separate or single-user toilet and necessary changing facilities shall be provided to assure privacy between the sexes.

(15) Document and maintain a record of all solicitations of offers for subcontracts from minority and female construction contractors and suppliers, including circulation of solicitation to minority and female contractor associations and other business associations.

(16) Conduct a review, at least annually, of all supervisors' adherence to and performance under the Contractor's EEO policies and affirmative action obligations.

H. Contractors are encouraged to participate in voluntary associations which assist in fulfilling one or more of their affirmative action obligations (G(1) through G(16)). The efforts of a contractor association, joint contractor-union, contractor-community, or other similar group of which the Contractor is a member and participant, may be asserted as fulfilling any one or more of its obligations under G(1) through G(16) of these specifications provided that the Contractor actively participates in the group, makes every effort to assure that the group has a positive impact on the employment of minorities and women in the industry, ensures that the concrete benefits of the program are reflected in the Contractor's minority and female workforce participation, makes a good faith effort to meet its individual goals and timetables, and can provide access to documentation which demonstrates the effectiveness of actions taken on behalf of the Contractor. The obligation shall not be a defense for the Contractor's non-compliance.

I. A single goal for minorities and a separate single goal for women has been established. The Contractor, however, is required to provide equal employment opportunity and to take affirmative action for all minority groups, both male and female, and all women, both minority and non-minority. Consequently, the Contractor may be in violation of the Executive Order if a particular group is employed in a substantially disparate manner (for example, even though the Contractor has achieved its goals for women generally, the Contractor may be in violation of the Executive Order if a specific minority group of women is underutilized).

J. The Contractor shall not use the goals and timetables or affirmative action standards to discriminate against any persons because of race, color, religion, sex, or national origin.

K. The Contractor shall not enter into any subcontract with any person or firm debarred from government contracts pursuant to E.O. 11246.

L. The Contractor shall carry out such sanctions and penalties for violation of these specifications and of the Equal Opportunity Clause including suspension, termination, and cancellation of existing subcontracts as may be imposed or ordered pursuant to E.O. 11246, as amended.

M. The Contractor, in fulfilling its obligations under these specifications, shall implement specific affirmative action steps, at least as extensive as those standards prescribed in paragraph G of these specifications, so as to achieve maximum results from its efforts to ensure equal employment opportunity. If the Contractor fails to comply with the requirements of the Executive Order, the implementing regulations, or these specifications, the Director shall proceed in accordance with 41 CFR 60-4.8.

N. The Contractor shall designate a responsible official to monitor all employment related activity to ensure that the company EEO policy is being carried out, to submit reports relating to the provisions hereof as may be required by the government and to keep records. Records shall at least include for each employee, the name, address, telephone numbers, construction trade, union affiliation if any, employee identification number where assigned, social security number, race, sex, status (e.g., mechanic, apprenticeship trainee, helper, or laborer), dates of changes in status, hours worked per week in the indicated trade, rate of pay, and location at which the work was performed. Records shall be maintained in an easily understandable and retrievable form; however, to the degree that existing records satisfy this requirement, Contractors shall not be required to maintain separate records.

O. Nothing herein provided shall be construed as a limitation upon the application of other laws which establish different standards of compliance or upon the application or requirements for the hiring of local or other area residents (e.g., those under the Public Works Employment Act of 1977 and the Community Development Block Grant Program).

3. <u>NOTICE OF REQUIREMENT FOR AFFIRMATIVE ACTION</u>
(Applicable to contracts and subcontract over $10,000)

A. The Offeror’s or Bidder's attention is called to the "Equal Opportunity Clause" and the "Standard Federal Equal Employment Opportunity Construction Contract Specifications" set forth herein.

B. The goals and timetables for minority and female participation, expressed in percentage terms for the Contractor's aggregate workforce in each trade on all construction work in the covered area, are as follows:

Goals for minority participation: *(see table below)*

Goals for female participation: 6.9%

These goals are applicable to all the Contractor's construction work (whether or not it is federal or federally assisted) performed in the covered area. If the contractor performs construction work in a geographic area located outside of the covered area, it shall apply the goals established for such geographic area where the work is actually performed. With regard to this second area, the Contractor also is subject to the goals for both its federally involved and non-federally involved construction.

The Contractor's compliance with the Executive Order and the regulations in 41 CFR Part 60-4 shall be based on its implementation of the Equal Opportunity Clause, specific affirmative action obligations required by the specifications set forth in 41 CFR 60-4.3 (a) and its efforts to meet the goals established for the geographical area where the contract resulting from this solicitation is to be performed. The hours of minority and female employment and training must be substantially uniform throughout the length of the contract, and in each trade, and the Contractor shall make a good faith effort to employ minorities and women evenly on each of its projects. The transfer of minority or female employees or trainees from Contractor to Contractor or from project to project for the sole purpose of meeting the Contractor's goals shall be a violation of the contract, the Executive Order, and the regulations in 41 CFR Part 60-4. Compliance with the goals will be measured against the total work hours performed.

MINORITY PARTICIPATION GOALS

PARISH	MIN. GOAL (%)	PARISH	MIN. GOAL (%)	PARISH	MIN. GOAL (%)	PARISH	MIN. GOAL (%)
Acadia	24.1	E. Baton Rouge	26.1	Madison	27.9	St. Landry	24.1
Allen	17.8	East Carroll	27.9	Morehouse	27.9	St. Martin	24.1
Ascension	26.1	East Feliciana	30.4	Natchitoches	29.3	St. Mary	24.1
Assumption	27.7	Evangeline	24.1	Orleans	31.0	St. Tammany	31.0
Avoyelles	29.3	Franklin	27.9	Ouachita	22.8	Tangipahoa	27.7
Beauregard	17.8	Grant	25.7	Plaquemines	27.7	Tensas	27.9
Bienville	29.3	Iberia	24.1	Pointe Coupee	30.4	Terrebonne	27.7
Bossier	29.3	Iberville	30.4	Rapides	25.7	Union	27.9
Caddo	29.3	Jackson	27.9	Red River	29.3	Vermilion	24.1
Calcasieu	19.3	Jefferson	31.0	Richland	27.9	Vernon	17.8
Caldwell	27.9	Jefferson Davis	17.8	Sabine	29.3	Washington	27.7
Cameron	17.8	Lafayette	20.6	St. Bernard	31.0	Webster	29.3
Catahoula	27.9	Lafourche	27.7	St. Charles	27.7	W. Baton Rouge	26.1
Claiborne	29.3	LaSalle	27.9	St. Helena	30.4	West Carroll	27.9
Concordia	30.4	Lincoln	27.9	St. James	27.7	West Feliciana	30.4
De Soto	29.3	Livingston	26.1	St. John the Baptist	27.7	Winn	29.3

C. The Contractor shall provide written notification to the Director of the Office of Federal Contract Compliance Programs within 10 working days of award of any construction subcontract in

excess of $10,000 at any tier for construction work under the contract resulting from this solicitation. The notification shall list the name, address, and telephone number of the subcontractor; employer identification number; estimated dollar amount of the subcontract; estimated starting and completion dates of the sub-contract; and the geographical area in which the contract is to be performed.

D. As used in this Notice, and in the contract resulting from this solicitation, the "covered area" is *(insert description of the geographical areas where the contract is to be performed, giving the State, parish, and city, if any)*:

4. CERTIFICATION OF NONSEGREGATED FACILITIES

(Applicable to contracts and subcontracts over $10,000)

By the submission of this bid, the bidder, offeror, applicant or subcontractor certifies that he/she does not maintain or provide for his/her establishments, and that he/she does not permit employees to perform their services at any location, under his/her control, where segregated facilities are maintained. He/she certifies further that he/she will not maintain or provide for employees any segregated facilities at any of his/her establishments, and he/she will not permit employees to perform their services at any location under his/her control where segregated facilities are maintained. The bidder, offeror, applicant or subcontractor agrees that a breach of this certification is a violation of the equal opportunity clause of this contract.

As used in this certification, the term "segregated facilities" means any waiting rooms, work areas, rest rooms and wash rooms, restaurants and other eating areas, time clocks, locker rooms, and other storage or dressing areas, parking lots, drinking fountains, recreation or entertainment areas, transportation and housing facilities provided for employees which are segregated by explicit directive or are, in fact, segregated on the basis of race, color, religion, or national origin because of habit, local custom, or any other reason.

He/she further agrees that (except where he/she has obtained for specific time periods) he/she will obtain identical certification from proposed subcontractors prior to the award of subcontracts exceeding $10,000 which are not exempt from the provisions of the equal opportunity clause; that he/she will retain such certifications in his/her files; and that he/she will forward the following notice to such proposed subcontractors (except where proposed subcontractors have submitted identical certifications for specific time periods).

5. CIVIL RIGHTS

The Contractor shall comply with the provisions of Title VI of the Civil Rights Act of 1964. No person shall, on the grounds of race, color, or national origin, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving federal financial assistance.

6. SECTION 109 OF THE HOUSING AND COMMUNITY DEVELOPMENT ACT OF 1974

The Contractor shall comply with the provisions of Section 109 of the Housing and Community Development Act of 1974. No person in the United States shall on the grounds of race, color, national origin, or sex be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity funded in whole or in part with funds made available under this title. Section 109 further provides that discrimination on the basis of age under the Age

Discrimination Act of 1975 or with respect to an otherwise qualified handicapped individual as provided in Section 504 of the Rehabilitation Act of 1973, as amended, is prohibited.

7. SECTION 3 OF THE HOUSING AND URBAN DEVELOPMENT ACT OF 1968 - COMPLIANCE IN EMPLOYMENT AND TRAINING

The work to be performed under this Contract, including services performed under any related subcontract or subrecipient agreement, is subject to the requirements of Section 3 of the Housing and Urban Development Act of 1968, as amended, 12 U.S.C. 1701u (Section 3), 24 CFR §75, and 85 FR 61562, and any directives, benchmarks and programmatic requirements hereafter issued by HUD or OCD in the implementation of Section 3 requirements.

A. Section 3 requires that to the greatest extent feasible, and consistent with existing Federal, state, and local laws and regulations, recipients of CDBG assistance shall ensure that employment and training opportunities arising in connection with Section 3 projects are provided to Section 3 workers within the metropolitan area (or nonmetropolitan county) in which the project is located.

B. Section 3 also requires that to the greatest extent feasible, and consistent with existing Federal, state, and local laws and regulations, recipients covered by this subpart shall ensure contracts for work awarded in connection with Section 3 projects are provided to business concerns that provide economic opportunities to Section 3 workers residing within the metropolitan area (or nonmetropolitan county) in which the project is located.

C. The parties to this contract agree to comply with HUD's regulations in 24 CFR part 75, which implement Section 3. As evidenced by their execution of this contract, the parties to this contract certify that they are under no contractual or other impediment that would prevent them from complying with the part 75 regulations.

D. The contractor agrees, to the greatest extent feasible, take steps to achieve the Section 3 benchmarks established by HUD for Section 3 workers and Targeted Section 3 workers. Section 3 benchmarks will consist of the following two ratios: (i) The number of labor hours worked by Section 3 workers divided by the total number of labor hours worked by all workers on a Section 3 project. (ii) The number of labor hours worked by Targeted Section 3 workers as defined in § 75.21(a), divided by the total number of labor hours worked by all workers on a Section 3 project.

E. The contractor agrees to report in a manner prescribed by the Owner, (i) The total number of labor hours worked; (ii) The total number of labor hours worked by Section 3 workers; and (iii) The total number of labor hours worked by Targeted Section 3 workers.

F. If the contractor fails to achieve the HUD Section 3 benchmarks, the contractor must report in a form prescribed by the Owner on the qualitative nature of its activities and those of its subcontractors. Such qualitative efforts may, for example, include but are not limited to the following:

(1) Outreach efforts to generate job applicants who are Targeted Section 3 workers.

(2) Provided training or apprenticeship opportunities.

(3) Provided technical assistance to help Section 3 workers compete for jobs (*e.g.,* resume assistance, coaching).

(4) Provided or connected Section 3 workers with assistance in seeking employment including: drafting resumes, preparing for interviews, and finding job opportunities connecting residents to job placement services.

(5) Held one or more job fairs.

(6) Provided or referred Section 3 workers to services supporting work readiness and retention (*e.g.,* work readiness activities, interview clothing, test fees, transportation, child care).

(7) Provided assistance to apply for/or attend community college, a four-year educational institution, or vocational/technical training.

(8) Assisted Section 3 workers to obtain financial literacy training and/or coaching.

(9) Engaged in outreach efforts to identify and secure bids from Section 3 business concerns.

(10) Provided technical assistance to help Section 3 business concerns understand and bid on contracts.

(11) Divided contracts into smaller jobs to facilitate participation by Section 3 business concerns.

(12) Provided bonding assistance, guaranties, or other efforts to support viable bids from Section 3 business concerns.

(13) Promoted use of business registries designed to create opportunities for disadvantaged and small businesses.

(14) Outreach, engagement, or referrals with the state one-stop system as defined in Section 121(e)(2) of the Workforce Innovation and Opportunity Act.

G. The contractor agrees to include these Section 3 contract provisions in every subcontract subject to compliance with regulations in 24 CFR part 75 and agrees to take appropriate action, as provided in an applicable provision of the subcontract upon a finding that the subcontractor is in violation of the regulations in 24 CFR part 75. The contractor will not subcontract with any subcontractor where the contractor has notice or knowledge that the subcontractor has been found in violation of the regulations in 24 CFR part 75.

H. Noncompliance with HUD's regulations in 24 CFR part 75 may result in sanctions, termination of this contract for default, and debarment or suspension from future HUD assisted contracts.

8. <u>SECTION 503 OF THE REHABILITATION ACT OF 1973 (29 USC 793)</u>
(Applicable to contracts and subcontracts over $10,000)

A. The contractor will not discriminate against any employee or applicant for employment because of physical or mental disability in regard to any position for which the employee or applicant for employment is qualified. The contractor agrees to take affirmative action to employ and advance in employment individuals with disabilities, and to treat qualified individuals without discrimination on the basis of their physical or mental disability in all employment practices, including the following:

(1) Recruitment, advertising, and job application procedures;

(2) Hiring, upgrading, promotion, award of tenure, demotion, transfer, layoff, termination, right of return from layoff and rehiring;

(3) Rates of pay or any other form of compensation and changes in compensation;

(4) Job assignments, job classifications, organizational structures, position descriptions, lines of progression, and seniority lists;

(5) Leaves of absence, sick leave, or any other leave;

(6) Fringe benefits available by virtue of employment, whether or not administered by the contractor;

(7) Selection and financial support for training, including apprenticeship, professional meetings, conferences, and other related activities, and selection for leaves of absence to pursue training;

(8) Activities sponsored by the Contractor including social or recreational programs;

(9) Any other term, condition, or privilege of employment.

B. The Contractor agrees to comply with the rules, regulations, and relevant orders of the Secretary of Labor issued pursuant to the Act.

C. In the event of the Contractor's noncompliance with the requirements of this clause, actions for noncompliance may be taken in accordance with the rules, regulations, and relevant orders of the Secretary of Labor issued pursuant to the Act.

D. The Contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices in a form to be prescribed by the Director, Office of Federal Contract Compliance Programs, provided by or through the contracting officer. Such notices shall state the rights of applicants and employees as well as the Contractor's obligation under the law to take affirmative action to employ and advance in employment qualified employees and applicants with disabilities. The contractor must ensure that applicants or employees with disabilities are provided the notice in a form that is accessible and understandable to the individual applicant or employee (e.g., providing Braille or large print versions of the notice, or posting a copy of the notice at a lower height for easy viewing by a person using a wheelchair). With respect to employees who do not work at a physical location of the contractor, a contractor will satisfy its posting obligations by posting such notices in an electronic format, provided that the contractor provides computers, or access to computers, that can access the electronic posting to such employees, or the contractor has actual knowledge that such employees otherwise are able to access the electronically posted notices. Electronic notices for employees must be posted in a conspicuous location and format on the company's intranet or sent by electronic mail to employees. An electronic posting must be used by the contractor to notify job applicants of their rights if the contractor utilizes an electronic application process. Such electronic applicant notice must be conspicuously stored with, or as part of, the electronic application.

E. The Contractor will notify each labor organization or representative of workers with which it has a collective bargaining agreement or other contract understanding, that the Contractor is bound by the terms of Section 503 of the Rehabilitation Act of 1973, and is committed to take affirmative action to employ and advance in employment, and shall not discriminate against, individuals with physical or mental disabilities.

F. The Contractor will include the provisions of this clause in every subcontract or purchase order of $10,000 or more unless exempted by rules, regulations, or orders of the Secretary issued pursuant to Section 503 of the Act, so that such provisions will be binding upon each subcontractor or vendor. The Contractor will take such action with respect to any subcontract or purchase order as the Director of the Office of Federal Contract Compliance Programs may direct to enforce such provisions, including action for noncompliance.

G. The contractor must, in all solicitations or advertisements for employees placed by or on behalf of the contractor, state that all qualified applicants will receive consideration for employment and will not be discriminated against on the basis of disability.

9. SECTION 504 OF THE REHABILITATION ACT OF 1973, AS AMENDED

The Contractor agrees that no otherwise qualified individual with disabilities shall, solely by reason of his disability, be denied the benefits, or be subjected to discrimination including discrimination in employment, any program or activity that receives the benefits from the federal financial assistance.

10. AGE DISCRIMINATION ACT OF 1975

The Contractor shall comply with the provisions of the Age Discrimination Act of 1975. No person in the United States shall, on the basis of age, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under, any program or activity receiving federal financial assistance.

11. CERTIFICATION OF COMPLIANCE WITH AIR AND WATER ACTS
(Applicable to contracts and subcontracts exceeding $150,000)

The Contractor and all subcontractors shall comply with the requirements of the Clean Air Act, as amended, 42 USC 7401 et seq., the Federal Water Pollution Control Act, as amended, 33 USC 1251 et seq. Violations must be reported to the Federal awarding agency and the Regional Office of the Environmental Protection Agency (EPA)

In addition to the foregoing requirements, all nonexempt contractors and subcontractors shall furnish to the owner, the following:

A. A stipulation by the Contractor or subcontractors, that any facility to be utilized in the performance of any nonexempt contract or subcontract, is not listed on the List of Violating Facilities issued by the Environmental Protection Agency (EPA) pursuant to 40 CFR Part 15, as amended.

B. Agreement by the Contractor to comply with all the requirements of Section 114 of the Clean Air Act, as amended, (42 USC 1857 c-8) and Section 308 of the Federal Water Pollution Control Act, as amended, (33 USC 1318) relating to inspection, monitoring, entry, reports and information, as well as all other requirements specified in said Section 114 and Section 308, and all regulations and guidelines issued thereunder

C. A stipulation that as a condition for the award of the contract, prompt notice will be given of any notification received from the Director, Office of Federal Activities, EPA, indicating that a facility

utilized, or to be utilized for the contract, is under consideration to be listed on the EPA List of Violating Facilities.

D. Agreement by the Contractor that he will include, or cause to be included, the criteria and requirements in paragraph (1) through (4) of this section in every nonexempt subcontract and requiring that the Contractor will take such action as the government may direct as a means of enforcing such provisions.

12. SPECIAL CONDITIONS PERTAINING TO HAZARDS, SAFETY STANDARDS AND ACCIDENT PREVENTION

A. Lead-Based Paint Hazards
(Include in contracts for construction or rehabilitation of residential structures)

The construction or rehabilitation of residential structures is subject to the HUD Lead-Based Paint regulations, 24 CFR Part 35. The Contractor and subcontractors shall comply with the provisions for the elimination of lead-based paint hazards under Subpart B of said regulations. The Owner will be responsible for the inspections and certifications required under Section 35.14 (f) thereof.

B. Use of Explosives (Modify as Required)

When the use of explosives is necessary for the prosecution of the work, the Contractor shall observe all local, state and federal laws in purchasing and handling explosives. The Contractor shall take all necessary precaution to protect completed work, neighboring property, water lines, or other underground structures. Where there is danger to structures or property from blasting, the charges shall be reduced and the material shall be covered with suitable timber, steel or rope mats.

The Contractor shall notify all owners of public utility property of intention to use explosives at least 8 hours before blasting is done close to such property. Any supervision or direction of use of explosives by the engineer does not in any way reduce the responsibility of the Contractor or his Surety for damages that may be caused by such use.

C. Danger Signals and Safety Devices (Modify as Required)

The Contractor shall make all necessary precautions to guard against damages to property and injury to persons. He shall put up and maintain in good condition, sufficient red or warning lights at night, suitable barricades and other devices necessary to protect the public. In case the Contractor fails or neglects to take such precautions, the Owner may have such lights and barricades installed and charge the cost of this work to the Contractor. Such action by the Owner does not relieve the Contractor of any liability incurred under these specifications or contract.

13. FLOOD DISASTER PROTECTION

This contract is subject to the requirements of the Flood Disaster Protection Act of 1973 (P.L. 93-234). Nothing included as a part of this contract is approved for acquisition or construction purposes as defined under Section 3(a) of said

Act, for use in an area identified by the Secretary of HUD as having special flood hazards which is located in a community not then in compliance with the requirements for participation in the National Flood Insurance Program pursuant to Section 201(d) of said Act; and the use of any assistance provided under this contract for such acquisition for construction in such identified areas in communities then participating in the National Flood Insurance Program shall be subject to the mandatory purchase of flood insurance requirements or Section 102(a) of said Act.

Any contract or agreement for the sale, lease, or other transfer of land acquired, cleared or improved with assistance provided under this Contract shall contain, if such land is located in an area identified by the Secretary as having special flood hazards and in which the sale of flood insurance has been made available under the National Flood Insurance Act of 1968, as amended, 42 U.S.C. 4001 et seq., provisions obligating the transferee and its successors or assigns to obtain and maintain, during the ownership of such land, such flood insurance as required with respect to financial assistance for acquisition or construction purposes under Section 102(a) of Flood Disaster Protection Act of 1973.

14. ACCESS TO RECORDS - MAINTENANCE OF RECORDS

The State of Louisiana, the Department of Housing and Urban Development, the Comptroller General of the United States, or any of their duly authorized representatives, shall have access to any books, documents, papers and records of the Contractor which are directly pertinent to this specific contract, for the purpose of audits, examinations, and making excerpts and transcriptions. All records connected with this contract will be maintained in a central location by the unit of local government and will be maintained for a period of five (5) years after the official date of the State's final closeout of its grant with HUD.

15. INSPECTION

The authorized representative and agents of the State of Louisiana and the Department of Housing and Urban Development shall be permitted to inspect all work, materials, payrolls, records of personnel, invoices of materials, and other relevant data and records.

16. REPORTING REQUIREMENTS

The Contractor shall complete and submit all reports, in such form and according to such schedule, as may be required by the Owner.

17. CONFLICT OF INTEREST

A. No officer or employee of the local jurisdiction or its designees or agents, no member of the governing body, and no other public official of the locality who his/her tenure or for one year thereafter, shall have any interest, direct or indirect, in any contract or subcontract, or the proceeds thereof, for work to be performed. Further, the Contractor shall cause to be incorporated in all subcontracts the language set forth in this paragraph prohibiting conflict of interest.

B. No member of or delegate to Congress, or Resident Commissioner, shall be admitted to any share or part of this contract or to any benefit that may arise therefrom, but this provision shall not be construed to extend to this contract if made with a corporation for its general benefit.

18. ACTIVITIES AND CONTRACTS NOT SUBJECT TO EXECUTIVE ORDER 11246, AS AMENDED
(Applicable to contracts and subcontracts of $10,000 and under)

During the performance of this contract, the Contractor agrees as follows:

A. The Contractor shall not discriminate against any employee or applicant for employment because of race, color, religion, sex, or national origin. The Contractor shall take affirmative action to ensure that applicants for employment are employed, and that employees are treated during employment, without regard to their race, color, religion, sex, or national origin. Such action shall include, but not be limited to, the following: employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship.

B. The Contractor shall post in conspicuous places, available to employees and applicants for employment, notices to be provided by Contracting Officer setting forth the provisions of this non-discrimination clause. The Contractor shall state that all qualified applicants will receive consideration for employment without regard to race, color, religion, sex, or national origin.

C. Contractors shall incorporate foregoing requirements in all subcontracts.

19. PATENTS

A. The Contractor shall hold and save the Owner and its officers, agents, servants, and employees harmless from liability of any nature or kind, including cost and expenses for, or on account of any patented or unpatented invention, process, article, or appliance manufactured or used in the performance of the contract including its use by the Owner, unless otherwise specifically stipulated in the Contract Document.

B. License or Royalty Fees: License and/or Royalty Fees for the use of a process which is authorized by the Owner of the project must be reasonable, and paid to the holder of the patent, or his authorized license, direct by the Owner and not by or through the Contractor.

C. If the Contractor uses any design device or materials covered by letters, patent or copyright, he shall provide for such use by suitable agreement with the owner of such patented or copy-righted design device or material. It is mutually agreed and understood, that without exception the contract prices shall include all royalties or costs arising from the use of such design, device or materials, in any way involved in the work. The Contractor and/or his Sureties shall indemnify and save harmless the Owner of the project from any and all claims for infringement by reason of the use of such patented or copy-righted design, device or materials or any trademark or copy-right in connection with work agreed to be performed under this contract, and shall indemnify the Owner for any cost, expense, or damage which it may be obliged to pay by reason of such infringement at any time during the prosecution of the work or after completion of the work.

20. COPYRIGHT

No materials, to include but not limited to reports, maps, or documents produced as a result of this contract, in whole or in part, shall be available to the Contractor for copyright purposes. Any such materials produced as a result of this contract that might be subject to copyright shall be the property of the Owner and all such rights shall belong to the Owner.

21. TERMINATION FOR CAUSE

If, through any cause, the Contractor shall fail to fulfill in a timely and proper manner his obligations under this contract, or if the Contractor shall violate any of the covenants, agreements, or stipulations of this contract, the Owner shall thereupon have the right to terminate this contract by giving written notice to the Contractor of such termination and specifying the effective date thereof, at least five (5) days before the effective date of such termination. In such event, all finished or unfinished documents, data, studies, surveys, drawings, maps, models, photographs, and reports prepared by the Contractor under this contract shall, at the option of the Owner, become the Owner's property and the Contractor shall be entitled to receive just and equitable compensation for any work satisfactorily completed hereunder. Notwithstanding the above, the Contractor shall not be relieved of liability to the Owner for damages sustained by the Owner by virtue of any breach of the contract by the Contractor, and the Owner may withhold any payments to the Contractor for the purpose of set-off until such time as the exact amount of damages due the Owner from the Contractor is determined.

22. TERMINATION FOR CONVENIENCE

The Owner may terminate this contract at any time by giving at least ten (10) days notice in writing to the Contractor. If the contract is terminated by the Owner as provided herein, the Contractor will be paid for the time provided and expenses incurred up to the termination date.

23. ENERGY EFFICIENCY

The Contractor shall comply with mandatory standards and policies relating to energy efficiency which are contained in the state energy conservation plan issued in compliance with the Energy Policy and Conservation Act (Public Law 94-163).

24. SUBCONTRACTS

A. The Contractor shall not enter into any subcontract with any subcontractor who has been debarred, suspended, declared ineligible, or voluntarily excluded from participating in contacting programs by any agency of the United States Government or the State of Louisiana.

B. The Contractor shall be as fully responsible to the Owner for the acts and omissions of the Contractor's subcontractors, and of persons either directly or indirectly employed by them, as he is for the acts and omissions of persons directly employed by the Contractor.

C. The Contractor shall cause appropriate provisions to be inserted in all subcontracts relative to the work to bind subcontractor to the Contractor by the terms of the contract documents insofar as applicable to the work of subcontractors and to give the Contractor the same power as regards terminating any subcontract that the Owner may exercise over the Contractor under any provision of the contract documents.

D. Nothing contained in this contract shall create any contractual relation between any subcontractor and the Owner.

25. DEBARMENT, SUSPENSION, AND INELIGIBILITY

The Contractor represents and warrants that it and its subcontractors are not debarred, suspended, or placed in ineligibility status under the provisions of 2 CFR 180 that implement Executive Order 12549, *Debarment and Suspension* (3 CFR Part 1986 Comp., p. 189) and Executive Order 12689, *Debarment and Suspension* (3 CFR Part 1989 Comp., p. 235).

26. PROTECTION OF LIVES AND HEALTH

The Contractor shall exercise proper precaution at all times for the protection of persons and property and shall be responsible for all damages to persons or property, either on or off the worksite, which occur as a result of his prosecution of the work. The safety provisions of applicable laws and building and construction codes, in addition to specific safety and health regulations described by Chapter XIII, Bureau of Labor Standards, Department of Labor, Part 1518, Safety and Health Regulations for Construction, as outlined in the Federal Register, Volume 36, No. 75, Saturday, April 17, 1971, Title 29 - LABOR, shall be observed and the Contractor shall take or cause to be taken, such additional safety and health measures as the Owner may determine to be reasonably necessary.

27. BREACH OF CONTRACT TERMS

Any violation or breach of terms of this contract on the part of the Contractor or the Contractor's subcontractors may result in the suspension or termination of this contract or such other action that may be necessary to enforce the rights of the parties of this contract. The duties and obligations imposed by the contract documents and the rights and remedies available thereunder shall be in addition to and not a limitation of any duties, obligations, rights and remedies otherwise imposed or available by law.

28. PROVISIONS REQUIRED BY LAW DEEMED INSERTED

Each and every provision of law and clause required by law to be inserted in this contract shall be deemed to be inserted herein and the contract shall be read and enforced as though it were included herein, and if through mistake or otherwise any such provision is not inserted, or is not correctly inserted, then upon the application of either party the contract shall forthwith be physically amended to make such insertion or correction.

29. CHANGES

The Owner may, from time to time, request changes in the scope of the services of the Contractor to be performed hereunder. Such changes, including any increase or decrease in the amount of the Contractor's compensation which are mutually agreed upon by and between the Owner and the Contractor, shall be incorporated in written and executed amendments to this Contract.

30. PERSONNEL

The Contractor represents that it has, or will secure at its own expense, all personnel required in performing the services under this Contract. Such personnel shall not be employees of or have any contractual relationship with the Owner.

All the services required hereunder will be performed by the Contractor or under its supervision, and all personnel engaged in the work shall be fully qualified and shall be authorized or permitted under State and local law to perform such services.

No person who is serving sentence in a penal or correctional institution shall be employed on work under this Contract.

31. ANTI-KICKBACK RULES

Salaries of personnel performing work under this Contract shall be paid unconditionally and not less often than once a month without payroll deduction or rebate on any account except only such payroll deductions as are mandatory by law or permitted by the applicable regulations issued by the Secretary of Labor pursuant to the "Anti-Kickback Act" of June 13, 1934 (48 Stat. 948; 62 Stat. 740; 63 Stat. 108; Title 18 U.S.C. 874; and Title 40 U.S.C. 276c). The Contractor shall comply with all applicable "Anti-Kickback" regulations and shall insert appropriate provisions in all subcontracts covering work under this contract to insure compliance by the subcontractors with such regulations, and shall be responsible for the submission of affidavits required of subcontractors thereunder except as the Secretary of Labor may specifically provide for variations of or exemptions from the requirements thereof.

32. ASSIGNABILITY

The Contractor shall not assign any interest in this Contract, and shall not transfer any interest in the same (whether by assignment or novation) without prior written approval of the Owner provided that claims for money due or to become due the Contractor from the Owner under this Contract may be assigned to a bank, trust company, or other financial institution, or to a Trustee in Bankruptcy, without such approval. Notice of any such assignment or transfer shall be furnished promptly to the Owner.

33. INTEREST OF CONTRACTOR

The Contractor covenants that he presently has no interest and shall not acquire any interest direct or indirect in the above described project or any parcels therein or any other interest which would conflict in any manner or degree with the performance of his services hereunder. The Contractor further covenants that in the performance of this Contract no person having any such interest shall be employed.

34. POLITICAL ACTIVITY

The Contractor will comply with the provisions of the Hatch Act (5 U.S.C. 1501 et seq.), which limits the political activity of employees.

35. COMPLIANCE WITH THE OFFICE OF MANAGEMENT AND BUDGET

The parties agree to comply with the regulations, policies, guidelines, and requirements of the Office of Management and Budget, *"Uniform Administrative Requirements, Cost Principles, and Audit Requirements for Federal Awards"*, 2 CFR Part 200, as they relate to the use of Federal funds under this contract.

36. DISCRIMINATION DUE TO BELIEFS

No person with responsibilities in operation of the project to which this grant relates will discriminate with respect to any program participant or any applicant for participation in such program because of political affiliation or beliefs.

37. CONFIDENTIAL FINDINGS

All of the reports, information, data, etc., prepared or assembled by the Contractor under this Contract are confidential, and the Contractor agrees that they shall not be made available to any individual or organization without prior written approval of the Owner.

38. LOBBYING

The Contractor certifies, to the best of his or her knowledge and belief that:

A. No federally appropriated funds have been paid or will be paid, by or on behalf of the contractor, to any person for influencing or attempting to influence an officer or employee of any agency, a member of Congress, an officer or employee of Congress, or an employee of a member of Congress in connection with the awarding of any federal contract, the making of any federal grant, the making of any federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any federal contract, grant, loan, or cooperative agreement.

B. If any funds other than federally appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a member of Congress, an officer or employee of Congress, or an employee of a member of Congress in connection with this federal contract, grant, loan, or cooperative agreement, the contractor shall complete and submit Standard Form-LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions.

39. CONTRACTING WITH SMALL AND MINORITY FIRMS, WOMEN'S BUSINESS ENTERPRISES, AND LABOR SURPLUS AREA FIRMS

The Contractor will take necessary affirmative steps to assure that minority firms, women's business enterprises, and labor surplus area firms are used in subcontracting when possible. Steps include:

A. Placing qualified small and minority businesses and women's business enterprises on solicitation lists;

B. Assuring that small and minority businesses, and women's business enterprises are solicited whenever they are potential sources;

C. Dividing total requirements, when economically feasible, into smaller tasks or quantities to permit maximum participation by small and minority business, and women's business enterprises;

D. Establishing delivery schedules, where the requirement permits, which encourage participation by small and minority business, and women's business enterprises; and

E. Using the services and assistance of the Small Business Administration, and the Minority Business Development Agency of the Department of Commerce.

40. PROCUREMENT OF RECOVERED MATERIALS

A. In accordance with Section 6002 of the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act, the Contractor shall procure items designated in guidelines of the Environmental Protection Agency (EPA) at 40 CFR Part 247 that contain the highest percentage of recovered materials practicable, consistent with maintaining a satisfactory level of competition. The Contractor shall procure items designated in the EPA guidelines that contain the highest percentage of recovered materials practicable unless the Contractor determines that such items: (1) are not reasonably available in a reasonable period of time; (2) fail to meet reasonable performance standards, which shall be determined on the basis of the guidelines of the National Institute of Standards and Technology, if applicable to the item; or (3) are only available at an unreasonable price.

B. Paragraph A of this clause shall apply to items purchased under this contract where: (1) the Contractor purchases in excess of $10,000 of the item under this contract; or (2) during the preceding Federal fiscal year, the Contractor: (i) purchased any amount of the items for use under a contract that was funded with Federal appropriations and was with a Federal agency or a State agency or agency of a political subdivision of a State; and (ii) purchased a total of in excess of $10,000 of the item both under and outside that contract.

41. PROHIBITION ON CONTRACTING FOR COVERED TELECOMMUNICATIONS EQUIPMENT OR SERVICES

A. Definitions. As used in this clause, the terms backhaul; covered foreign country; covered telecommunications equipment or services; interconnection arrangements; roaming; substantial or essential component; and telecommunications equipment or services have the meaning as defined in FEMA Policy 405-143-1, Prohibitions on Expending FEMA Award Funds for Covered Telecommunications Equipment or Services (Interim), as used in this clause—

B. Prohibitions.

i) Section 889(b) of the John S. McCain National Defense Authorization Act for Fiscal Year 2019, Pub. L. No. 115-232, and 2 C.F.R. § 200.216 prohibit the head of an executive agency on or after Aug.13, 2020, from obligating or expending grant, cooperative agreement, loan, or loan guarantee funds on certain telecommunications products or from certain entities for national security reasons.

ii) Unless an exception in paragraph (c) of this clause applies, the contractor and its subcontractors may not use grant, cooperative agreement, loan, or loan guarantee funds from the Federal Emergency Management Agency to:

(1) Procure or obtain any equipment, system, or service that uses covered telecommunications equipment or services as a substantial or essential component of any system, or as critical technology of any system;

(2) Enter into, extend, or renew a contract to procure or obtain any equipment, system, or service that uses covered telecommunications equipment or services as a substantial or essential component of any system, or as critical technology of any system;

(3) Enter into, extend, or renew contracts with entities that use covered telecommunications equipment or services as a substantial or essential component of any system, or as critical technology as part of any system; or

(4) Provide, as part of its performance of this contract, subcontract, or other contractual instrument, any equipment, system, or service that uses covered telecommunications equipment or services as a substantial or essential component of any system, or as critical technology as part of any system.

C. Exceptions.

i) This clause does not prohibit contractors from providing—

(1) A service that connects to the facilities of a third-party, such as backhaul, roaming, or interconnection arrangements; or

(2) Telecommunications equipment that cannot route or redirect user data traffic or permit visibility into any user data or packets that such equipment transmits or otherwise handles.

ii) By necessary implication and regulation, the prohibitions also do not apply to:

(1) Covered telecommunications equipment or services that:

i. Are not used as a substantial or essential component of any system; and
ii. Are not used as critical technology of any system.

(2) Other telecommunications equipment or services that are not considered covered telecommunications equipment or services.

D. Reporting requirement.

i) In the event the contractor identifies covered telecommunications equipment or services used as a substantial or essential component of any system, or as critical technology as part of any system, during contract performance, or the contractor is notified of such by a subcontractor at any tier or by any other source, the contractor shall report the information in paragraph (d)(2) of this clause to the recipient or subrecipient, unless elsewhere in this contract are established procedures for reporting the information.

ii) The Contractor shall report the following information pursuant to paragraph (d)(1) of this clause:

(1) Within one business day from the date of such identification or notification: The contract number; the order number(s), if applicable; supplier name; supplier unique entity identifier (if known); supplier Commercial and Government Entity (CAGE) code (if known); brand; model number (original equipment manufacturer number, manufacturer part number, or wholesaler number); item description; and any readily available information about mitigation actions undertaken or recommended.

(2) Within 10 business days of submitting the information in paragraph (d)(2)(i) of this clause: Any further available information about mitigation actions undertaken or recommended. In addition, the contractor shall describe the efforts it undertook to prevent use or submission of covered telecommunications equipment or services, and any additional efforts that will be incorporated to prevent future use or submission of covered telecommunications equipment or services.

iii) Subcontracts. The Contractor shall insert the substance of this clause, including this paragraph, in all subcontracts and other contractual instruments."

42. DOMESTIC PREFERENCES FOR PROCUREMENTS

As appropriate, and to the extent consistent with law, the contractor should, to the greatest extent practicable, provide a preference for the purchase, acquisition, or use of goods, products, or materials produced in the United States. This includes, but is not limited to iron, aluminum, steel, cement, and other manufactured products.

For purposes of this clause:

Produced in the United States means, for iron and steel products, that all manufacturing processes, from the initial melting stage through the application of coatings, occurred in the United States.

Manufactured products mean items and construction materials composed in whole or in part of non-ferrous metals such as aluminum; plastics and polymer-based products such as polyvinyl chloride pipe; aggregates such as concrete; glass, including optical fiber; and lumber

43. FEDERAL LABOR STANDARDS PROVISIONS

The Contractor shall abide by the requirements of the Federal Labor Standards Provisions (form HUD-4010) as follows.

44. AUTHORIZATION

ATTEST:

YWCA Greater New Orleans

_____

By: Loyce Pierce Wright
President of the Board of Directors

_____ Date: _____

[name of CONTRACTOR]

_____ By: _____
[*name & title of CONTRACTOR Representative*]

_____ Date: _____

HUD-4010
Federal Labor Standards Provisions

U.S. Department of Housing and Urban Development
Office of Davis-Bacon and Labor Standards

A. APPLICABILITY

The Project or Program to which the construction work covered by this Contract pertains is being assisted by the United States of America, and the following Federal Labor Standards Provisions are included in this Contract pursuant to the provisions applicable to such Federal assistance.

(1) MINIMUM WAGES

(i) All laborers and mechanics employed or working upon the site of the work will be paid unconditionally and not less often than once a week, and without subsequent deduction or rebate on any account (except such payroll deductions as are permitted by regulations issued by the Secretary of Labor under the Copeland Act (29 CFR Part 3)), the full amount of wages and bona fide fringe benefits (or cash equivalents thereof) due at time of payment, computed at rates not less than those contained in the wage determination of the Secretary of Labor (which is attached hereto and made a part hereof), regardless of any contractual relationship which may be alleged to exist between the contractor and such laborers and mechanics. Contributions made or costs reasonably anticipated for bona fide fringe benefits under Section 1(b)(2) of the Davis-Bacon Act on behalf of laborers or mechanics are considered wages paid to such laborers or mechanics, subject to the provisions of 29 CFR 5.5(a)(1)(iv); also, regular contributions made or costs incurred for more than a weekly period (but not less often than quarterly) under plans, funds, or programs, which cover the particular weekly period, are deemed to be constructively made or incurred during such weekly period.

Such laborers and mechanics shall be paid the appropriate wage rate and fringe benefits on the wage determination for the classification of work actually performed, without regard to skill, except as provided in 29 CFR 5.5(a)(4). Laborers or mechanics performing work in more than one classification may be compensated at the rate specified for each classification for the time actually worked therein: Provided, that the employer's payroll records accurately set forth the time spent in each classification in which work is performed. The wage determination (including any additional classification and wage rates conformed under 29 CFR 5.5(a)(1)(ii) and the Davis-Bacon poster (WH1321)) shall be posted at all times by the contractor and its subcontractors at the site of the work in a prominent and accessible place, where it can be easily seen by the workers.

(ii) Additional Classifications.

(A) Any class of laborers or mechanics which is not listed in the wage determination and which is to be employed under the contract shall be classified in conformance with the wage determination. HUD shall approve an additional classification and wage rate and fringe benefits therefor only when the following criteria have been met:

(1) The work to be performed by the classification requested is not performed by a classification in the wage determination;
(2) The classification is utilized in the area by the construction industry; and
(3) The proposed wage rate, including any bona fide fringe benefits, bears a reasonable relationship to the wage rates contained in the wage determination.

(B) If the contractor, the laborers and mechanics to be employed in the classification (if known), or their representatives, and HUD or its designee agree on the proposed classification and wage rate (including the amount designated for fringe benefits, where appropriate), a report of the action taken shall be sent by HUD or its designee to the Administrator of the Wage and Hour Division ("Administrator"), Employment Standards Administration, U.S. Department of Labor, Washington, D.C. 20210. The Administrator, or an authorized representative, will approve, modify, or disapprove every additional classification action within 30 days of receipt and so advise HUD or its designee or will notify HUD or its designee within the 30-day period that additional time is necessary. (Approved by the Office of Management and Budget ("OMB") under OMB control number 1235-0023.)

(C) In the event the contractor, the laborers or mechanics to be employed in the classification or their representatives, or HUD or its designee do not agree on the proposed classification and wage rate (including the amount designated for fringe benefits, where appropriate), HUD or its designee shall refer the questions, including the views of all interested parties and the recommendation of HUD or its designee, to the Administrator for determination. The Administrator, or an authorized representative, will issue a determination within 30 days of receipt and so advise HUD or its designee or will notify HUD or its designee within the 30-day period that additional time is necessary. (Approved by the Office of Management and Budget under OMB Control Number 1235-0023.)

(D) The wage rate (including fringe benefits, where appropriate) determined pursuant to subparagraphs (1)(ii)(B) or (C) of this paragraph, shall be paid to all workers performing work in the classification under this Contract from the first day on which work is performed in the classification.

(iii) Whenever the minimum wage rate prescribed in the contract for a class of laborers or mechanics includes a fringe benefit which is not expressed as an hourly rate, the contractor shall either pay the benefit as stated in the wage determination or shall pay another bona fide fringe benefit or an hourly cash equivalent thereof.

(iv) If the contractor does not make payments to a trustee or other third person, the contractor may consider as part of the wages of any laborer or mechanic the amount of any costs reasonably anticipated in providing bona fide fringe benefits under a plan or program, Provided, that the Secretary of Labor has found, upon the written request of the contractor, that the applicable standards of the Davis-Bacon Act have been met. The Secretary of Labor may require the contractor to set aside in a separate account assets for the meeting of obligations under the plan or program. (Approved by the Office of Management and Budget under OMB Control Number 1235-0023.)

(2) Withholding. HUD or its designee shall, upon its own action or upon written request of an authorized representative of the U.S. Department of Labor, withhold or cause to be withheld from the contractor under this contract or any other Federal contract with the same prime contractor, or any other Federally-assisted contract subject to Davis-Bacon prevailing wage requirements which is held by the same prime contractor, so much of the accrued payments or advances as may be considered necessary to pay laborers and mechanics, including apprentices, trainees and helpers, employed by the contractor or any subcontractor the full amount of wages required by the contract. In the event of failure to pay any laborer or mechanic, including any apprentice, trainee or helper, employed or working on the site of the work, all or part of the wages required by the contract, HUD or its designee may, after written notice to the contractor, sponsor, applicant, or owner, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds until such violations have ceased. HUD or its designee may, after written notice to the contractor, disburse such amounts withheld for and on account of the contractor or subcontractor to the respective employees to whom they are due. The U.S. Department of Labor shall make such disbursements in the case of direct Davis-Bacon Act contracts.

(3) Payrolls and basic records.

(i) Maintaining Payroll Records. Payrolls and basic records relating thereto shall be maintained by the contractor during the course of the work and preserved for a period of three years thereafter for all laborers and mechanics working at the site of the work. Such records shall contain the name, address, and social security number of each such worker, his or her correct classification(s), hourly rates of wages paid (including rates of contributions or costs anticipated for bona fide fringe benefits or cash equivalents thereof of the types described in Section 1(b)(2)(B) of the Davis-Bacon Act), daily and weekly number of hours worked, deductions made, and actual wages paid.

Whenever the Secretary of Labor has found, under 29 CFR 5.5(a)(1)(iv), that the wages of any laborer or mechanic include the amount of any costs reasonably anticipated in providing benefits under a plan or program described in Section 1(b)(2)(B) of the Davis-Bacon Act, the contractor shall maintain records which show that the commitment to provide such benefits is enforceable, that the plan or program is financially responsible, and that the plan or program has been communicated in writing to the laborers or mechanics affected, and records which show the costs anticipated or the actual cost incurred in providing such benefits.

Contractors employing apprentices or trainees under approved programs shall maintain written evidence of the registration of apprenticeship programs and certification of trainee programs, the registration of the apprentices and trainees, and the ratios and wage rates prescribed in the applicable programs. (Approved by the Office of Management and Budget under OMB Control Numbers 1235-0023 and 1215-0018)

(ii) Certified Payroll Reports.

(A) The contractor shall submit weekly, for each week in which any contract work is performed, a copy of all payrolls to HUD or its designee if the agency is a party to the contract, but if the agency is not such a party, the contractor will submit the payrolls to the applicant sponsor, or owner, as the case may be, for transmission to HUD or its designee. The payrolls submitted shall set out accurately and completely all of the information required to be maintained under 29 CFR 5.5(a)(3)(i), except that full social security numbers and home addresses shall not be included on weekly transmittals. Instead, the payrolls only need to include an individually identifying number for each employee (e.g., the last four digits of the employee's social security number). The required weekly payroll information may be submitted in any form desired. Optional Form WH-347 is available for this purpose from the Wage and Hour Division Web site at **https://www.dol.gov/agencies/whd/forms** or its successor site. The prime contractor is responsible for the submission of copies of payrolls by all subcontractors.

Contractors and subcontractors shall maintain the full social security number and current address of each covered worker, and shall provide them upon request to HUD or its designee if the agency is a party to the contract, but if the agency is not such a party, the contractor will submit the payrolls to the applicant sponsor, or owner, as the case may be, for transmission to HUD or its designee, the contractor, or the Wage and Hour Division of the U.S. Department of Labor for purposes of an investigation or audit of compliance with prevailing wage requirements. It is not a violation of this subparagraph for a prime contractor to require a subcontractor to provide addresses and social security numbers to the prime contractor for its own records, without weekly submission to HUD or its designee. (Approved by the Office of Management and Budget under OMB Control Number 1235-0008.)

(B) Each payroll submitted shall be accompanied by a "Statement of Compliance," signed by the contractor or subcontractor or his or her agent who pays or supervises the payment of the persons employed under the contract and shall certify the following:

(1) That the payroll for the payroll period contains the information required to be provided under 29 CFR 5.5(a)(3)(ii), the appropriate information is being maintained under 29 CFR 5.5(a)(3)(i), and that such information is correct and complete;

(2) That each laborer or mechanic (including each helper, apprentice, and trainee) employed on the contract during the payroll period has been paid the full weekly wages earned, without rebate, either directly or indirectly, and that no deductions have been made either directly or indirectly from the full wages earned, other than permissible deductions as set forth in 29 CFR Part 3;

(3) That each laborer or mechanic has been paid not less than the applicable wage rates and fringe benefits or cash equivalents for the classification of work performed, as specified in the applicable wage determination incorporated into the contract; and

(C) The weekly submission of a properly executed certification set forth on the reverse side of Optional Form WH-347 shall satisfy the requirement for submission of the "Statement of Compliance" required by subparagraph (a)(3)(ii)(b).

(D) The falsification of any of the above certifications may subject the contractor or subcontractor to civil or criminal prosecution under Section 1001 of Title 18 and Section 3729 of Title 31 of the United States Code.

(iii) The contractor or subcontractor shall make the records required under subparagraph (a)(3)(i) available for inspection, copying, or transcription by authorized representatives of HUD or its designee or the U.S. Department of Labor, and shall permit such representatives to interview employees during working hours on the job. If the contractor or subcontractor fails to submit the required records or to make them available, HUD or its designee may, after written notice to the contractor, sponsor, applicant, or owner, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds. Furthermore, failure to submit the required records upon request or to make such records available may be grounds for debarment action pursuant to 29 CFR 5.12.

(4) Apprentices and Trainees.

(i) Apprentices. Apprentices will be permitted to work at less than the predetermined rate for the work they performed when they are employed pursuant to and individually registered in a bona fide apprenticeship program registered with the U.S. Department of Labor, Employment and Training Administration, Office of Apprenticeship Training, Employer and Labor Services, or with a State Apprenticeship Agency recognized by the Office, or if a person is employed in his or her first 90 days of probationary employment as an apprentice in such an apprenticeship program, who is not individually registered in the program, but who has been certified by the Office of Apprenticeship Training, Employer and Labor Services, or a State Apprenticeship Agency (where appropriate), to be eligible for probationary employment as an apprentice.

The allowable ratio of apprentices to journeymen on the job site in any craft classification shall not be greater than the ratio permitted to the contractor as to the entire work force under the registered program. Any worker listed on a payroll at an apprentice wage rate, who is not registered or otherwise employed as stated above, shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any apprentice performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. Where a contractor is performing construction on a project in a locality other than that in which its program is registered, the ratios and wage rates (expressed in percentages of the journeyman's hourly rate) specified in the contractor's or subcontractor's registered program shall be observed.

Every apprentice must be paid at not less than the rate specified in the registered program for the apprentice's level of progress, expressed as a percentage of the journeymen hourly rate specified in the applicable wage determination. Apprentices shall be paid fringe benefits in accordance with the provisions of the apprenticeship program.

If the apprenticeship program does not specify fringe benefits, apprentices must be paid the full amount of fringe benefits listed on the wage determination for the applicable classification. If the Administrator determines that a different practice prevails for the applicable apprentice classification, fringe benefits shall be paid in accordance with that determination. In the event the Office of Apprenticeship Training, Employer and Labor Services, or a State Apprenticeship Agency recognized by the Office, withdraws approval of an apprenticeship program, the contractor will no longer be permitted to utilize apprentices at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

(ii) **Trainees.** Except as provided in 29 CFR 5.16, trainees will not be permitted to work at less than the predetermined rate for the work performed, unless they are employed pursuant to and individually registered in a program which has received prior approval, evidenced by formal certification by the U.S. Department of Labor, Employment and Training Administration. The ratio of trainees to journeymen on the job site shall not be greater than permitted under the plan approved by the Employment and Training Administration. Every trainee must be paid at not less than the rate specified in the approved program for the trainee's level of progress, expressed as a percentage of the journeyman hourly rate specified in the applicable wage determination. Trainees shall be paid fringe benefits in accordance with the provisions of the trainee program. If the trainee program does not mention fringe benefits, trainees shall be paid the full amount of fringe benefits listed on the wage determination unless the Administrator of the Wage and Hour Division determines that there is an apprenticeship program associated with the corresponding journeyman wage rate on the wage determination which provides for less than full fringe benefits for apprentices. Any employee listed on the payroll at a trainee rate who is not registered and participating in a training plan approved by the Employment and Training Administration shall be paid not less than the applicable wage rate on the wage determination for the work actually performed.

In addition, any trainee performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. In the event the Employment and Training Administration withdraws approval of a training program, the contractor will no longer be permitted to utilize trainees at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

(iii) **Equal employment opportunity.** The utilization of apprentices, trainees, and journeymen under 29 CFR Part 5 shall be in conformity with the equal employment opportunity requirements of Executive Order 11246, as amended, and 29 CFR Part 30.

(5) **Compliance with Copeland Act requirements.** The contractor shall comply with the requirements of 29 CFR Part 3, which are incorporated by reference in this Contract.

(6) **Subcontracts.** The contractor or subcontractor will insert in any subcontracts the clauses contained in subparagraphs (1) through (11) in this paragraph (a) and such other clauses as HUD or its designee may, by appropriate instructions, require, and a copy of the applicable prevailing wage decision, and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for the compliance by any subcontractor or lower tier subcontractor with all the contract clauses in this paragraph.

(7) **Contract termination; debarment.** A breach of the contract clauses in 29 CFR 5.5 may be grounds for termination of the contract and for debarment as a contractor and a subcontractor as provided in 29 CFR 5.12.

(8) **Compliance with Davis-Bacon and Related Act Requirements.** All rulings and interpretations of the Davis-Bacon and Related Acts contained in 29 CFR Parts 1, 3, and 5 are herein incorporated by reference in this Contract.

(9) **Disputes concerning labor standards.** Disputes arising out of the labor standards provisions of this Contract shall not be subject to the general disputes clause of this Contract. Such disputes shall be resolved in accordance with the procedures of the U.S. Department of Labor set forth in 29 CFR Parts 5, 6, and 7. Disputes within the meaning of this clause include disputes between the contractor (or any of its subcontractors) and HUD or its designee, the U.S. Department of Labor, or the employees or their representatives.

(10) **Certification of Eligibility.**

(i) By entering into this Contract, the contractor certifies that neither it (nor he or she) nor any person or firm who has an interest in the contractor's firm is a person or firm ineligible to be awarded Government contracts by virtue of Section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1) or to be awarded HUD contracts or participate in HUD programs pursuant to 24 CFR Part 24.

(ii) No part of this Contract shall be subcontracted to any person or firm ineligible for award of a Government contract by virtue of Section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1) or to be awarded HUD contracts or participate in HUD programs pursuant to 24 CFR Part 24.

(iii) Anyone who knowingly makes, presents, or submits a false, fictitious, or fraudulent statement, representation or certification is subject to criminal, civil and/or administrative sanctions, including fines, penalties, and imprisonment (e.g., 18 U.S.C. §§ 287, 1001, 1010, 1012; 31 U.S.C. §§ 3729, 3802.

(11) Complaints, Proceedings, or Testimony by Employees. No laborer or mechanic, to whom the wage, salary, or other labor standards provisions of this Contract are applicable, shall be discharged or in any other manner discriminated against by the contractor or any subcontractor because such employee has filed any complaint or instituted or caused to be instituted any proceeding or has testified or is about to testify in any proceeding under or relating to the labor standards applicable under this Contract to his employer.

B. CONTRACT WORK HOURS AND SAFETY STANDARDS ACT

The provisions of this paragraph (b) are applicable where the amount of the prime contract exceeds **$100,000**. As used in this paragraph, the terms "laborers" and "mechanics" include watchmen and guards.

(1) Overtime requirements. No contractor or subcontractor contracting for any part of the contract work, which may require or involve the employment of laborers or mechanics, shall require or permit any such laborer or mechanic in any workweek in which the individual is employed on such work to work in excess of 40 hours in such workweek, unless such laborer or mechanic receives compensation at a rate not less than one and one-half times the basic rate of pay for all hours worked in excess of 40 hours in such workweek.

(2) Violation; liability for unpaid wages; liquidated damages. In the event of any violation of the clause set forth in subparagraph B(1) of this paragraph, the contractor, and any subcontractor responsible therefor, shall be liable for the unpaid wages. In addition, such contractor and subcontractor shall be liable to the United States (in the case of work done under contract for the District of Columbia or a territory, to such District or to such territory) for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer or mechanic, including watchmen and guards, employed in violation of the clause set forth in subparagraph B(1) of this paragraph, **in the sum set by the U.S. Department of Labor at 29 CFR 5.5(b)(2)** for each calendar day on which such individual was required or permitted to work in excess of the standard workweek of 40 hours without payment of the overtime wages required by the clause set forth in subparagraph B(1) of this paragraph. In accordance with the Federal Civil Penalties Inflation Adjustment Act of 1990 (28 U.S.C. § 2461 Note), the DOL adjusts this civil monetary penalty for inflation no later than January 15 each year.

(3) Withholding for unpaid wages and liquidated damages. HUD or its designee shall, upon its own action or upon written request of an authorized representative of the U.S. Department of Labor, withhold or cause to be withheld from any moneys payable on account of work performed by the contractor or subcontractor under any such contract, or any other Federal contract with the same prime contract, or any other Federally-assisted contract subject to the Contract Work Hours and Safety Standards Act which is held by the same prime contractor, such sums as may be determined to be necessary to satisfy any liabilities of such contractor or subcontractor for unpaid wages and liquidated damages, as provided in the clause set forth in subparagraph B(2) of this paragraph.

(4) Subcontracts. The contractor or subcontractor shall insert in any subcontracts the clauses set forth in subparagraph B(1) through (4) of this paragraph and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for compliance by any subcontractor or lower tier subcontractor with the clauses set forth in subparagraphs B(1) through (4) of this paragraph.

C. HEALTH AND SAFETY

The provisions of this paragraph (c) are applicable where the amount of the prime contract exceeds **$100,000**.

(1) No laborer or mechanic shall be required to work in surroundings or under working conditions which are unsanitary, hazardous, or dangerous to his or her health and safety, as determined under construction safety and health standards promulgated by the Secretary of Labor by regulation.

(2) The contractor shall comply with all regulations issued by the Secretary of Labor pursuant to 29 CFR Part 1926 and failure to comply may result in imposition of sanctions pursuant to the Contract Work Hours and Safety Standards Act, (Public Law 91-54, 83 Stat 96), 40 U.S.C. § 3701 et seq.

(3) The contractor shall include the provisions of this paragraph in every subcontract, so that such provisions will be binding on each subcontractor. The contractor shall take such action with respect to any subcontractor as the Secretary of Housing and Urban Development or the Secretary of Labor shall direct as a means of enforcing such provisions.

SECTION 01010

FEDERAL WAGE DECISION

YWCA GREATER NEW ORLEANS
NEW DAYCARE, EDUCATION & COUNSELING BUILDING

DAVIS BACON WAGE LIST FOR ORLEANS PARISH

"General Decision Number: LA20250041 04/04/2025

Superseded General Decision Number: LA20240041

State: Louisiana

Construction Type: Building

County: Orleans County in Louisiana.

BUILDING CONSTRUCTION PROJECTS (does not include single family
homes or apartments up to and including 4 stories).

Note: Contracts subject to the Davis-Bacon Act are generally
required to pay at least the applicable minimum wage rate
required under Executive Order 14026 or Executive Order 13658.
Please note that these Executive Orders apply to covered
contracts entered into by the federal government that are
subject to the Davis-Bacon Act itself, but do not apply to
contracts subject only to the Davis-Bacon Related Acts,
including those set forth at 29 CFR 5.1(a)(1).

If the contract is entered into on or after January 30, 2022, or the contract is	. Executive Order 14026 generally applies to the contract.

renewed or extended (e.g., an option is exercised) on or after January 30, 2022:	. The contractor must pay all covered workers at least $17.75 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on the contract in 2025.	
If the contract was awarded on or between January 1, 2015 and January 29, 2022, and the contract is not renewed or extended on or after January 30, 2022:	. Executive Order 13658 generally applies to the contract. . The contractor must pay all covered workers at least $13.30 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on that contract in 2025.	

|_____|_____|

The applicable Executive Order minimum wage rate will be adjusted annually. If this contract is covered by one of the Executive Orders and a classification considered necessary for performance of work on the contract does not appear on this wage determination, the contractor must still submit a conformance request.

Additional information on contractor requirements and worker protections under the Executive Orders is available at http://www.dol.gov/whd/govcontracts.

Modification Number	Publication Date
0	01/03/2025
1	02/28/2025
2	03/14/2025
3	04/04/2025

ASBE0053-001 09/02/2024

	Rates	Fringes
ASBESTOS WORKER/HEAT & FROST INSULATOR	$ 32.66	9.86

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* ELEC0130-010 12/02/2024

	Rates	Fringes

ELECTRICIAN (Including
Communication Technician and
Low Voltage Wiring).....$ 35.00
16.03

ELEV0016-001 01/01/2025

	Rates	Fringes
ELEVATOR MECHANIC	$ 51.11	38.435+a+b

a. PAID HOLIDAYS: New Year's Day, Memorial Day, Independence Day, Labor Day, Veterans' Day, Thanksgiving Day, the Friday after Thanksgiving Day and Christmas Day.

b. VACATION: Employer contributes 8% of basic hourly rate for 5 years or more of service; 6% of basic hourly rate for under 5 years of service as vacation pay credit.

ENGI0406-002 07/01/2014

	Rates	Fringes
POWER EQUIPMENT OPERATOR (Crane)	$ 23.46	8.35

CRANE PREMIUMS:

50-150 Tons	$1.75
Over 150 Tons	$2.25

IRON0623-021 07/01/2024

	Rates	Fringes
IRONWORKER (REINFORCING AND STRUCTURAL)	$ 34.75	13.86

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* PAIN1244-006 09/01/2024

	Rates	Fringes
GLAZIER	$ 25.44	12.20

PAIN1244-013 12/01/2021

	Rates	Fringes
PAINTER: Spray Only (Excludes Drywall Finishing/Taping)	$ 18.83	9.48

PLAS0567-001 08/01/2022

	Rates	Fringes
CEMENT MASON/CONCRETE FINISHER	$ 30.47	7.97

PLUM0060-009 06/03/2024

	Rates	Fringes
PIPEFITTER (Including HVAC Pipe and Unit Installation; Excluding Installation of HVAC Temperature Controls)	$ 33.30	14.98
PLUMBER (Installation of HVAC Temperature Controls; Excluding HVAC Pipe and Unit Installation)	$ 33.30	14.98

SHEE0214-010 09/01/2013

	Rates	Fringes
SHEET METAL WORKER (Including HVAC Duct Installation)	$ 26.71	11.93

* SULA2012-026 09/22/2014

	Rates	Fringes
BRICKLAYER	$ 18.66	0.00
CARPENTER (Form Work Only)	$ 15.00 **	0.00
CARPENTER, Excludes Drywall Hanging and Metal Stud Installation, and Form Work	$ 19.37	2.46
DRYWALL FINISHER/TAPER	$ 16.55 **	0.00

DRYWALL HANGER AND METAL STUD
INSTALLER.....$ 18.21
4.90

LABORER: Common or General.....$ 13.09 **
0.00

LABORER: Mason Tender - Brick...$ 12.38 **
0.00

OPERATOR:
Backhoe/Excavator/Trackhoe.....$ 22.92
0.00

PAINTER (BRUSH AND ROLLER),
Excludes Drywall
Finishing/Taping.....$ 17.25 **
0.00

ROOFER.....$ 16.77 **
5.66

SPRINKLER FITTER (Fire
Sprinklers).....$ 21.08
5.79

TILE SETTER.....$ 20.00
0.00

TRUCK DRIVER: Dump Truck.....$ 15.00 **
0.00

WELDERS - Receive rate prescribed for craft performing
operation to which welding is incidental.

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** Workers in this classification may be entitled to a higher minimum wage under Executive Order 14026 ($17.75) or 13658 ($13.30). Please see the Note at the top of the wage determination for more information. Please also note that the minimum wage requirements of Executive Order 14026 are not currently being enforced as to any contract or subcontract to which the states of Texas, Louisiana, or Mississippi, including their agencies, are a party.

Note: Executive Order (EO) 13706, Establishing Paid Sick Leave for Federal Contractors applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2017. If this contract is covered by the EO, the contractor must provide employees with 1 hour of paid sick leave for every 30 hours they work, up to 56 hours of paid sick leave each year. Employees must be permitted to use paid sick leave for their own illness, injury or other health-related needs, including preventive care; to assist a family member (or person who is like family to the employee) who is ill, injured, or has other health-related needs, including preventive care; or for reasons resulting from, or to assist a family member (or person who is

like family to the employee) who is a victim of, domestic violence, sexual assault, or stalking. Additional information on contractor requirements and worker protections under the EO is available at https://www.dol.gov/agencies/whd/government-contracts.

Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses (29CFR 5.5 (a) (1) (iii)).

The body of each wage determination lists the classifications and wage rates that have been found to be prevailing for the type(s) of construction and geographic area covered by the wage determination. The classifications are listed in alphabetical order under rate identifiers indicating whether the particular rate is a union rate (current union negotiated rate), a survey rate, a weighted union average rate, a state adopted rate, or a supplemental classification rate.

Union Rate Identifiers

A four-letter identifier beginning with characters other than

""SU"", ""UAVG"", ?SA?, or ?SC? denotes that a union rate was prevailing for that classification in the survey. Example: PLUM0198-005 07/01/2024. PLUM is an identifier of the union whose collectively bargained rate prevailed in the survey for this classification, which in this example would be Plumbers. 0198 indicates the local union number or district council number where applicable, i.e., Plumbers Local 0198. The next number, 005 in the example, is an internal number used in processing the wage determination. The date, 07/01/2024 in the example, is the effective date of the most current negotiated rate.

Union prevailing wage rates are updated to reflect all changes over time that are reported to WHD in the rates in the collective bargaining agreement (CBA) governing the classification.

Union Average Rate Identifiers

The UAVG identifier indicates that no single rate prevailed for those classifications, but that 100% of the data reported for the classifications reflected union rates. EXAMPLE: UAVG-OH-0010 01/01/2024. UAVG indicates that the rate is a weighted union average rate. OH indicates the State of Ohio. The next number, 0010 in the example, is an internal number

used in producing the wage determination. The date, 01/01/2024
in the example, indicates the date the wage determination was
updated to reflect the most current union average rate.

A UAVG rate will be updated once a year, usually in January, to
reflect a weighted average of the current rates in the
collective bargaining agreements on which the rate is based.

Survey Rate Identifiers

The ""SU"" identifier indicates that either a single non-union
rate prevailed (as defined in 29 CFR 1.2) for this
classification in the survey or that the rate was derived by
computing a weighted average rate based on all the rates
reported in the survey for that classification. As a weighted
average rate includes all rates reported in the survey, it may
include both union and non-union rates. Example: SUFL2022-007
6/27/2024. SU indicates the rate is a single non-union
prevailing rate or a weighted average of survey data for that
classification. FL indicates the State of Florida. 2022 is the
year of the survey on which these classifications and rates are
based. The next number, 007 in the example, is an internal
number used in producing the wage determination. The date,

6/27/2024 in the example, indicates the survey completion date
for the classifications and rates under that identifier.

?SU? wage rates typically remain in effect until a new survey
is conducted. However, the Wage and Hour Division (WHD) has the
discretion to update such rates under 29 CFR 1.6(c)(1).

State Adopted Rate Identifiers

The ""SA"" identifier indicates that the classifications and
prevailing wage rates set by a state (or local) government were
adopted under 29 C.F.R 1.3(g)-(h). Example: SAME2023-007
01/03/2024. SA reflects that the rates are state adopted. ME
refers to the State of Maine. 2023 is the year during which the
state completed the survey on which the listed classifications
and rates are based. The next number, 007 in the example, is an
internal number used in producing the wage determination.
The date, 01/03/2024 in the example, reflects the date on which
the classifications and rates under the ?SA? identifier took
effect under state law in the state from which the rates were
adopted.

WAGE DETERMINATION APPEALS PROCESS

1) Has there been an initial decision in the matter? This can
be:

a) a survey underlying a wage determination
b) an existing published wage determination
c) an initial WHD letter setting forth a position on
a wage determination matter
d) an initial conformance (additional classification
and rate) determination

On survey related matters, initial contact, including requests
for summaries of surveys, should be directed to the WHD Branch
of Wage Surveys. Requests can be submitted via email to
davisbaconinfo@dol.gov or by mail to:

Branch of Wage Surveys
Wage and Hour Division
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

Regarding any other wage determination matter such as
conformance decisions, requests for initial decisions should be
directed to the WHD Branch of Construction Wage Determinations.
Requests can be submitted via email to BCWD-Office@dol.gov or
by mail to:

Branch of Construction Wage Determinations
Wage and Hour Division
U.S. Department of Labor

200 Constitution Avenue, N.W.
Washington, DC 20210

2) If an initial decision has been issued, then any interested party (those affected by the action) that disagrees with the decision can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Requests for review and reconsideration can be submitted via email to dba.reconsideration@dol.gov or by mail to:

Wage and Hour Administrator
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

The request should be accompanied by a full statement of the interested party's position and any information (wage payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

3) If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board). Write to:

Administrative Review Board
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210.

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END OF GENERAL DECISION"

SECTION 01011

DAVIS-BACON AND LABOR STANDARDS CONTRACTOR GUIDE ADDENDUM

YWCA GREATER NEW ORLEANS
NEW DAYCARE, EDUCATION & COUNSELING BUILDING

DAVIS-BACON AND LABOR STANDARDS
CONTRACTOR GUIDE ADDENDUM

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INTRODUCTION

This Guide has been prepared for you as a contractor performing work on construction projects that are assisted by the Department of Housing and Urban Development and subject to Davis-Bacon prevailing wage requirements. This Guide does not address contractor requirements involved in direct Federal contracting where HUD or another Federal agency enters into a procurement contract. In this latter case, the Federal Acquisition Regulations (FAR) are applicable. While the guidance contained in this Guide is generally applicable to any Davis-Bacon covered project, specific questions pertaining to direct Federal contracts should be addressed to the Contracting Officer who signed the contract for the Federal agency.

Our objective here is to provide you with a guide that is simple and non-bureaucratic yet comprehensive, and will help you better understand and comply with Davis-Bacon labor standards. HUD's Office of Davis Bacon and Labor Standards worked closely with the Department of Labor's Wage and Hour Division to make sure that the labor standards provisions in your contract and the specifics of complying with them represent the latest information. It is the Department of Labor that has general administrative oversight of all Federal contracting agencies, such as HUD, which administer the day-to-day responsibilities of enforcing Davis-Bacon provisions in construction contracts that they either fund or assist in funding.

This Guide contains six main chapters. The first chapter includes the laws and regulations associated with Federal labor standards administration and enforcement. The second chapter lists the responsibilities of contractors and of state, tribal, and local contracting agencies that administer HUD programs. The third chapter lists wage basics, including wage decisions, wage classifications, and wage rates, to provide background for the rest of the Guide. The fourth chapter discusses reviewing and reporting payrolls. The fifth chapter delves into additional work classifications and wage rates. The sixth and final chapter discusses sanctions and restitution. For further background, the DBLS Agency Guide may be used as a reference.

Finally, not all HUD construction projects are covered by Davis-Bacon wage rates. For the purpose of this Guide, we are assuming that a determination has already been made that Davis-Bacon wage rates are applicable. Should you wish assistance in determining whether Davis-Bacon wage rates apply to a particular project or if you need other related technical assistance, please consult with the HUD Labor Standards Field staff for your area.

RESOURCE

Visit the Office of Davis Bacon and Labor Standards online: www.hud.gov/program_offices/davis_bacon_and_labor_standards

BASIC DBA DEFINITIONS

See Section 3 in the Agency Guide.

LAWS AND REGULATIONS

The Davis-Bacon Act (DBA)

The Davis-Bacon Act (DBA) requires the payment of prevailing wage rates (determined by the U.S. Department of Labor) to all laborers and mechanics on Federal government and District of Columbia construction projects in excess of $2,000. Construction includes alteration and/or repair, including painting and decorating, of public buildings or public works. Most HUD construction work is not covered by the DBA itself since HUD seldom contracts directly for construction services. Most often, if DB applies to a HUD project is it because of a labor provision contained in one of HUD's "Related Acts" (see 5.9 in the Agency Guide). The Related Acts are often referred to as the Davis-Bacon and Related Acts or DBRA.

The Contract Work Hours and Safety Standards Act (CWHSSA)

CWHSSA requires time and one-half pay for overtime (OT) hours (over 40 in any workweek) worked on a covered project. The CWHSSA applies to both direct federal contracts and to federally-assisted contracts where those contracts require or involve the employment of laborers and mechanics and where federal wage standards (e.g., Davis-Bacon or HUD-determined prevailing wage rates) are applicable. CWHSSA provisions apply to all laborers and mechanics, including watchmen and guards, employed by any contractor or subcontractor. CWHSSA also applies to maintenance laborers and mechanics employed by contractors or subcontractors engaged in the operation of Public Housing Agencies (PHA), Tribally Designated Housing Entities (TDHE), and Indian Housing Agencies (IHA) developments.

Exemptions:

CWHSSA O/T provisions do not apply where the federal assistance is only in the nature of a loan guarantee or insurance.

CWHSSA O/T provisions do not apply to prime contracts of $100,000 or less.

The Copeland Act (Anti-Kickback Act)

The Copeland Act makes it a Federal crime for anyone to require any laborer or mechanic (employed on a Federal or Federally-assisted project) to kickback, (i.e., give up or pay back) any part of their wages. The Copeland Act requires every employer to submit weekly certified payroll reports, and regulates permissible payroll deductions.

The Fair Labor Standards Act (FLSA)

The FLSA governs matters such as federal minimum wage rates and O/T. These standards are generally applicable to any labor performed and may be pre-empted by other (often more stringent) federal standards such as the DBRA prevailing wage requirements and CWHSSA O/T provisions. The authority to administer and enforce FLSA provisions resides solely with DOL.

Davis-Bacon Regulations

DOL has published rules and instructions concerning Davis-Bacon and other labor laws in the Code of Federal Regulations (CFR). These regulations can be found in Title 29 CFR Parts 1, 3, 5, 6, and 7. Part 1 explains how DOL establishes and publishes DBA wage determinations (also referred to as wage decisions) and provides instructions on how to use the determinations. Part 3 describes Copeland Act requirements for payroll deductions and the submission of weekly CPRs. Part 5 covers the labor standards provisions that are in contracts relating to Davis-Bacon Act wage rates and the responsibilities of contractors and contracting agencies to administer and enforce the provisions. Part 6 provides for administrative proceedings enforcing Federal labor standards on construction and service contracts. Finally, Part 7 sets parameters for practice before the Administrative Review Board. These regulations are used as the basis for administering and enforcing the laws.

DOL Regulations are available online: www.ecfr.gov/current/title-29

Construction Contract Provisions and Labor Standards Administration

Labor standards administration involves the activities that take place primarily before construction begins. Administration sets the stage for the compliance activities that occur during the construction phase. The first and sometimes most difficult step is determining whether and to what extent Davis-Bacon wage standards apply to a particular contract or project. The Factors of Labor Standards Applicability (see Appendix II-6) should be helpful. Most HUD-assisted construction work is covered by Davis-Bacon, but there are some exceptions. The best and safest approach is to first assume that Davis-Bacon requirements will be applicable whenever the contract/project involves construction work valued in excess of $2,000, then look more closely to see if there is any reason for non-coverage. Each contract subject to Davis-Bacon labor standards requirements must contain labor standards clauses and a Davis-Bacon wage decision. These documents are normally wound into the contract specifications.

The labor standards clauses

The contract for construction is the vehicle to ensure contractor compliance and Davis-Bacon wage enforcement. Therefore, the bid specifications and/or the contract for each project subject to Davis-Bacon wage rates must contain both a Davis-Bacon wage decision and labor standards clauses. The labor standards clauses describe the responsibilities of the contractor concerning Davis-Bacon wages and obligate the contractor to comply with the Davis-Bacon wage and reporting requirements and with the O/T provisions of the CWHSSA (applicable only when the prime contract is valued at over $100,000). The labor standards clauses also provide for remedies in the event of violations, including the withholding of payments due to the contractor to ensure the payment of wages or liquidated damages that may be found due, and sanctions should violations occur. These contract clauses enable the contract administrator to enforce the Federal labor standards applicable to the project. HUD has standard forms that contain contract clauses. For example, the HUD-92554M, Supplementary Conditions Of The Contract for Construction, which is issued primarily for FHA (Federal Housing Administration) multifamily housing and other construction projects administered by HUD; the HUD-4010, Federal Labor Standards Provisions, which is used for CDBG (Community Development and Block Grant) and HOME (HOME Investment Partnerships Program) projects; and the HUD-5370, General Conditions for Construction Contracts (construction contracts >$150,000) or the HUD-5370-EZ, General Contract Conditions for Small Construction/Development Contracts (construction contracts >$2,000 but ≤$150,000) which are used for Public and Indian Housing projects. These should be wound into the contract specifications or incorporated by specific reference in the bid/contract documents (see Labor Relations Letter 96-03).

Davis-Bacon Wage Decisions

The term "wage decision" includes the original decision and any subsequent decisions that modify, supersede, correct, or otherwise change the provisions of the original decision. The term "wage decision" is used within this Guide to mean the Davis-Bacon wage decision. The terms "wage decision" and "wage determination" are used interchangeably. A wage decision is a schedule of construction work classifications, wage rates, and fringe benefits that represent the minimum rates that must be paid to workers employed in those classifications. Wage decisions are established for defined geographic areas, usually by county or group of counties, and four general characters of construction work.

RESOURCE

The Department of Housing and Urban Development (HUD) one stop forms resource page.
www.hud.gov/program_offices/administration/hudclips/forms

RESOURCE

All current Davis Bacon wage decisions can be accessed online at no cost at www.sam.gov

CONTRACTOR RESPONSIBILITIES

The principal contractor is responsible for the full compliance of all employers (the contractor, subcontractors, and any lower-tier subcontractors) with the labor standards provisions applicable to the project. Because of the contractual relationship between a prime contractor and their subcontractors, subcontractors generally should communicate with the contract administrator only through the prime contractor. (See Contract Administrator Responsibilities, below.)

CONTRACT ADMINISTRATOR RESPONSIBILITIES

The contract administrator is responsible for the proper administration and enforcement of the Federal labor standards provisions on contracts covered by Davis-Bacon requirements. This term is used to represent the person (or persons) who will provide labor standards advice and support to contractors and other project principals (e.g., owner, sponsor, architect), including providing the proper Davis-Bacon wage decision (see 6.1, The Wage Decision) and ensuring that the wage decision and contract clauses are incorporated into the contract for construction. The contract administrator also monitors labor standards compliance (see Section 12, Payroll Compliance Reviews and Corrections, in the Agency Guide) by conducting interviews with construction workers at the job site and reviewing payroll reports, and oversees any enforcement actions that may be required.

The contract administrator could be an employee or agent of HUD, or of a city or county or public housing agency. For HUD projects administered directly by HUD staff, usually FHA-insured multifamily projects, the contract administrator will be the HUD Labor Standards field staff. But many HUD-assisted projects are administered by local contracting agencies such as PHAs, TDHEs, and States, cities and counties under HUD's CDBG and HOME programs.

In these cases, the contract administrator will likely be local agency staff. In either case, the guidance for contractors remains essentially the same.

DOL also has a role in monitoring Davis-Bacon administration and enforcement. In addition, DOL has independent authority to conduct investigations. A DOL investigator or other DOL representative may visit Davis-Bacon construction sites to interview construction workers or review payroll information.

RESOURCE

Program technical guidance

For interpretations of program requirements or handbooks and instructions on the use of forms:

Housing Programs - See our Contact List for help.

WAGE BASICS

The Wage Decision

Davis-Bacon labor standards stipulate the wage payment requirements for skilled workers, operators, truck drivers, and laborers—for example: carpenters, electricians, plumbers, roofers, rollers, screeds, bulldozers, water wagons, dump trucks, and other construction work classifications that may be needed for the project. The Davis-Bacon wage decision that applies to the project contains a schedule of work classifications and wage rates that must be followed.

Remember, the wage decision is contained in the contract specifications along with the labor standards clauses. See 5.12 in the Agency Guide.

The work classifications and wage rates

A Davis-Bacon wage decision is simply a listing of different work classifications and the minimum wage rates that must be paid to anyone performing work in those classifications.

You'll want to make sure that the work classifications you need are contained in the wage decision, and make certain that you know exactly what wage rate(s) you will need to pay. Some wage decisions cover several counties and/or types of construction work (e.g., residential and commercial work) and can be lengthy and difficult to read. The contract administrator (HUD Labor Standards field staff or local agency staff) is available to assist with any trouble reading the wage decision or finding the applicable work classification(s).

To make reading lengthy wage decisions easier, a contract administrator may prepare a Project Wage Sheet (HUD-4720). This sheet is a one-page transcript that will show only the classifications and wage rates for a project. A blank copy of a Project Wage Rate Sheet is provided in the Appendix.

RESOURCE

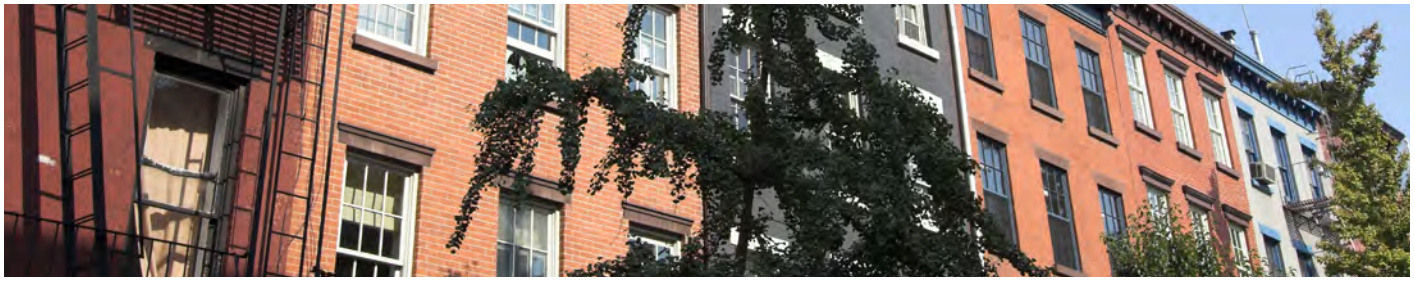
A fillable version of this form is available online at HUDClips www.hud.gov/program_offices/administration/hudclips/forms Contact the contract administrator monitoring the project for assistance with a Project Wage Rate.

Posting the wage decision, Davis-Bacon poster, and Additional Classifications wages

The prime contractor is responsible for posting a copy of the wage decision (or the Project Wage Rate Sheet), a copy of the DOL Davis-Bacon poster titled Employee Rights Under the Davis-Bacon Act (Form WH-1321), and Additional Classifications wages at the job site in a place that is easily accessible to all the construction workers employed on the project and where the wage decision and poster will not be destroyed by wind, rain, etc. The purpose of this posting is to provide information to the construction laborers and mechanics working on the project about their entitlement to the prevailing wage for their trade, and to advise them whom to contact (the contract administrator) if they have any questions or want to file a complaint.

RESOURCE

The Employee Rights Under the Davis Bacon Act poster replaces the Notice To All Employees. The new poster is available in English and Spanish online at: www.hud.gov/program_offices/davis_bacon_and_labor_standards/olrmk13.



REVIEWING PAYROLLS

Certified Payroll Reports (CPRs)

To demonstrate compliance with labor standards requirements, each employer shall prepare, certify, and submit payroll reports for each week to the sponsor, applicant, or owner for any contract work that is performed. See 29 CFR § 5.5(a)(3)(ii) for information on CPRs.

CPR format

Employers on an FHA project are required to use the HUD-authorized Electronic Payroll System (EPS) to submit CPR reports. If an approved electronic payroll reporting system is not being used by the LCA,, the employer must ensure that all information from DOL Payroll Form WH-347 is included and that the LSS can reasonably interpret it. Form WH-347 is available online at www.dol.gov/whd/forms/wh347.pdf.

Submission requirements

Each employer shall submit payroll reports beginning with the first week such employer performs work on the site of the work. Employers shall submit reports promptly following the close of each such pay week.

"No Work" payrolls

Employers are not required to submit reports for weeks during which no work was performed at the site of work, provided that the payroll reports are numbered sequentially or that the employer has provided written notice that its work on the project has been suspended.

Weekly payroll certification

Each weekly payroll submitted shall be accompanied by a "Statement of Compliance" that bears the original signature of the owner, executive/corporate officer, or a designee authorized by the owner or officer. The signature must be in ink; pencil is not acceptable. Signature stamps, photocopies, and facsimiles are not acceptable. The employer may utilize the reverse side of the DOL Payroll Form WH-347 as its Statement of Compliance or another document that contains the same language prescribed on the reverse of the WH-347.

False Submissions

The falsification of any of the above certifications may subject the employer to civil or criminal prosecution under § 1001 of Title 18 and § 231 of Title 31 of the United States Code (USC).

Payroll Review and Submission

The prime contractor should review each subcontractor's payroll reports for compliance prior to submitting the reports to the contract administrator. Remember, the prime contractor is responsible for the full compliance of all subcontractors on the contract and will be held accountable for any wage restitution that may be found due to any laborer or mechanic that is underpaid and for any liquidated damages that may be assessed for O/T violations. All the payroll reports for any project must be submitted to the contract administrator through the prime contractor.

An alert prime contractor that reviews subcontractor payroll submissions can detect any misunderstandings early, prevent costly underpayments, and protect itself from financial loss should underpayments occur.

Payroll Retention

Every contractor (including every subcontractor) must keep a complete set of their own payrolls and other basic records—such as employee addresses and full SSNs, time cards, tax records, evidence of fringe benefit payments—for a Davis-Bacon project for at least three years after the project is completed. The prime contractor must keep a complete set of all the payrolls for every contractor (including subcontractors) for at least three years after completion of the project.

Payroll Inspection

In addition to submitting payrolls to the contract administrator, every contractor (including subcontractors) must make their own copy of the payrolls and other basic records available for review or copying to any authorized representative from HUD or DOL.

REPORTING PAYROLLS

Completing a Payroll Report

Each employer shall maintain payroll records with respect to their own workforce employed at the site of the work. The prime contractor shall maintain such records relative to all laborers and mechanics working at the site of the work during the course of the construction work for at least three years following the completion of the work. Such records shall contain:

Project and contractor/subcontractor information

Each payroll must identify the contractor or subcontractor's name and address, the project name and number, and the week ending date. Week dates must be indicated in the spaces provided. Numbering payrolls is optional but strongly recommended.

Employee information

The name and an individually identifying 4-digit number for each laborer and mechanic. Employers must always maintain each employee's address and full Social Security number (SSN) during the construction of the project and for no less than three years following completion. This information must be made available to the prime contractor, HUD, and/or the LCA upon request.

Employers (prime contractors and subcontractors) must maintain the current address and full SSN for each employee and must provide this information upon request to the contracting agency or other authorized representative responsible for Federal labor standards compliance monitoring. Prime contractors may require a subcontractor to provide this information for the prime contractor's records. DOL has modified form WH-347, Payroll, to accommodate these reporting requirements.

Work classification

Each employee must be classified in accordance with the wage decision based on the type of work they perform.

Apprentices or trainees

The first payroll on which any apprentice or trainee appears must be accompanied by a copy of that apprentice's or trainee's registration in a registered or approved program. A copy of the portions of the registered or approved program pertaining to the wage rates and ratios shall also accompany the first payroll on which the first apprentice or trainee appears.

Split classifications

For an employee that worked in a split classification, make a separate entry for each classification of work performed, distributing the hours of work to each classification accordingly, and reflecting the rate of pay and gross earnings for each classification. Deductions and net pay may be based upon the total gross amount earned for all classifications.

Hours worked

The payroll should show only the regular and O/T hours worked on one particular project. The employer must show both the daily and total weekly hours for each employee. If an employee performs work at job sites other than the project for which the payroll is prepared, those "other job" hours should not be reported on the payroll. In these cases, employers should list the employee's name, classification, hours for this project only, the rate of pay and gross earnings for this project, and the gross earned for all projects. Deductions and net pay may be based upon the employee's total earnings (for all projects) for the week.

Rate of pay

Employers must show the basic hourly rate of pay for each employee for one particular project. If the wage decision includes a fringe benefit and the employer does not participate in approved fringe benefit programs, the employer must add the fringe benefit rate to the basic hourly rate of pay, and must list the O/T rate if O/T hours were worked.

Piece-work

For any piece-work employees, the employer must compute an effective hourly rate for each employee each week based upon the employee's piece-work earnings for that week. To compute the effective hourly rate, divide the piece-work earnings by the total number of hours worked, including consideration for any O/T hours.

The effective hourly rate must be reflected on the certified payroll. This hourly rate may be no less than the wage rate (including fringe benefits, if any) on the wage decision for the classification of work performed. It does not matter that the effective hourly rate changes from week to week, only that the rate is no less than the rate on the wage decision for the classification of work performed.

Remember, the O/T rate is computed at one and one-half times the basic rate of pay plus any fringe benefits. For example, if the wage decision requires $10/hour basic plus $5/hour fringe benefits, the O/T rate would be: ($10 x 1.5) + $5 = $20/hour.

Gross wages earned

Show the gross amount of wages earned for work performed on a particular project. Note: Employees with work hours and earnings on other projects may show gross wages for a particular project over gross earnings from all projects (e.g., $425.40/$764.85) and base deductions and net pay on the "all projects" earnings.

Deductions

Show the amounts of any deductions from the gross earnings. "Other" deductions should be identified (e.g., Savings Account or Loan Repayment). Any voluntary deduction (i.e., not required by law or by an order of a proper authority) must be authorized in writing by the employee or provided for in a collective bargaining (union) agreement. A short note signed by the employee is all that is needed and should accompany the first payroll on which the other deduction appears. The note needs to show the type, amount, and frequency of the deduction. A new deduction authorization is required when any of the aforementioned items change.

MORE INFO

Only one employee authorization is needed for recurring (e.g., weekly) "other" deductions. Written employee authorization is not required for income tax and Social Security deductions.

Net pay

Show the net amount of wages paid.

Statement of Compliance

The Statement of Compliance is the certification. It is located on the reverse side of a standard payroll form (WH-347). Employers must be sure to complete the identifying information at the top, particularly if attaching the Statement of Compliance to an alternate payroll form such as a computer payroll. Also, the employer must check either 4(a) or 4(b) if the wage decision contains a fringe benefit. Checking 4(a) indicates that the employer is paying required fringe benefits to approved plans or programs; and 4(b) indicates that the employer is paying any required fringe benefit amounts directly to the employee by adding the fringe benefit rate to the basic hourly rate of pay. If the employer is paying a portion of the required fringe benefit to programs and the balance directly to the employee, the employer must explain those differences in box 4(c).

Signature

For paper payrolls submitted, the payroll is signed with an original signature in ink. The payroll must be signed by a principal of the firm (owner or officer such as the president, treasurer, or payroll administrator) or by an authorized agent (a person authorized by a principal in writing to sign the payroll reports). Signature authorization (for persons other than a principal) should be submitted with the first payroll signed by such an agent. For paper payrolls, signatures in pencil, signature stamps, Xerox copies, PDFs, and other facsimiles are not acceptable.

MORE INFO

Only one Statement of Compliance is required for each employ er's weekly payroll no matter how many pages are needed to re port the employee data.

ADDITIONAL WORK CLASSIFICATION AND WAGE RATES

After contract award, if it is determined that additional work classifications are required because the wage decision lacks all the necessary classifications and wage rates, the prime contractor and, if applicable, its subcontractors employing workers in such classifications shall request an additional work classification and propose a wage rate and fringe benefits for such classification on form SF-1444, Request for Authorization of Additional Classification and Rate. The contractor or subcontractor shall make its request for a final decision through the LSS or LCA, as appropriate, to DOL at whd-cbaconformance_incoming@dol.gov. The LSS/LCA shall assist the employer in preparing the request and, if necessary, provide guidance on the policies and procedures involved.

Note: Additional work classifications and wage rates may be requested only after the effective wage decision "lock-in" date. (See DOL Regulations at 29 CFR Part 5 § 5.5(a)(1)(ii).)

Additional Work Classification and Wage Rate Parameters

Signature

Additional work classifications must be signed by DBLS for FHA-insured projects managed by HUD and signed by the LCA contracting officer for projects managed by LCAs, then forwarded to DOL with the applicable wage decision where:

The requested work classification is used in the area of the project by the construction industry;

The work that will be performed by the requested work classification is not performed by a work classification that is already contained within the applicable wage decision;

The proposed wage rate for the requested work classification bears a reasonable relationship to the wage rates on the wage decision; and

The workers that will be employed in the requested work classification (if it is known who the workers are or will be) or the workers' representatives agree with the proposed wage rate.

General guide

The wage rate and fringe benefits proposed for any classification must be in accordance with the guidance available in All Agency Memorandum 213. The proposed wage rate and fringe benefits should bear a reasonable relationship to the entirety of the rates within the relevant category. There are four basic categories: skilled crafts, laborers, truck drivers, and power equipment operators. Additional classifications proposed for power equipment operators must specify the type(s) of power equipment involved.

Making the Request

Although a request for additional work classification and wage rate may be prompted following an LSS/LCA review, the proposal must originate with the prime contractor/employer that will utilize the work classification. The prime contractor/employer must submit the request in writing. A basic request must identify the contract/project involved, the work classification requested, and the wage rate, including any bona fide fringe benefits proposed. In some cases, it may be necessary for the prime contractor/employer to describe the work that the requested work classification would perform. The prime contractor/employer should use form SF-1444, Request for Authorization of Additional Classification and Rate, to submit the request.

LSS/LCA Review of Request

The LSS/LCA will review the prime contractor/employer's request to determine if it satisfies the approval criteria at 5.12.1.9.2. The LSS/LCA will contact the prime contractor/employer if clarification or additional information is needed to complete the review.

Signing the request, reporting to DOL

If the LSS/LCA review finds that the requested work classifications and wage rate/fringe benefits meet the criteria at 5.12.1.9.2, the LSS/LCA submits the completed SF-1444, related documentation, and the applicable wage decision to the DOL National Office for final decision using DOL's dedicated email address:

whd-cbaconformance_incoming@dol.gov.

Disagreement with the request; referring for DOL decision

If the LSS/LCA review finds that the requested work classification and wage rate/fringe benefits fails to meet the approval criteria or if the parties do not agree on the proper classification or wage rate/fringe benefits for the work described, the LSS/LCA shall prepare an SF-1444 and a written report explaining the results of the review and any issues in dispute among the parties, and shall forward these along with a copy of the applicable wage decision to the DOL National Office for its decision using the same dedicated DOL email address.

DOL decision

DOL regulations permit 30 days for DOL to respond to the SF-1444. DOL will notify the LSS/LCA in writing of its decision.

DOL approval

When DOL approves the requested additional work classification and wage rate/fringe benefits, the LSS/LCA shall provide a copy of the DOL notice of approval to the prime contractor/employer with instructions that the additional work classification and wage rate/fringe benefits must be posted on the job site with the wage decision.

DOL disapproval

When DOL disapproves the requested work classification and wage rate/fringe benefits, DOL will notify the LSS/LCA in writing of the reasons why the request cannot be approved. DOL may also indicate what work classifications/wage rate/fringe benefits could be approved for the work involved if a modified request is submitted.

Notification to the prime contractor/employer

The LSS/LCA will notify the prime contractor/employer in writing of the results of the LSS/LCA review and/or DOL decision and provide a copy of the DOL notice.

Requests for DOL reconsideration

The LSS/LCA, the prime contractor/employer, or other interested parties may request reconsideration of the DOL decision on a requested additional work classification and wage rate/fringe benefits. Such requests must be made in writing accompanied by a full statement of the interested party's views and any supporting wage data or other pertinent information.

SANCTIONS AND RESTITUTION

Introduction

Even in the best of circumstances, things can go wrong. In a Davis-Bacon context, "things going wrong" usually means there's a difference of opinion or a dispute about whether and to what extent underpayments have occurred. These disputes are usually between the contract administrator and one or more employers (the prime contractor and/or a subcontractor). The dispute may involve something simple such as an additional classification request that is pending before DOL, or something as significant as investigative findings following a complaint of underpayment. This chapter discusses some of the things you might expect, and what you can do to make your views known and to lessen any delays in resolving the problem or issue.

Administrative Review on Labor Standards Disputes

The labor standards clauses in the contract and DOL regulations provide for administrative review of issues where there is a difference of views between the contract administrator and any employer. The most common circumstances include:

Additional classifications and wage rates

Additional classification and wage rate requests are sometimes denied by DOL. An employer that is dissatisfied with the denial can request reconsideration by the DOL Wage and Hour Administrator. The employer may continue to pay the wage rate, as requested, until a final decision is rendered on the matter. When the final decision is known, the employer will be required to pay any additional wages that may be necessary to satisfy the wage rate that is established.

Reconsideration

DOL normally identifies the reasons for denial in its response to the request. Any interested person (e.g., the contract administrator, employer, or representatives of the employees) may request reconsideration of the decision on the additional classification request.

The request for reconsideration must be made in writing and must thoroughly address the denial reasons identified by DOL. Employer requests for reconsideration should be made through the contract administrator but may be made directly to DOL. (See DOL Regulations 29 CFR § 1.8.) All requests initiated by or made through the contract administrator or HUD must be submitted through HQLS (Headquarters Office Davis-Bacon and Labor Standards).

Administrative Review Board

Any interested party may request a review of the Administrator's decision on reconsideration by DOL's Administrative Review Board. DOL regulations 29 CFR Part 7 explain the procedures for such reviews. (See also 29 CFR § 1.9.)

Findings of underpayment

Compliance reviews and other follow-up enforcement actions may result in findings of underpayment. The primary goal in every case and at every step in this process is to reach agreements about who may have been underpaid and how much wage restitution may be due, and to promptly deliver restitution to any underpaid workers. The contract administrator will usually work informally with employers to reach such agreements.

Rulings and interpretations unrelated to findings of underpayment

DOL is the authority for rulings and interpretations unrelated to findings of underpayments. This includes disputes concerning the prevailing wage rates as determined by DOL, DBRA applicability, character of work decisions, and interpretation and application of DOL regulations at 29 CFR Parts 1, 3, and 5. These and other such matters must be referred to the DOL Wage and Hour Administrator for their ruling and/or interpretation per 29 CFR § 5.13. Any request for a ruling or an interpretation from the DOL Administrator via DBLS must be submitted through HQLS with a copy to the local LSS.

Disputes concerning findings of underpayment

Underpayments usually occur when a contractor or subcontractor does not properly pay wages according to the approved wage determination and it has been identified as part of a Davis-Bacon and DBLS enforcement action. There may be other situations that also create underpayments, and they can originate from the employer, prime contractor, or any other interested party. Any underpayment decision by DBLS will include a formal decision letter with a Notice of Right to Appeal.

DOL review

DOL will review the contract administrator's report and the arguments against the findings presented in the hearing request. DOL may affirm or modify the findings based upon the materials presented. You will be notified in writing by DOL of the results of its review. If DOL concludes that violations have occurred, you will be given an opportunity to correct any underpayments or to request a hearing before a DOL ALJ. (See DOL Regulations 29 CFR § 5.11 (b) and 29 CFR Part 6, Rules of Practice for Administrative Proceedings.)

Administrative Review Board

Contractors and/or subcontractors may request a review by the Administrative Review Board of the decision(s) rendered by the DOL ALJ in the administrative hearing process. See DOL regulations 29 CFR Part 7 for more information about this proceeding.

Withholding

The contract administrator shall cause the withholding of payments due to the prime contractor to ensure the payment of wages that are believed to be due and unpaid (e.g., if wage underpayments or other violations are not corrected within 30 days after written notification to the prime contractor). DOL may also direct the withholding of contract payments for alleged wage underpayments. Withholding is serious and is not taken unless warranted. If withholding is deemed necessary, the contractor will be notified in writing. Only the amounts needed to meet the contractor's (and/or subcontractors') liability shall be withheld.

Deposits and Escrows

In some situations, certain labor standards issues are not or cannot be resolved in time to meet project closeout schedules. In order to permit a final closing/closeout to proceed while certain labor issues are outstanding, a deposit account (HUD-administered projects, e.g. multifamily housing-insured and grant programs) or an escrow account (LCA-administered projects, e.g., CDBG, HOME, HOPE VI (Housing Opportunities for People Everywhere)) may be established as a guarantee to ensure the payment of any wages that have been or may be found due to workers that were employed in the construction of the project. Deposit and escrow accounts may also hold fringe benefits payments that are due to plans or programs and/or liquidated damages that are assessed for violations of CWHSSA O/T provisions. The deposit or escrow account is controlled by the contract administrator. When a final decision is rendered, the contract administrator makes disbursements from the account in accordance with the decision. Deposit/escrow accounts are established for one or more of the following reasons:

MORE INFO

Remember, the prime contractor is responsible and will be held liable for any wage restitution that is due to any worker employed in the construction of the project, including workers employed by subcontractors and any lower-tier subcontractors. See 3.2, Responsibilities of the Principal Contractor, and 12.4, Restitution for Underpayment of Wages, in the Agency Guide.

Where the parties have agreed to amounts of wage restitution that are due, but the employer hasn't furnished evidence yet that all the underpaid workers have received their back wages (e.g., unfound workers)

The amount of the deposit is equal to the total gross amount of restitution due to workers lacking payment evidence. As these workers are paid and proper documentation is provided to the contract administrator, amounts corresponding to the documented payments are returned to the depositor. Amounts for any workers who cannot be located are held in the deposit/escrow account for three years and disposed as described in Section 11.4.1 of this Guide;

Sometimes, wage restitution cannot be paid to an affected employee because, for example, the employee has moved and cannot be located. After wage restitution has been paid to all the workers who could be located, the employer must submit a list of any workers who could not be found and paid (unfound workers). See 12.4.6 in the Agency Guide for more information.

Where underpayments are suspected or alleged and an investigation has not yet been completed

The deposit is equal to the amount of wage restitution and any liquidated damages, if applicable, that are estimated to be due. If the final determination of wages due is less than the amount estimated and placed in the escrow account, the escrow will be reduced to the final amount and the difference will be returned to the depositor. If the parties agree to the investigative findings, the amounts due to the workers will be paid by the employer. As these workers are paid and proper

documentation is provided to the contract administrator, the gross amounts corresponding to the documented payments are returned to the depositor;

If the employer is unable to make the payments to the workers (e.g., lacks the funds necessary), the contract administrator may make disbursements directly to the workers in the net amounts calculated by the employer. The amounts withheld from the workers for tax deduction will be returned to the employer as payments to workers are made. The employer shall be responsible for reporting and transmitting withholdings to the appropriate agencies.

If the employer is not cooperating in the resolution, the contract administrator shall make disbursements to the workers in accordance with the schedule of wages due. Amounts for unfound workers will be retained as described in Section 13.4.6 in the Agency Guide.

If the parties do not agree and an administrative hearing is requested, the escrow will be maintained.

MORE INFO

Remember, if you have any questions or need assistance con cerning labor standards requirements, help is always available. Contact the contract administrator for the project you're work ing on or the HUD Field Labor Standards staff in your area.

Where the parties are waiting for the outcome of an administrative hearing that has been or will be requested contesting a final determination of wages due

The deposit shall be equal to the amount of wage restitution and liquidated damages, if applicable, that have been determined due. Once a final decision is rendered, disbursements from the escrow account are made in accordance with the decision.

Administrative Sanctions

Contractors and/or subcontractors that violate the labor standards provisions may face administrative sanctions imposed by HUD and/or DOL.

DOL debarment

Contractors and/or subcontractors that are found by the Secretary of Labor to be in aggravated or willful violation of the labor standards provisions of the DBRA will be ineligible (debarred) to participate in any DBRA or Davis-Bacon Act contracts for up to three years. Debarment includes the contractor or subcontractor and any firm, corporation, partnership, or association in which the contractor or subcontractor has a substantial interest. Debarment proceedings can be recommended by the contract administrator or initiated by DOL. Debarment proceedings are described in DOL regulations 29 CFR § 5.12.

HUD sanctions

HUD sanctions may include Limited Denials of Participation (LDPs), debarments, and suspensions.

Limited Denial of Participation

HUD may issue to the employer an LDP, which prohibits the employer from further participation in HUD programs for a period of up to one year. The LDP is usually effective for the HUD program in which the violation occurred and for the geographic jurisdiction of the issuing HUD Office. HUD regulations concerning LDPs are found at 24 CFR §§ 24.700-24.714.

Debarment and suspensions

In certain circumstances, HUD may initiate its own debarment or suspension proceedings against a contractor and/or subcontractor in connection with improper actions regarding Davis-Bacon obligations. For example, HUD may initiate debarment where a contractor has been convicted for making false statements (such as false statements on certified payrolls or other prevailing wage certifications), or initiate suspension where a contractor has been indicted for making false statements. HUD regulations concerning debarment and suspension are found at 24 CFR Part 24.

Falsification of Certified Payroll Reports

Cases that involve certified payroll falsification may be referred to DOL for its investigation at the outset or referred to DOL for administrative review/hearings or other sanctions.

All referrals suggesting consideration for criminal prosecution must be submitted through the established hierarchy:

States may submit any such recommendation to DOL directly.

MORE INFO

Remember, if you have any questions or need assistance concerning labor standards requirements, help is always available. Contact the contract administrator for the project you're working on or the HUD Field Labor Standards staff in your area.

SECTION 01020

SECTION 3 GENERAL INFORMATION

YWCA GREATER NEW ORLEANS
NEW DAYCARE, EDUCATION & COUNSELING BUILDING

This Construction Contract includes the requirement to ensure that employment opportunities be directed to low – and very low income persons, particularly those who are recipients of government assistance for housing. These requirements are included in Section 3 of the Housing and Urban Development Act of 1968; and are known as "Section 3 Provisions".

The rules and requirements for adherence with Section 3 will impact the obligation and reporting requirements of you as the prime contractor, as well as all of your subcontractors. Section 3 regulations:

1. Establishes a benchmark of twenty-five (25) percent of the total labor hours on the project (worked by existing employees and new employees) must be performed by Section 3 Workers. A **Section 3 Worker** must meet one of the following criteria:
    a. Household income is below HUD's income limits (worker's self-certification); **or**
    b. Participation in a means-tested program such as public housing or Section 8 assisted housing (worker's self-certification); **or**
    c. Employment by a Section 3 Business Concern.

2. Establishes a benchmark of five (5) percent of the total labor hours on the project (worked by existing employees and new employees) must be performed by Targeted Section 3 Workers. In addition to meeting the criteria for a Section 3 Worker, **Targeted Section 3 Worker** must also meet one of the following criteria:
    a. Employment by a Section 3 Business Concern; **or**
    b. Live within a one (1) mile radius of the project site; **or**
    c. Participate in a YouthBuild program.

Contractors and subcontractors must document efforts to comply with Section 3 and meet the benchmarks stated above though the compilation and maintenance of a "good faith efforts" file. It should contain memoranda, correspondence, advertisements, etc., illustrating your attempts to reach eligible persons and businesses.

SECTION 01021

SECTION 3 FREQUENTLY ASKED QUESTIONS

YWCA GREATER NEW ORLEANS
NEW DAYCARE, EDUCATION & COUNSELING BUILDING

(Published: March 25, 2021)

"Best Efforts" and "To the Greatest Extent Feasible"

ATTACHMENT A
FREQUENTLY ASKED QUESTIONS
for
SECTION 3

Published: March 25, 2021

The following is a guidance document published by the Department of Housing and Urban Development Office of Field Policy and Management for the purpose of providing answers to frequently asked questions about Section 3 of the HUD Act of 1968 (12 U.S.C § 1701u) and its associated regulations (24 C.F.R. Part 75). This document is intended to provide guidance for Section 3 funding recipients, subrecipients, contractors, subcontractors, workers, and other stakeholders.

This guidance document covers questions in several topic areas and is divided into parts that contain questions on that part's topic.

I. GENERAL QUESTIONS REGARDING SECTION 3:
1. What is Section 3?
2. What Do "Best Efforts" and "to the Greatest Extent Feasible" Mean?
3. What Does "Section 3 Worker" Mean?
4. What Does "Targeted Section 3 Worker" Mean?
5. What Does "Section 3 Business Concern" mean?
6. How are low-income and very low-income determined?
7. What is YouthBuild?
8. As a funding recipient, what are my Section 3 reporting goals?
9. How does Section 3 differ from the Minority Business Enterprise/Women Business Enterprise programs?
10. What is a Section 3 project?
11. Who is considered a recipient of Section 3 funding?
12. What are funding thresholds and how do they apply to Section 3 covered financial assistance?
13. Which recipient agencies (or sources of HUD financial assistance) are required to comply with Section 3?
14. Can a non-profit organization be considered a business concern for the purposes of Section 3?
15. What is a "Service Area" or "Neighborhood of the project"?
16. What if my agency does not meet all benchmark goals for employment or contracting?
17. My agency has met all benchmark goals for employment and contracting, does this mean that we are considered in compliance with Section 3?

II. APPLICABILITY:
1. What HUD assistance does Section 3 apply to?
2. Do the requirements of Section 3 apply to grantees on a per project basis?
3. If a project is funded with non-HUD assistance, do the requirements of Section 3 still apply?
4. What recordkeeping responsibilities do contractors/subcontractors have if they receive Section 3 covered contracts?
5. Do the Section 3 requirements apply to material only contracts?
6. Do the Section 3 requirements apply to Section 8 project-based rental assistance contracts?
7. Are maintenance projects covered by Section 3?

8. Does the reduction and abatement of lead-based paint hazards constitute housing rehabilitation?
9. Are demolition projects covered by the requirements of Section 3?
10. Are professional service contracts required to be reported under Section 3?
11. Does Section 3 apply to labor hours by a CDBG-Entitlement recipient?
12. Does Section 3 apply to labor hours by a Public Housing Authority?

III. CONSISTENCY WITH OTHER LAWS:

1. Are recipients required to comply with Federal/state/local laws in addition to Section 3?
2. What is the relationship between Section 3 and Davis Bacon requirements?
3. What does the new rule mean for Tribes and Tribally Designated Housing Entities?

IV. RECIPIENT RESPONSIBILITIES:

1. What are the responsibilities of recipient agencies under Section 3?
2. What are the reporting requirements for legacy contracts entered into under the old Part 135 rule? 3. What are the reporting requirements for Section 3 projects for which assistance or funds are committed during the transition period?
4. What is the reporting timeline for Public Housing Authorities and other recipients of public housing financial assistance?
5. What are the reporting requirements for Public Housing Authorities and other recipients of public housing financial assistance during the transition period?
6. What are good strategies for targeting Section 3 workers and businesses?
7. Are funds provided to recipients so that they can comply with the requirements of Section 3?
8. Are Section 3 workers or business concerns guaranteed employment or contracting opportunities under Section 3?
9. Are recipients, developers, and contractors required to provide long- term employment opportunities, and not simply seasonal or temporary employment?
10. When might a recipient agency be exempt from the quantitative reporting requirements of Section 3?
11. Are recipients required to request developers or contractors to make payments into Section 3 training or implementation funds?

V. SECTION 3 CERTIFICATION:

1. How can a prospective Section 3 worker or business concern certify that they meet the eligibility requirements?
2. What documentation must be maintained by HUD recipients, contractors and subcontractors certifying that low- and very-low individuals and business concerns meet the regulatory definitions under Section 3?
3. What are examples of acceptable evidence to determine eligibility as a Section 3 worker?
4. What are examples of acceptable evidence for determining eligibility as a Section 3 business concern?
5. Are all public housing residents considered Section 3 workers regardless of their income?
6. Does qualifying as a Section 3 businesses mean that the business will be selected if it meets the technical requirements of the bid, regardless of bid price?
7. Can contracting with MBE/WBE businesses count towards Section 3 benchmarks?
8. Does a business have to be incorporated to be considered a Section 3 eligible business?

VI. ECONOMIC OPPORTUNITIES NUMERICAL BENCHMARKS:

1. How can low- and very low-income persons and businesses locate recipient agencies that are required to comply with Section 3 in their area?

2. How can I find Section 3 business concerns in my area?
3. Do the benchmark requirements only count toward new hires?
4. Should PHA's report on staff hours?
5. What category of PHA Staff should be included?
6. Are recipient agencies required to meet the Section 3 benchmarks, or are they optional?
7. Will there be changes to the benchmark requirements?
8. What is considered "other" public construction?
9. What is the meaning of the safe harbor determination?

VII. SECTION 3 COMPLAINTS:

1. How should complaints be made?
2. Where else can I file complaints alleging denied employment and contracting opportunities?

I. GENERAL QUESTIONS REGARDING SECTION 3:

1. What is Section 3?

Section 3 is a provision of the Housing and Urban Development Act of 1968. The purpose of Section 3 is to ensure that employment and other economic opportunities generated by certain HUD financial assistance shall, to the greatest extent feasible, and consistent with existing Federal, State, and local laws and regulations, be directed to low- and very low-income persons, particularly those who are recipients of government assistance for housing, and to business concerns which provide economic opportunities to low- and very low-income persons.

2. What Do "Best Efforts" and "to the Greatest Extent Feasible" Mean?

"Best efforts" and "greatest extent feasible" are statutory terms, used in the statute in different contexts. As such, HUD uses both terms to track compliance, and there are many ways to interpret the language. Traditionally, HUD has used the terms interchangeably, as referenced in the statute, and will continue to be consistent with the statutory language. See 12 U.S.C. 1701u (b)-(d). These terms are integral to the statutory intent and provide flexibility, rather than administrative burden, to grantees or recipients of HUD funding.

HUD acknowledges that some perceive "best efforts" to be the more rigorous standard, while others perceive "greatest extent feasible" to be the more rigorous standard. HUD has determined not to define the difference between these two terms but rather to increase the emphasis on outcomes as a result of these efforts. A recipient's reported results will be compared to the outcome metrics defined in the benchmark notice. HUD program staff will evaluate the level of effort expended by those recipients that fail to meet the benchmark safe harbor, and thus will ensure that the statutory terms are being properly enforced. HUD included a list of examples in the regulation at 24 CFR §§ 75.15 and 75.25, including engagement in outreach efforts to generate job applicants who are Targeted Section 3 workers, providing training or apprenticeship opportunities, and providing technical assistance to help Section 3 workers compete for jobs (e.g., resume assistance, coaching).

3. What Does "Section 3 Worker" Mean?

A Section 3 worker is any worker who currently fits, or when hired within the past five years fit, at least one of the following categories, as documented:

1. The worker's income for the previous or annualized calendar year is below the income limit established by HUD (see Question 6 of this part I of these FAQs, below);

2. The worker is employed by a Section 3 business concern (see Question 5 of part I, below); or
3. The worker is a YouthBuild participant.

4. What Does "Targeted Section 3 Worker" Mean?

A Section 3 targeted worker for Public Housing Financial Assistance projects is a Section 3 worker who:

(1) is employed by a Section 3 business concern; or

(2) currently fits or when hired fit at least one of the following categories, as documented within the past five years:

(i) A resident of public housing or Section 8-assisted housing;

(ii) A resident of other public housing projects or Section 8-assisted housing managed by the PHA that is providing the assistance; or

(iii) A YouthBuild participant.

A Section 3 targeted worker for Housing and Community Development Financial Assistance projects is a Section 3 worker who:

(1) is employed by a Section 3 business concern; or

(2) currently fits or when hired fit at least one of the following categories, as documented within the past five years:

(i) Living within the service area or the neighborhood of the project, as defined in 24 CFR § 75.5; or

(ii) A YouthBuild participant.

5. What Does "Section 3 Business Concern" mean?

A Section 3 business concern is a business that meets at least one of the following criteria, documented within the last six-month period:

1. At least 51 percent owned and controlled by low- or very low-income persons;
2. Over 75 percent of the labor hours performed for the business over the prior three-month period are performed by Section 3 workers; or
3. A business at least 51 percent owned and controlled by current public housing residents or residents who currently live in Section 8-assisted housing.

6. How are low-income and very low-income determined?

Low- and very low-income limits are defined in Section 3(b) (2) of the Housing Act of 1937 and are determined annually by HUD. These limits are typically established at 80 percent and 50 percent of the area median individual income. HUD income limits may be obtained from: https://www.huduser.gov/portal/datasets/il.html.

7. What is YouthBuild?

YouthBuild is a community-based pre-apprenticeship program that provides job training and educational opportunities for at-risk youth ages 16-24 who have previously dropped out of high school.

YouthBuild participants learn vocational skills in construction, as well as in other in-demand industries that include health care, information technology, and hospitality. Youth also provide community service through the required construction or rehabilitation of affordable housing for low-income or homeless families in their own neighborhoods.

The Division of Youth Services within the Employment and Training Administration's Office of Workforce Investment at the U.S. Department of Labor administers the YouthBuild program. Each year, more than 6,000 youth participate in approximately 210 YouthBuild programs in more than 40 states. More information can be found here: https://www.dol.gov/agencies/eta/youth/youthbuild.

8. As a funding recipient, what are my Section 3 reporting goals?

Your Section 3 reporting goals depend on the type of assistance you are receiving, whether public housing financial assistance or housing and community development financial assistance.

For public housing financial assistance, the benchmark for Section 3 workers is set at 25 percent or more of the total number of labor hours worked by all workers employed with public housing financial assistance in the PHA's or other recipient's fiscal year. The benchmark for Targeted Section 3
workers is set at 5 percent or more of the total number of labor hours worked by all workers employed with public housing financial assistance in the PHA's or other recipient's fiscal year. This means that the 5 percent is included as part of the 25 percent threshold.

For housing and community development financial assistance projects, the benchmark for Section 3 workers is set at 25 percent or more of the total number of labor hours worked by all workers on a Section 3 project. The benchmark for Targeted Section 3 workers is set at 5 percent or more of the total number of labor hours worked by all workers on a Section 3 project. This means that the 5 percent is included as part of the 25 percent threshold.

9. How does Section 3 differ from the Minority Business Enterprise/Women Business Enterprise programs?

Section 3 is both race and gender neutral. The standards provided under this regulation are based on income-level and location. Section 3 regulations were designed to encourage recipients of HUD funding to direct employment, training, and contracting opportunities to low-income individuals, and the businesses that employ these persons within their community regardless of race and/or gender.

Minority Business Enterprise (MBE) means a business enterprise that is at least 51% owned and controlled by one or more minority or socially and economically disadvantaged persons. Such disadvantage may arise from cultural, racial, chronic economic circumstances or other similar causes.

Women's Business Enterprise (WBE) is an independent business concern that is at least 51% owned and controlled by one or more women who are U.S. citizens or Legal Resident Aliens; whose business formation and principal place of business are in the U.S. or its territories; and whose management and daily operation is controlled by a woman with industry expertise.

Section 3 standards are race and gender neutral. A minority and/or woman owned business enterprise must provide evidence that it meets at least one criterion of a Section 3 business concern outlined above in order to receive preference under Section 3. However, the Department anticipates that Section 3 will serve to support, and not impede, contract opportunities for minority business enterprises.

The MBE designation may provide preferences promoted by other statutes and regulations, such as goals for MBEs and other socially and economically disadvantaged businesses.

To learn more about the Minority Business Enterprise and Women Business Enterprise programs, please contact HUD's Office of Small and Disadvantaged Business Utilization at 202-708-1428, or visit their website, located at: https://www.hud.gov/program_offices/sdb.

10. What is a Section 3 project?

Section 3 projects are housing rehabilitation, housing construction, and other public construction projects assisted under HUD programs that provide housing and community development financial assistance when the total amount of assistance to the project exceeds a threshold of $200,000. The threshold is $100,000 where the assistance is from the Lead Hazard Control and Healthy Homes programs, as authorized by Sections 501 or 502 of the Housing and Urban Development Act of 1970 (12 U.S.C. 1701z–1 or 1701z–2), the Lead-Based Paint Poisoning Prevention Act (42 U.S.C 4801 et seq.,; and/or the Residential Lead-Based Paint Hazard Reduction Act of 1992 (42 U.S.C. 4851 et seq.). (See Question 12 of this part I of these FAQs for more detail regarding Lead Hazard Control and Healthy Homes programs.)

The project is the site or sites together with any building(s) and improvements located on the site(s) that are under common ownership, management, and financing. The requirements of Part 75 apply to an entire Section 3 project, regardless of whether the project is fully or partially assisted under HUD programs that provide housing and community development financial assistance.

11. Who is considered a recipient of Section 3 funding?

A recipient is any entity that receives directly from HUD public housing financial assistance or housing and community development assistance that funds Section 3 projects, including, but not limited to, any State, local government, instrumentality, PHA, or other public agency, public or private nonprofit organization. It does not include contractors or any intended beneficiary under the HUD program to which Section 3 applies, such as a homeowner or a Section 3 worker.

12. What are funding thresholds and how do they apply to Section 3 covered financial assistance?

Funding thresholds are minimum dollar amounts that trigger Section 3 requirements. There are no thresholds for public housing programs. The requirements of Section 3 apply to all programs receiving public housing financial assistance regardless of the amount of assistance received from HUD. Section 3 also applies to the entirety of a mixed-finance development project as described in 24 CFR 905.604, regardless of whether the project is fully or partially assisted with public housing financial assistance.

Section 3 projects are housing rehabilitation, housing construction, and other public construction projects assisted under HUD programs that provide housing and community development financial assistance when the total amount of assistance to the project exceeds a threshold of $200,000 (Lead Hazard Control and Healthy Homes (LHCHH) assistance is not included in calculating whether the assistance exceeds the $200,000 threshold).

The threshold is $100,000 when the assistance is from the Lead Hazard Control and Healthy Homes programs, as authorized by Sections 501 or 502 of the Housing and Urban Development Act of 1970, the Lead-Based Paint Poisoning Prevention Act, and the Residential Lead-Based Paint Hazard Reduction Act of 1992. LHCHH programs require Section 3 compliance if there is over $100,000 of LHCHH funding for the project (neither HUD public housing financial assistance nor HUD housing and community development financial assistance is included in calculating whether the assistance exceeds the $100,000 threshold). Recipients of LHCHH funding will also be required to comply with Section 3 regulations and report on the entirety of the project when the total amount of HUD housing and community development financial assistance to the project exceeds $200,000 (LHCHH

funding is not included in calculating whether the total assistance exceeds the $200,000 threshold), or if any public housing financial assistance is provided.

13. Which recipient agencies (or sources of HUD financial assistance) are required to comply with Section 3?

For public housing financial assistance, Public Housing Authorities (PHAs), regardless of size or number of public housing units, are required to comply with Section 3 and its reporting requirements. However, small PHAs (fewer than 250 units) are permitted to report qualitatively as permitted under 24 CFR § 75.15(d). Some examples of those qualitative efforts are listed in the answer to Question 15.

As previously stated, Section 3 also applies to projects with more than $200,000 in funding from housing and community development financial assistance programs. The following is a list of examples of such funds:

- Community Development Block Grant (CDBG)
- HOME Investment Partnership
- Housing Trust Fund (HTF)
- Neighborhood Stabilization Program Grants (NSP 1, 2 & 3)
- Housing Opportunities for Persons with AIDS (HOPWA)
- Emergency Solutions Grants (ESG)
- University Partnership Grants
- Economic Stimulus Funds
- 202/811 Grants
- Lead Hazard Control Grants ($100,000 threshold; see Question 12, above, in this part I of these FAQs)
- Healthy Homes Production Grants ($100,000 threshold; see Question 12, above, in this part I)
- Rental Assistance Demonstration (RAD) (see most recent RAD Notice, found through HUD's RAD website, www.hud.gov/rad/)

*Note: The requirements of Section 3 typically apply to recipients of HUD funds that will be used for housing construction, rehabilitation, or other public construction. Contact Section3@hud.gov to determine applicability to a particular project/activity.

14. Can a non-profit organization be considered a business concern for the purposes of Section 3?

Yes. A non-profit organization can be a business concern. Non-profit organizations must meet the criteria of a Section 3 business concern as defined at 24 CFR § 75.5 in order to receive Section 3 preference. See response to Question 5 above.

15. What is a "Service Area" or "Neighborhood of the project"?

"Service area" or the "neighborhood of the project" means an area within one mile of the Section 3 project or, if fewer than 5,000 people live within one mile of a Section 3 project, within a circle centered on the Section 3 project that is sufficient to encompass a population of 5,000 people according to the most recent U.S. Census.

16. What if my agency does not meet all benchmark goals for employment or contracting?

If reporting indicates that the agency has not met the Section 3 benchmarks, the agency must report in a method prescribed by HUD program offices on the qualitative nature of its activities and those its contractors and subcontractors pursued per 24 CFR § 75.15(b) and § 75.25(b).

Such qualitative efforts may, for example, include but are not limited to the following:

- Engaged in outreach efforts to generate job applicants who are Targeted Section 3 workers.
- Provided training or apprenticeship opportunities.
- Provided technical assistance to help Section 3 workers compete for jobs (e.g., resume assistance, coaching).
- Provided or connected Section 3 workers with assistance in seeking employment including: drafting resumes, preparing for interviews, and finding job opportunities connecting residents to job placement services.
- Held one or more job fairs.
- Provided or referred Section 3 workers to services supporting work readiness and retention (e.g., work readiness activities, interview clothing, test fees, transportation, childcare).
- Provided assistance to apply for/or attend community college, a four-year educational institution, or vocational/technical training.
- Assisted Section 3 workers to obtain financial literacy training and/or coaching.
- Engaged in outreach efforts to identify and secure bids from Section 3 business concerns.
- Provided technical assistance to help Section 3 business concerns understand and bid on =contracts.
- Divided contracts into smaller jobs to facilitate participation by Section 3 business concerns.
- Provided bonding assistance, guaranties, or other efforts to support viable bids from Section 3 business concerns.
- Promoted use of business registries designed to create opportunities for disadvantaged and small businesses.
- Outreach, engagement, or referrals with the state one-stop system as defined in Section 121(e) (2) of the Workforce Innovation and Opportunity Act

17. My agency has met all benchmark goals for employment and contracting, does this mean that we are considered in compliance with Section 3?

Yes. Recipients will be considered to have complied with Section 3 requirements, in the absence of evidence to the contrary, if they meet all benchmark goals and certify compliance with prioritization requirements found in 24 CFR § 75.9 or §75.19. However, if subsequent HUD enforcement activities reveal that the recipient has failed to comply with the recipient responsibilities set forth at 24 CFR §75.13 or §75.23, this compliance determination may be rescinded.

II. APPLICABILITY: /

1. What HUD assistance does Section 3 apply to?

Section 3 applies to both:

a) Public Housing Financial Assistance –

(i) Development assistance provided pursuant to Section 5 of the United States Housing Act of
1937 (the 1937 Act);

(ii) Operations and management assistance provided pursuant to Section 9(e) of the 1937 Act;

(iii) Development, modernization, and management assistance provided pursuant to Section

9(d) of the 1937 Act; and

(iv) The entirety of a mixed-finance development project as described in 24 CFR 905.604, regardless of whether the project is fully or partially assisted with public housing financial assistance as defined in subsections (i) through (iii).

b) Housing and Community Development Financial Assistance expended for housing rehabilitation, housing construction, or other public construction. See Question #2 below for applicability thresholds.

2. Do the requirements of Section 3 apply to grantees on a per project basis?

Yes, for housing and community development financial assistance projects. Section 3 projects are housing rehabilitation, housing construction, and other public construction projects assisted under HUD programs that provide housing and community development financial assistance when the total amount of assistance to the project exceeds a threshold of $200,000. The threshold is $100,000 where the assistance is from the Lead Hazard Control and Healthy Homes programs. See Question 12 of part I of these FAQs.

Section 3 applies to all public housing financial assistance funds, regardless of the amount of assistance from HUD.

3. If a project is funded with non-HUD assistance, do the requirements of Section 3 still apply?

Section 3 applies to projects that are fully or partially funded with HUD financial assistance. Projects that are financed with state, local or private matching or leveraged funds used in conjunction with HUD funds are covered by Section 3 if the amount of HUD funding for the project exceeds the regulatory thresholds (listed in Section I, Question #11).

For RAD projects, Section 3 applies regardless of what money is used to pay for repairs. Per the RAD Notice, "While most RAD conversions do not utilize funding covered by Section 3, HUD has established the alternative requirement that any Work required by the conversion after the RAD Closing that involves housing rehabilitation or housing construction is subject to the Section 3 requirements applicable to housing and community development activities as set forth in 12 U.S.C. 1701u(c)(2) and (d)(2) and the regulations derived from such provisions except that, with the exception of transactions receiving HUD housing and community development assistance, such as CDBG (24 CFR part 570) or HOME (24 CFR part 92), first priority for employment and other economic opportunities shall be given to residents of public housing or Section 8 assisted housing. Otherwise, the receipt of Section 8 rental assistance does not, in itself, trigger the applicability of Section 3."

4. What recordkeeping responsibilities do contractors/subcontractors have if they receive Section 3 covered contracts?

Recordkeeping requirements for recipients are found at 24 CFR § 75.31. Recipients are required to maintain documentation to demonstrate compliance with the regulations and are responsible for requiring their contractors/subcontractors to maintain or provide any documentation that will assist recipients in demonstrating compliance, including documentation that shows hours worked by Section 3 workers, Targeted Section 3 workers, and any qualitative efforts to comply with Section 3. Examples of documentation can be found in 24 CFR §75.31.

5. Do the Section 3 requirements apply to material only contracts?

No. Section 3 does not apply to material only contracts or those that do not require any labor. For example, a contract for office or janitorial supplies would not be covered by Section 3. In this example, Section 3 would be encouraged but not required. However, a contract to replace windows that includes the removal of existing windows and the installation of new windows would be covered due to the involvement of labor.

6. Do the Section 3 requirements apply to Section 8 project-based rental assistance contracts?

No. Section 8 project-based voucher or project-based rental assistance housing assistance payment contracts, are not covered by the statute, including properties converted through the Rental Assistance Demonstration (RAD).

7. Are maintenance projects covered by Section 3?

Yes, but only for PIH funded programs administered by Public Housing Authorities.

8. Does the reduction and abatement of lead-based paint hazards constitute housing rehabilitation?

No, reduction and abatement of lead-based paint hazards focuses on mitigating lead paint hazards only, not conducting general rehabilitation activities.

9. Are demolition projects covered by the requirements of Section 3?

Yes. Recipients of assistance covered by Section 3 should, where feasible, comply with Section 3 benchmarks.

10. Are professional service contracts required to be reported under Section 3?

No, professional service contracts for non-construction services that require an advanced degree or professional licensing are not required to be reported as a part of total Section 3 labor hours. However, this exclusion does not cover all non-construction services.

However, professional services staff labor hours are permitted to be reported and PHAs will be given credit for reporting opportunities created for professional services by including professional services labor hours in the numerator, and not in the denominator, of the reported outcome ratios. The reporting structure in the rule allows a recipient to count any work performed by a professional services Section 3 worker or Targeted Section 3 worker as Section 3 labor hours and as Targeted Section 3 labor hours (i.e., in the numerator of the calculation), even when the professional services as a whole are not counted in the baseline reporting (i.e., in the denominator of the calculation). The effect of this reporting structure is to give a recipient a bonus if they are able to report Section 3 hires in the professional services context.

11. Does Section 3 apply to labor hours by a CDBG-Entitlement recipient?

Yes. If the recipient intends to use its HUD grant to perform housing construction, rehabilitation, or other public construction and the total HUD assistance to the project exceeds $200,000, then Section 3 applies to the project.

12. Does Section 3 apply to labor hours by a Public Housing Authority?

Yes. Section 3 applies to all Public Housing capital, operating, or development funds.

III. CONSISTENCY WITH OTHER LAWS:

1. Are recipients required to comply with Federal/state/local laws in addition to Section 3?

Yes. Compliance with Section 3 shall be achieved, to the greatest extent feasible, consistent with existing Federal, state and local laws and regulations. Accordingly, recipients of Section 3-covered assistance are required to develop strategies for meeting both the regulatory requirements at 24 CFR part 75 and any other applicable statutes or regulations.

2. What is the relationship between Section 3 and Davis Bacon requirements?

Compliance with Section 3 must be achieved consistent with the requirements of Davis-Bacon. Certain construction contracts are subject to compliance with the requirement to pay prevailing wages determined under the Davis-Bacon Act (40 U.S.C. 3141 et seq.) and implementing U.S. Department of Labor regulations in 29 CFR Part 5. Additionally, certain HUD-assisted rehabilitation and maintenance activities on public housing projects are subject to compliance with the requirement to pay prevailing wage rates, as determined or adopted by HUD, to laborers and mechanics employed in this work.
(24 CFR § 965.101).

3. What does the new rule mean for Tribes and Tribally Designated Housing Entities?

After the Section 3 new rule went into effect on November 30, 2020, Tribes and Tribally Designated Housing Entities under the Indian Housing Block Grant and Indian Community Development Block Grant programs are no longer required comply with Section 3 requirements.

The new rule at 24 CFR part 75 provides that contracts, subcontracts, grants, or subgrants subject to Section 7(b) of the Indian Self-Determination and Education Assistance Act (25 U.S.C. 5307(b)) or subject to tribal preference requirements as authorized under 101(k) of the Native American Housing Assistance and Self-Determination Act (25 U.S.C. 4111(k)) must provide preferences in employment, training, and business opportunities to Indians and Indian organizations, and are therefore not subject to the requirements of 24 CFR Part 75.

IV. RECIPIENT RESPONSIBILITIES:

1. What are the responsibilities of recipient agencies under Section 3?

Recipients are required to ensure their own compliance and the compliance of their contractors/subcontractors with the Section 3 regulations, as outlined at 24 CFR part 75. These responsibilities include but are not limited to the following:

Designing and implementing procedures to comply with the requirements of Section 3: Recipient agencies must take an active role in ensuring Section 3 compliance. The first step is implementing procedures to ensure that all parties, including residents, businesses, contractors, and subcontractors, comply with Section 3 and maintain records verifying that compliance.

Facilitating the training and employment of Section 3 workers: The recipient agency must act as a facilitator, connecting Section 3 workers to training and employment opportunities.

Facilitating the award of contracts to Section 3 business concerns: The recipient agency must also work to link developers and contractors with capable Section 3 business concerns. Additionally, recipient agencies, when necessary, may direct Section 3 business concerns to organizations that provide capacity-building training.

Ensuring Contractor and Subcontractor Awareness of and Compliance with Section 3 Benchmarks and responsibilities: The recipient agency is responsible for ensuring that contractors and subcontractors are aware of, and in compliance with, Section 3 requirements.

Ensuring Compliance and Meeting Numerical Benchmarks: Recipient agencies shall ensure compliance with Section 3 by assessing the hiring and subcontracting needs of contractors; regularly monitoring contractor compliance; assisting and actively cooperating with the Secretary of HUD in obtaining the compliance of contractors; penalizing non-compliance; providing incentives for good performance; and refraining from entering into contracts with any contractor that previously failed to comply with the requirements of Section 3.

Reporting Requirements: Recipient agencies must document all actions taken to comply with the requirements of Section 3 and report these activities either through the Section 3 Performance Evaluation and Registration System (SPEARS), for Public Housing financial assistance, or any reporting system designated by program areas overseeing other funding.

2. What are the reporting requirements for legacy contracts entered into under the old Part 135 rule?

On and after November 30, 2020, Section 3 regulations codified at 24 CFR Part 135 (the old rule) have not applied and will not apply to new grants, commitments, contracts, or projects. Contracts executed or projects for which assistance or funds were committed prior to November 30, 2020 are still required to adhere to the requirements of the old rule. Recipients of such assistance or funds will still be expected to maintain records of Section 3 statutory, regulatory, and contractual compliance but will no longer be required to report Section 3 compliance to HUD in SPEARS. HUD does not require funding recipients to change or alter contracts that were in place prior to the new Section 3 requirements becoming effective on November 30, 2020.

3. What are the reporting requirements for Section 3 projects for which assistance or funds are committed during the transition period?

Projects for which assistance or funds are committed between November 30, 2020 and July 1, 2021 are subject to the new Section 3 regulations found in 24 CFR part 75, and HUD expects that funding recipients will begin following this final rule's requirements for new grants, commitments, and contracts. Recipients will be expected to maintain records of statutory, regulatory, and contractual compliance with Section 3 for these projects but will not be required to report to HUD on the requirements found in 24 CFR part 75.

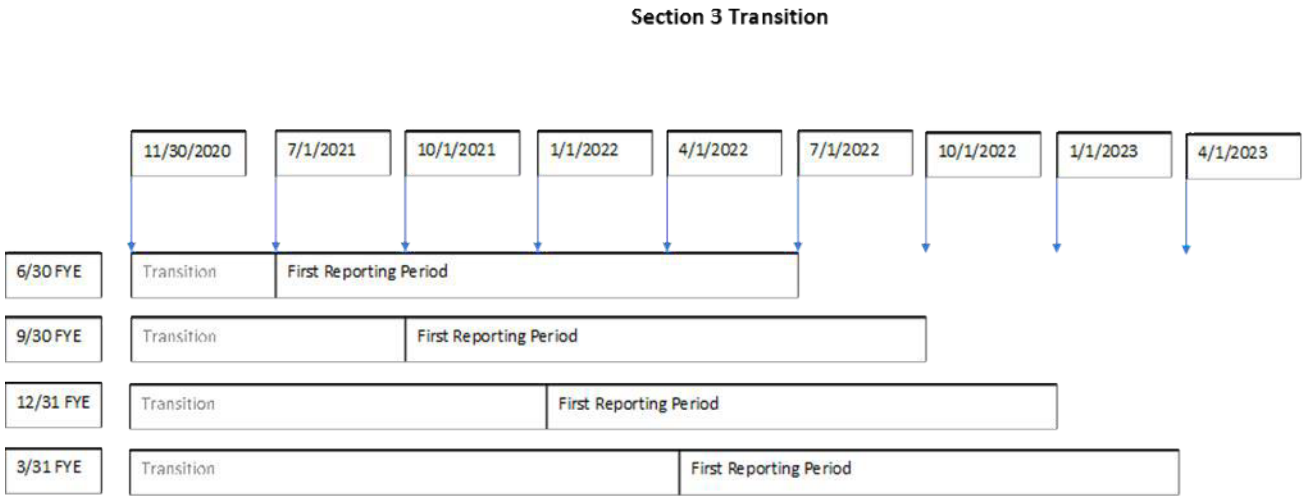
During the transition period between November 30, 2020 and July 1, 2021, recipients are expected to plan and revise processes, systems, and documents to comply with the new rule's requirements. During this time, funding recipients are still required to comply with Section 3's statutory requirements by ensuring that, to the greatest extent feasible, recipients continue to direct economic opportunities generated by certain HUD financial assistance to low- and very low-income persons and businesses that provide economic opportunities to low- and very low-income persons.

Recipients and employers should use this time to update policies and procedures for tracking labor hours and other requirements to ensure compliance with the new rules for projects for which funds are committed on or after July 1, 2021.

4. What is the reporting timeline for Public Housing Authorities and other recipients of public housing financial assistance?

As of November 30, 2020, PHAs' requirement to report their Section 3 activities and efforts starts 60 days after the end of their first fiscal year that begins after July 1, 2021. Please see the charts below for examples of PHA reporting schedules:

Fiscal Year End	New Reporting Period Begins	New Reporting Period Ends
6/30/21	7/1/21	6/30/22
9/30/21	10/1/21	9/30/22
12/31/21	1/1/22	12/13/22
3/31/22	4/1/22	3/31/23



5. What are the reporting requirements for Public Housing Authorities and other recipients of public housing financial assistance during the transition period?

All recipients of public housing financial assistance are required to follow the new Section 3 regulations found in 24 CFR part 75 beginning on November 30, 2020, and HUD expects that funding recipients and employers will begin following this final rule's requirements for new grants, commitments, and contracts on and after this date. Recipients will be expected to maintain records of statutory, regulatory, and contractual compliance with Section 3 but will not be required to report in SPEARS on the requirements found in 24 CFR part 75 until the recipient's first full fiscal year after July 1, 2021, as indicated in Question #4 above.

During the transition period between November 30, 2020 and a PHA or other recipient's required reporting start date, employers and grantees are expected to plan and revise processes, systems, and documents to comply with the new rule's requirements. During this time, PHAs and other recipients are still required to comply with Section 3's statutory requirements by ensuring that, to the greatest extent feasible, PHA's continue to direct economic opportunities generated by certain HUD financial assistance to low- and very low-income persons, tenants of public and assisted housing, and businesses that provide economic opportunities to low- and very low-income persons.

6. What are good strategies for targeting Section 3 workers and businesses?

In order to successfully target Section 3 workers and businesses for employment and contracting opportunities, recipients must establish and maintain an effective Section 3 program. HUD has found that hiring a Section 3 coordinator or assigning one individual the responsibility of coordinating all Section 3 related activities is instrumental in reaching Section 3's employment and contracting goals.

It is recommended that recipient agencies establish procedures to certify Section 3 workers and Section 3 business concerns for employment and contracting opportunities. Thereafter, they should maintain a list of eligible workers and businesses by skill, capacity or interest and contact them on a periodic basis when employment and contracting opportunities are available. Refer to the Section 3 regulations at 24 CFR § 75.15(b) and § 75.25(b) for a listing of qualitative efforts.

7. Are funds provided to recipients so that they can comply with the requirements of Section 3?

No. Funding has not been appropriated for Section 3 compliance. Section 3 requirements are only triggered when the normal expenditure of covered funds results in employment, training, or contracting opportunities.

8. Are Section 3 workers or business concerns guaranteed employment or contracting opportunities under Section 3?

Section 3 is not an entitlement program; therefore, employment and contracts are not guaranteed. Low- and very low-income individuals and Section 3 business concerns must be able to demonstrate that they have the ability or capacity to perform the specific job or successfully complete the contract that they are seeking.

9. Are recipients, developers, and contractors required to provide long- term employment opportunities, and not simply seasonal or temporary employment?

Recipients, developers, and contractors are required, to the greatest extent feasible, to direct employment opportunities to low- and very low-income persons, including seasonal and temporary employment opportunities. Benchmark goals include the calculation of all Section 3 worker and Targeted Section 3 Worker labor hours as a percentage of all labor hours worked on a project.

Recipients, developers, and contractors are encouraged to provide long-term employment to ensure that they meet the benchmark goals.

10. When might a recipient agency be exempt from the quantitative reporting requirements of Section 3?

A Small Public Housing Agency (less than 250 units) may elect to not report on labor hours. If the agency does elect not to report on labor hours, it is required to report solely on qualitative efforts as permitted in 24 CFR § 75.15(d).

11. Are recipients required to request developers or contractors to make payments into Section 3 training or implementation funds?

No. Recipients are not required to request contractors to make payments into a fund.

V. SECTION 3 CERTIFICATION:

1. How can a prospective Section 3 worker or business concern certify that they meet the eligibility requirements?

The individual or business must contact the agency or developer from which they are seeking employment or contracting opportunities (e.g.., the PHA, city, or local government). They should identify themselves as a Section 3 worker, Targeted Section 3 worker, or Section 3 business concern and provide whatever documentation that the recipient agency requires under their certification procedures. Prospective Section 3 workers and business concerns may self-certify that they meet the requirements as defined in the regulations. HUD recipients, contractors and subcontractors may also establish their own system to certify Section 3 workers and business concerns.

2. What documentation must be maintained by HUD recipients, subrecipients, contractors, and/or subcontractors certifying that low- and very-low individuals and business concerns meet the regulatory definitions under Section 3?

There are many ways that a worker can be certified as either a Section 3 Worker or Targeted Section 3 Worker under 24 CFR part 75:

For a worker to qualify as a Section 3 worker, one of the following must be maintained:

(i) A worker's self-certification that their income is below the income limit from the prior calendar year;
(ii) A worker's self-certification of participation in a means-tested program such as public housing or Section 8-assisted housing;
(iii) Certification from a PHA, or the owner or property manager of project-based Section 8-assisted housing, or the administrator of tenant-based Section 8-assisted housing that the worker is a participant in one of their programs;
(iv) An employer's certification that the worker's income from that employer is below the income limit when based on an employer's calculation of what the worker's wage rate would translate to if annualized on a full-time basis; or
(v) An employer's certification that the worker is employed by a Section 3 business concern.

(2) For a worker to qualify as a Targeted Section 3 worker, one of the following must be

maintained:

For Public Housing Financial Assistance projects:

(i) A worker's self-certification of participation in public housing or Section 8-assisted housing programs;
(ii) Certification from a PHA, or the owner or property manager of project-based Section 8 – assisted housing, or the administrator of tenant-based Section 8-assisted housing that the worker is a participant in one of their programs;
(iii) An employer's certification that the worker is employed by a Section 3 business concern; or
(iv) A worker's certification that the worker is a YouthBuild participant.

For Housing and Community Development Financial Assistance projects:

(i) An employer's confirmation that a worker's residence is within one mile of the work site or, if fewer than 5,000 people live within one mile of a work site, within a circle centered on the work site that is sufficient to encompass a population of 5,000 people
according to the most recent U.S. Census;

(ii) An employer's certification that the worker is employed by a Section 3 business concern; or

(iii) A worker's self-certification that the worker is a YouthBuild participant.

The documentation must be maintained for the time period required for record retentions in accordance with applicable program regulations or, in the absence of applicable program regulations, in accordance with 2 CFR § 200.334, Retention Requirements for Records (www.ecfr.gov/cgi-bin/retrieveECFR?n=se2.1.200_1334), which provides for retaining records for at least three years, as described in detail in that regulation..

A PHA or recipient may report on Section 3 workers and Targeted Section 3 workers for five years from when their certification as a Section 3 worker or Targeted Section 3 worker is established.

3. What are examples of acceptable evidence to determine eligibility as a Section 3 worker?

HUD does not prescribe that any specific forms of evidence to establish Section 3 eligibility.

Acceptable documentation includes, but is not limited to the following:

- Proof of residency in a public housing project; or
- Evidence of participation in the YouthBuild program.

4. What are examples of acceptable evidence for determining eligibility as a Section 3 business concern?

HUD does not prescribe that any specific forms of evidence be required to establish Section 3 eligibility. The business seeking the preference must be able to demonstrate that they meet one of the following criteria:

1. At least 51 percent owned and controlled by low- or very low-income persons;
2. Over 75 percent of the labor hours performed for the business over the prior three-month period are performed by Section 3 workers; or
3. A business at least 51 percent owned and controlled by current public housing residents or residents who currently live in Section 8-assisted housing.

5. Are all public housing residents considered Section 3 workers regardless of their income?

No. To qualify as a Section 3 Worker, an individual must meet one of the following criteria:

1. The worker's income for the previous or annualized calendar year is below the income limit established by HUD;
2. The worker is employed by a Section 3 business concern; or
3. The worker is a YouthBuild participant.

6. Does qualifying as a Section 3 businesses mean that the business will be selected if it meets the technical requirements of the bid, regardless of bid price?

No. As provided in 2 CFR 200.318, contract awards shall only be made to responsible contractors possessing the ability to perform under the terms and conditions of the proposed contract. In order to meet the requirements of Section 3 and Federal and state procurement laws, recipient agencies must develop procedures that are consistent with all applicable regulations.

7. Can contracting with MBE/WBE businesses count towards Section 3 benchmarks?

It depends. Section 3 is race and gender neutral. Only MBEs/WBEs that meet the eligibility criteria as a Section 3 business concern set forth in the regulation can be counted towards the Section 3 labor hour calculation.

8. Does a business have to be incorporated to be considered a Section 3 eligible business?

No. A Section 3 business concern can be any type of business, such as a sole proprietorship, partnership, or a corporation, properly licensed and meeting all legal requirements to perform the contract under consideration.

VI. ECONOMIC OPPORTUNITIES NUMERICAL BENCHMARKS:

1. How can low- and very low-income persons and businesses locate recipient agencies that are required to comply with Section 3 in their area?

To find local recipients' agencies, Section 3 residents or businesses should contact their local HUD office. To find your closest office, visit: www.hud.gov/localoffices.

2. How can I find Section 3 business concerns in my area?

Contact local recipient agencies to find Section 3 business concerns in your area. Section 3 business concerns that have registered in the Section 3 Business Registry are also available at: https://portalapps.hud.gov/Sec3BusReg/BRegistry/BRegistryHome.

3. Do the benchmark requirements only count toward new hires?

No, the rule does not apply to only new hires, but if someone is currently on staff and qualifies as a Section 3 resident under 24 CFR part 135, they will need to re-certify as either a Section 3 worker or Targeted Section 3 worker under 24 CFR part 75.

4. Should PHA's report on staff hours?

Yes, but not all PHA staff qualify as Section 3 workers. Only PHA staff that meet the definition of a Section 3 worker or Targeted Section 3 worker would qualify to be counted toward total Section 3 or Targeted Section 3 labor hours. Once a PHA determines that a Section 3 worker or Targeted Section 3 worker is hired or currently employed, the PHA would just report those hours as the numerator over the total labor hours funded with public housing financial assistance as the denominator.

5. What category of PHA Staff should be included?

Both salaried and hourly workers need to be reported. There is a limited good faith assessment exception for PHAs and other recipient employers of hourly and salaried workers that are not subject to requirements specifying time and attendance reporting and do not have systems already in place to track labor hours. This exception is to address employers that do not already track labor hours without making changes in time and attendance or payroll.

6. Are recipient agencies required to meet the Section 3 benchmarks, or are they optional?

The Section 3 benchmarks are minimum targets that must be reached in order for the Department to consider a recipient in compliance. Recipient agencies are required to make best efforts, or to the greatest extent feasible, to achieve the benchmarks required for the number of labor hours performed by both Section 3 workers and Targeted Section 3 workers. If an agency fails to fully meet the Section 3 benchmarks, they must adequately document the efforts taken to meet the numerical goals (see Question #9 for a discussion of safe harbor.)

7. Will there be changes to the benchmark requirements?

The Secretary of Housing and Urban Development is required in the Benchmark Notice published in the Federal Register to review and update the Benchmarks by Federal Register notice no less frequently than once every three years.

8. What is considered "other" public construction?

Other public construction includes infrastructure work, such as extending water and sewage lines, sidewalk repairs, site preparation, and installing conduits for utility services.

9. What is the meaning of the safe harbor determination?

Recipients will be considered to have complied with the Section 3 requirements and met the safe harbor, in the absence of evidence to the contrary, if they certify that they have followed the required prioritization of effort and met or exceeded the applicable Section 3 benchmarks.

If a recipient agency or contractor does not meet the benchmark requirements but can provide evidence that they have made a number of qualitative efforts to assist low- and very low-income persons with employment and training opportunities, the recipient or contractor is considered to be in compliance with Section 3, absent evidence to the contrary (i.e., evidence or findings obtained from a Section 3 compliance review).

VII. SECTION 3 COMPLAINTS:

1. How should complaints be made?

Complaints alleging failure of compliance with this part may be reported to the HUD program office responsible for the public housing financial assistance or the Section 3 project, or to the local HUD field office. These offices can be found through the HUD website, www.hud.gov/.

2. Where else can I file complaints alleging denied employment and contracting opportunities?

You may be eligible to bring complaints under other federal laws. The U.S. Equal Employment Opportunity Commission (EEOC) is responsible for enforcing federal laws that make it illegal to discriminate against a job applicant or an employee because of the person's race, color, religion, sex (including pregnancy), national origin, age (40 or older), disability or genetic information (medical history or predisposition to disease). For more information about your rights, please contact EEOC at: www.EEOC.gov.

The Department of Labor Office of Federal Contract Compliance Programs (OFCCP) enforces, for the benefit of job seekers and wage earners, the contractual promise of affirmative action and equal employment opportunity required of those who do business with the Federal government. More information about the services they provide can be obtained at: http://www.dol.gov/ofccp/.

SECTION 01022

CERTIFICATION OF **PRIME CONTRACTOR** REGARDING SECTION 3 AND SEGREGATED FACILITIES

YWCA GREATER NEW ORLEANS
NEW DAYCARE, EDUCATION & COUNSELING BUILDING

Name of Prime Contractor	Project Name

The undersigned hereby certifies that:

a) Section 3 provisions are included in the Contract;

b) To the greatest extent feasible economic opportunities, most importantly employment, generated by this project shall be directed to low- and very low-income persons, particularly those who are recipients of government assistance for housing or residents of YWCA Greater New Orleans.

c) No segregated facilities will be maintained as required by Title VI of the Civil Rights Act of 1964.

Typed Name and Title of Authorized Representative	Company (Prime Contractor)
Signature of Authorized Representative	Date

SECTION 01023

CERTIFICATION OF **SUBCONTRACTOR** REGARDING SECTION 3 AND SEGREGATED FACILITIES

YWCA GREATER NEW ORLEANS
NEW DAYCARE, EDUCATION & COUNSELING BUILDING

Name of Subcontractor	Project Name

The undersigned hereby certifies that:

a) Section 3 provisions are included in the Contract;

b) To the greatest extent feasible economic opportunities, most importantly employment, generated by this project shall be directed to low- and very low-income persons, particularly those who are recipients of government assistance for housing or residents of YWCA Greater New Orleans.

c) No segregated facilities will be maintained as required by Title VI of the Civil Rights Act of 1964.

Typed Name and Title of Authorized Representative	Company (Prime Contractor)
Signature of Authorized Representative	Date

SECTION 01024

CONTRACTOR SECTION 3 PLAN

YWCA GREATER NEW ORLEANS
NEW DAYCARE, EDUCATION & COUNSELING BUILDING

[Name of Contractor], Contractor, agrees to ensure, to the greatest extent feasible, that economic opportunities, most importantly employment, generated by CDBG financial assistance shall be directed to low- and very low-income persons, particularly those who are recipients of government assistance for housing or residents of the community in which the CDBG financial assistance is spent.

Goals

To the greatest extent feasible, and consistent with existing Federal, state, and local laws and regulations, the Contractor agrees to comply with the employment and training, and contract prioritization efforts of 24 CFR 75.19. The goals of this Plan are, where feasible, to:

- Provide employment opportunities and training to Section 3 workers, participants in YouthBuild programs.
- Provide contacting opportunities to qualified Section 3 business concerns.
- Give priority for employment opportunities and training to Section 3 workers residing within the service area of the project and participants in YouthBuild Programs.

On this project, the Contractor and its subcontractors will collectively strive to meet the following Section 3 minimum labor hour benchmarks:

Labor Hour Standard	Ratio Formula	Minimum %
Section 3 Workers	Section 3 Worker Hours ÷ Total Labor Hours	25%
Targeted Section 3 Workers	Targeted Section 3 Worker Hours ÷ Total Labor Hours	5%

Reporting

To document the Contractor's and subcontractor's efforts to achieve the benchmarks and comply with the reporting requirements set forth in 24 CFR 75.25(a), the Contractor and its subcontractors will complete and submit the following certifications and reports[1] as applicable:

- Section 3 Employee Data Form and Self-Certification.
- Section 3 Business Concern Contractor/Subcontractor Certification.
- Section 3 Activity and Good Faith Efforts Report (quarterly).
- Section 3 Employee Roster-Job specific
- Section 3 Utilization Report (final)

Contract Provisions

In compliance with 24 CFR 75.27, the Contractor will include contract provisions in all subcontract agreements that require the subcontractor to meet the requirements of 24 CFR 75.19 as outlined above.

The undersigned declares that the Contractor agrees to implement this Section 3 Plan for the above-named Section 3 covered project.

Printed Name and Title	Authorized Signature	Date

[1] The Contractor may substitute an internal computer-generated employee registry in lieu of completing a specific form or report provided it includes the worker's name, worker's address, employer, hours worked and indicates Section 3/targeted Section 3 Status.

SECTION 01025

SECTION 3 WORKER SELF CERTIFICATION

YWCA GREATER NEW ORLEANS
NEW DAYCARE, EDUCATION & COUNSELING BUILDING

To be completed by Employee:

Employee General Information

1. Name of Employer _____
2. Name of Employee _____
3. Street Address of Employee _____
4. City and Zip Code of Employee _____
5. Phone Number and Email _____
6. Date of Employment _____

The purpose of this form is to comply with Section 3 of the HUD Act of 1968 employer certification requirements listed in 24 CFR § 75.31. To qualify as a Section 3 worker, any United States legal resident's annual income must not exceed the HUD income limits for the year before the worker was hired, or the individual's current income annualized on a full-time basis for the year must be below the HUD income limit. Additionally, an individual can qualify as a Section 3 worker if they are a YouthBuild participant or employee of a Section 3 Business concern.

SECTION 3 WORKER QUALIFICATIONS

To qualify as a Section 3 Worker, you must meet **one** of the following requirements **OR** have your employer certify that you are employed by a Section 3 Business Concern.

• Income for the previous calendar year is below the income limit* • A participant in a means-tested program such as public housing or Section 8-assisted housing • A YouthBuild Participant*	Income limit $XX,XXX

* Currently or at the time of hire if hired within the past 5 years

Income Limit is the HUD 80% One Person Income Limit for Parish for which employee resides. Income limits may be obtained at: Income Limits | HUD USER

☐ I meet at least one of the requirements in the box above and therefore qualify to be counted as a Section 3 Worker under 24 CFR § 75.

TARGETED SECTION 3 WORKER QUALIFICATIONS

If applicable, please indicate which requirement you meet to be considered a Targeted Section 3 worker in the box below. If you select "Living within the service area or neighborhood of the project," that selection will have to be confirmed by your employer. If you do not meet any of these requirements or do not know if you meet any of the requirements listed below, you may leave this section blank.

___	Living within the service area or neighborhood of the project (requires employer confirmation)*
___	YouthBuild participant*

*Currently or at the time of hire if hired within the past 5 years

Service area or the neighborhood of the project means an area within one mile of the Section 3 project or, if fewer than 5,000 people live within one mile of a Section 3 project, within a circle centered on the Section 3 project that is sufficient to encompass a population of 5,000 people according to the most recent U.S. Census.

☐ In addition to qualifying as a Section 3 Worker, I meet at least one of the requirements in the box above and therefore qualify to be counted as a Targeted Section 3 Worker under 24 CFR § 75.

I/We, the undersigned, certify under penalty of perjury that the information provided above is true and correct and certifies that the worker identified above meets the definition of a Section 3 worker. WARNING: Anyone who knowingly submits a false claim or makes a false statement is subject to criminal and/or civil penalties, including confinement for up to 5 years, fines, and civil and administrative penalties. (18 U.S.C. §§ 287, 1001, 1010, 1012; 31 U.S.C. §3729, 3802)

_____ _____

Signature Date

SECTION 01026

SECTION 3 WORKER EMPLOYER CERTIFICATION FORM

YWCA GREATER NEW ORLEANS
NEW DAYCARE, EDUCATION & COUNSELING BUILDING

To be completed by Employer:

A. Employer General Information

1. Name of Employer _____
2. Street Address of Employer _____
3. City and Zip Code of Employer _____
4. Phone Number and Email _____

The purpose of this form is to comply with Section 3 of the HUD Act of 1968 employer certification requirements listed in 24 CFR § 75.31. To qualify as a Section 3 worker, the United States legal resident's annual income must not exceed the HUD income limits for the year before the worker was hired, or the individual's current income annualized on a full-time basis for the year must be below the HUD income limit. Additionally, an individual can qualify as a Section 3 worker and Targeted Section 3 worker, if an employee of a Section 3 Business Concern. To qualify as a Targeted Section 3 worker, an employer can confirm that the employee lives within the service area or neighborhood of the project.

B. Employee General Information

1. Name of Employee _____
2. Street Address of Employee _____
3. City and Zip Code of Employee _____
4. Phone Number and Email _____

SECTION 3 WORKER AND TARGETED SECTION 3 WORKER QUALIFICATIONS

Please indicate which of the following is true for the worker listed above: (Select ALL that apply)

___ Worker's income from your employment is below the income limit based on a calculation of what the worker's wage rate would translate to if annualized on a full-time basis* ___ Worker is employed by a Section 3 Business Concern (Select if your business qualifies as a Section 3 Business Concern) ___ Worker's residence is within the service area or neighborhood of the project *	Income Limit $XX,XXX

*Currently or at the time of hire if hired within the past 5 years

Income Limit is the HUD 80% One Person Income Limit for Parish for which employee resides. Income limits may be obtained at: Income Limits | HUD USER

Service area or the neighborhood of the project means an area within one mile of the Section 3 project or, if fewer than 5,000 people live within one mile of a Section 3 project, within a circle centered on the Section 3 project that is sufficient to encompass a population of 5,000 people according to the most recent U.S. Census.

I/We, the undersigned, certify under penalty of perjury that the information provided above is true and correct and certifies that the worker identified above meets the definition of a Section 3 worker. WARNING: Anyone who knowingly submits a false claim or makes a false statement is subject to criminal and/or civil penalties, including confinement for up to 5 years, fines, and civil and administrative penalties. (18 U.S.C. §§ 287, 1001, 1010, 1012; 31 U.S.C. §3729, 3802)

Employer Signature _____ Date _____

SECTION 01027

SECTION 3 BUSINESS CONCERN CONTRACTOR/SUBCONTRACTOR CERTIFICATION

YWCA GREATER NEW ORLEANS
NEW DAYCARE, EDUCATION & COUNSELING BUILDING

Name of Business:_____

Name of Business Owner:_____

Address of Business:_____

Phone Number:_____

Email Address:_____

Type of Business: ____ Corporation ____ Partnership ____ Sole Proprietorship ____ Joint Venture

The undersigned hereby certifies that **(select any that apply):**

_____ The business is at least 51% owned and controlled by low or very low income persons; **or**

_____ Over 75% of the labor hours performed for the business over the previous 3 month period are preformed by Section 3 workers; **or**

_____ The business is at least 51% owned and controlled by current resident of public housing or Section 8 assisted housing.

Business Concern Affirmation

I affirm and certify that the above statements are true, complete, and correct to the best of my knowledge and belief. I understand that businesses who misrepresent themselves as Section 3 business concerns and report false information may have their contracts terminated as default and be barred from ongoing and future considerations for contracting opportunities. I hereby certify, under penalty of law, that all information provided is correct to the best of my knowledge.

_____
Name & Title of Company Representative (Print or Type)

_____ _____
Signature Date

FOR ADMINISTRATIVE USE ONLY

Qualifies as Section 3 Business Concern: _____ Yes _____ No
By: _____ Date: _____

*This certification expires six (6) months after date of signature.

SECTION 01028

SECTION 3 ACTIVITY AND GOOD FAITH EFFORTS QUARTERLY REPORT

YWCA GREATER NEW ORLEANS
NEW DAYCARE, EDUCATION & COUNSELING BUILDING

General Contractor: _____

Subcontractor (If applicable): _____

Reporting Period: _____ **Report Type: Quarterly**

Quarterly
January – March: Due April 15th
April – June: Due July 15th
July – September: Due October 15th
October – December: Due January 15th

Contractor Section 3 Point of Contact: _____

Phone: _____ Email: _____

Section 3 Goals

Section 3 is a provision of the Housing and Urban Development (HUD) Act of 1968 that helps foster local economic development, neighborhood economic improvement, and individual self-sufficiency. The Section 3 program requires recipients of certain HUD financial assistance to provide job training, employment, and contracting, to the greatest extent feasible, for low- or very low-income residents in connection with projects andactivities in their neighborhoods. Section 3 is race and gender-neutral and is NOT the same as WBE/MBE.

Projects over $200,000 trigger Section 3. When triggered, best efforts must be made to extend Section 3 opportunities to verified Section 3 residents and business concerns to meet these *minimum* numeric goals:

1. Twenty-five percent (25%) of the total hours on a Section 3 project worked by Section 3 workers; and
2. Five percent (5%) of the total hours on a Section 3 project worked by Targeted Section 3 workers.

Programmatic Responsibilities

Contractors and/or Subcontractors are expected to meet the minimum goals listed above, to the greatest extent feasible. All efforts to utilize Section 3 businesses and workers should be documented.

PART 1: SECTION 3 COMPLIANCE (See Sample Labor Hour Tracker for example of information to be compiled for reporting – Page 6 of 6)		
I. SECTION 3 HOURS WORKED – *Report the number of Section 3 hours for this reporting period.*		
A. Total hours worked this period by all workers	B. Number of Section 3 hours worked this period	% Section 3 hours (Divide column B by column A)
II. TARGETED SECTION 3 HOURS WORKED – *Report the number of targeted Section 3 hours for this reporting period*		
A. Total hours worked this period by all workers	B. Number of targeted Section 3 hours worked this period	% Targeted Section 3 hours (Divide column B by column A)

PART 2: SUBCONTRACTOR INFORMATION

- ☐ This project WILL NOT utilize subcontractors.
- ☐ This project MAY utilize the following subcontractors:

No.	Sect3 Bus.	Subcontractor Name	Subcontractor Address and Phone Number	Trade	Subcontract Amount
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					
25					
26					
27					
28					

PART 3: PERMANENT EMPLOYEES (On This Project Only)

Please list all current permanent employees (both full and part-time) employed by your company (or local/regional office) as of the signature date on Section 001020 – Certification of Prime Contractor Regarding Section 3 and Segregated Facilities, as well as employees of all subcontractors working on this project. Use additional sheets as necessary. A computer-generated employee registry can be provided in lieu of this form if it includes the worker's name, employer and job category and indicates Section 3/targeted Section 3 status.

No.	Name of Worker	Employer	Job Category/Trade	Section 3 Worker (Y/N)	Targeted Section 3 Worker (Y/N)
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					
25					
26					
27					
28					
29					
30					
31					
32					
33					
34					
35					
36					
37					
38					

PART 4: DOCUMENTATION OF QUALITATIVE EFFORTS

Describe efforts to provide Sec 3 Workers and Section 3 Business Concerns with first consideration for employment and contracting opportunities, and all outreach activities performed. If no activity, explain why*

1. Describe all efforts made to direct the employment and other economic opportunities generated by HUD financial assistance for housing and community development programs, to the greatest extent feasible, to Section 3 workers. Attach additional pages if needed.

   Attach supporting documentation such as:

   - Copies of all publications, notices, pictures of posted notices, and other outreach materials.
   - List of all Section 3 workers that responded to your responded to your outreach efforts (e.g., submitted job applications, phone logs, etc.); were any of them hired? If not, please explain why.

2. Describe all efforts made to notify Section 3 businesses of any subcontracting opportunities generated by HUD financial assistance for this project, to the greatest extent feasible. Attach additional pages if needed.

   Attach supporting documentation such as:

   - Section 3 Business List used in any solicitation.
   - List of Section 3 business included in any solicitation and documentation of efforts (emails, letters, phone, logs, etc.).
   - List of Section 3 businesses that responded to your solicitation and/or outreach efforts; were any ofthem hired? If not, please explain why.
   - Copies of all publications, notices, pictures of posted notices, and any other outreach material utilized.

.

3. Describe all additional qualitative efforts made to comply with Section 3 requirements. See below for examples. Attach all applicable supporting documentation.

4. If there are employment opportunities associated with your project, include a draft of the proposed signage. Section 3 signage should be posted at the construction site. Signage must be large enough to be visible from the street. The sign must (a) identify the name of the project, (b) state the project is a HUD Section 3 Project, and (c) include the name, phone number and email address of an appropriate point of contact regarding employment opportunities.

Examples of Qualitative Efforts

- Engage in outreach efforts to generate job applicants who are Targeted Section 3 workers
- Provide training or apprenticeship opportunities
- Provide technical assistance to help Section 3 workers compete for jobs (e.g., resume assistance, coaching)
- Assist or connect Section 3 workers with drafting resumes, preparing for interviews, and finding job opportunities
- Hold one or more job fairs
- Provide or refer Section 3 workers to services supporting work readiness and retention (e.g., work readiness activities, interview clothing, test fees, transportation, childcare)
- Provide assistance to apply for or attend community college, a four-year educational institution, or vocational/technical training
- Help Section 3 workers to obtain financial literacy training and/or coaching
- Engage in outreach efforts to identify and secure bids from Section 3 business concerns
- Provide technical assistance to help Section 3 business concerns understand and bid on contracts
- Divide contracts into smaller jobs to facilitate participation by Section 3 business concerns
- Provide bonding assistance, guaranties, or other efforts to support viable bids from Section 3 business concerns
- Promote use of business registries designed to create opportunities for disadvantaged and small businesses
- Outreach, engagement, or referrals with the state one-stop system as defined in Section 121(e)(2) of the Workforce Innovation and Opportunity Act

I declare that all statements contained in this report and any accompanying documents are true and correct, and made with full knowledge that all statements given are subject to investigation and that any false or dishonest answer to any question may be grounds for denial or revocation of funding or other penalties as prescribed under 18 U.S. Code § 1001.

Typed/Printed Name and Title of Company Representative

Signature of Company Representative **Date**

YWCA GREATER NEW ORLEANS

NEW DAYCARE, EDUCATION & COUNSELING BUILDING

LABOR HOURS TRACKER

Contractor:

Subcontractor:

Employee Name	Status				Hours Worked per Pay Period							
	Existing	New	Sec 3 Worker	Sec 3 Targeted Worker	PR #1	PR #2	PR #3	PR #4	PR #5	PR #6	PR #7	PR #8

LWI - 3/28/23

(Reporting and Compliance Form)

Section 3 Labor Hour Tracker Methodology

(Sample)

SECTION 01029

SECTION 3 UTILIZATION FINAL REPORT

YWCA GREATER NEW ORLEANS
NEW DAYCARE, EDUCATION & COUNSELING BUILDING

(To Be Completed By the Prime Contractor and Include Data for All Sub-Contractors and Submitted to Owner and Owner's Grant Manager After Substantial Completion**)**

A. Section 3 Employee Labor Information

1. Total number of Labor Hours on the project: _____

2. Total number of Section 3 Labor Hours on the project: _____

Percent of Total Labor Hours: _____

3. Total number of Targeted Section 3 Labor Hour on the project: _____

Percent of Total Labor Hours: _____

4. Number of Section 3 Employees Utilized on the Project by Prime Contractor: _____

5. Number of Section 3 Employees Utilized on the Project by Subcontractors: _____

6. Total Number of Section 3 Employees Utilized on Project: _____

7. Names of all subcontractors *(attach additional sheet if necessary)*:

_____ _____ _____

_____ _____ _____

B. Certification of Prime Contractor

General Contractor: _____

Address: _____

Phone: _____

As an officer and representative of the Company, I hereby certify that the above information is true and accurate and is reported fully for this construction project. It is understood final payment from the Owner for this project cannot be made until this report is submitted to the owner or authorized designee.

_____
Name & Title of Company Representative (Print or Type)

_____ _____
Signature Date

(Reporting and Compliance Form)

DIRECTIONS FOR COMPLETION OF SECTION 3 UTILIZATION REPORT

1. Determine the level of Section 3 participation in the construction project.
   a) All employees of the Prime Contractor and all subcontractors must fill out an Employee Information Form, to be retained by the Prime Contractor with copies submitted to the Owner's Compliance Officer. All new hires during the construction project must also complete the Employee Information Form.
   b) Distribute copies of the Employee Information Form to **all** subcontractors you engage for the project, for completion by all employees to be submitted to the prime for retention, with copies submitted to the Owner's Compliance Officer.
   c) Determine Section 3 eligibility for all employees in order to track labor hours performed (tracking spreadsheet provided separately)
2. Complete **(A) Section 3 Employee Information** area of the report.
   a) Enter the total number of labor hours on the project on Line 2.
   b) Enter the number of labor hours for Section 3 Workers, on Line 3; calculate the percentage (Line 2 divided by Line 3)
   c) Enter the number of labor hours for Targeted Section 3 Workers on Line 4; calculate the percentage (Line 2 divided by Line 4)
   d) Enter number of Section 3 Employees utilized by Prime Contractor on Line 5
   e) Enter number of Section 3 Employees utilized by subcontractors on Line 6
   f) Enter total number Section 3 Employees utilized on the project on Line 7 (Line 5 + Line 6)
   g) List all subcontractors on Line 8 (insert additional pages as needed)
3. Complete **(B) Certification by Prime Contractor** section of the report
   a) List name, address, and telephone of your company (prime contractor)
   b) Print or type the name and title of authorized company representative
   c) Have authorized company representative sign and date the Report

Important Reminder

Final payment of retainage funds will not be made until Section 3 Utilization Report is submitted to the Owner or Owner's Compliance Officer.

EXHIBIT C

REQUIRED CONTRACT PROVISIONS

REQUIRED CONTRACT PROVISIONS

FEMA REQUIRED CLAUSES ADDENDUM.

THE CONTRACT PROVISIONS REQUIRED BY FEMA AS DESCRIBED HEREIN ARE HEREBY INCORPORATED INTO THE STANDARD FORM OF AGREEMENT BETWEEN OWNER AND CONTRACTOR AIA DOCUMENT A101 -2017 BETWEEN Owner, YWCA Greater New Orleans ("YWCA") AND Contractor:

EQUAL EMPLOYMENT OPPORTUNITY.

Standard.

Except as otherwise provided under 41 C.F.R. Part 60, all contracts that meet the definition of "federally assisted construction contract" in 41 C.F.R. § 60- 1.3 must include the equal opportunity clause provided under 41 C.F.R. § 60-1.4(b), in accordance with Executive Order 11246**,** *Equal Employment Opportunity* (30 Fed. Reg. 12319, 12935, 3 C.F.R. Part, 1964-1965 Comp., p. 339), as amended by Executive Order 11375, *Amending Executive Order 11246 Relating to Equal Employment Opportunity*, and implementing regulations at 41 C.F.R. Part 60 (Office of Federal Contract Compliance Programs, Equal Employment Opportunity, Department of Labor). See 2 C.F.R. Part 200, Appendix II, ¶ C.

Key Definitions.

Federally Assisted Construction Contract. The regulation at 41 C.F.R. § 60-1.3 defines a "federally assisted construction contract" as any agreement or modification thereof between any applicant and a person for construction work which is paid for in whole or in part with funds obtained from the Government or borrowed on the credit of the Government pursuant to any Federal program involving a grant, contract, loan, insurance, or guarantee, or undertaken pursuant to any Federal program involving such grant, contract, loan, insurance, or guarantee, or any application or modification thereof approved by the Government for a grant, contract, loan, insurance, or guarantee under which the applicant itself participates in the construction work.

Contractor _____Owner _____

Construction Work. The regulation at 41 C.F.R. § 60-1.3 defines "construction work" as the construction, rehabilitation, alteration, conversion, extension, demolition or repair of buildings, highways, or other changes or improvements to real property, including facilities providing utility services. The term also includes the supervision, inspection, and other onsite functions incidental to the actual construction.

Applicability. This requirement applies to all FEMA grant and cooperative agreement programs.

The regulation at 41 C.F.R. Part 60-1.4(b) requires the insertion of the following contract clause:

"**During the performance of this contract, the contractor agrees as follows:**

(1) The contractor will not discriminate against any employee or applicant for employment because of race, color, religion, sex, sexual orientation, gender identity, or national origin. The contractor will take affirmative action to ensure that applicants are employed, and that employees are treated during employment without regard to their race, color, religion, sex, sexual orientation, gender identity, or national origin. Such action shall include, but not be limited to the following:
Employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. The contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided setting forth the provisions of this nondiscrimination clause.

(2) The contractor will, in all solicitations or advertisements for employees placed by or on behalf of the contractor, state that all qualified applicants will receive consideration for employment without regard to race, color, religion, sex, sexual orientation, gender identity, or national origin.

(3) The contractor will not discharge or in any other manner discriminate against any employee or applicant for employment because such employee or applicant has inquired about, discussed, or disclosed the compensation of the employee or applicant or another employee or applicant. This provision shall not apply to instances in which an employee who has access to the compensation information of other employees or applicants as a part of such employee's essential job functions discloses the compensation of such other employees or applicants to individuals who do not otherwise have access to such information, unless such disclosure is in response to a formal complaint

or charge, in furtherance of an investigation, proceeding, hearing, or action, including an investigation conducted by the employer, or is consistent with the contractor's legal duty to furnish information.

(4) The contractor will send to each labor union or representative of workers with which he has a collective bargaining agreement or other contract or understanding, a notice to be provided advising the said labor union or workers' representatives of the contractor's commitments under this section, and shall post copies of the notice in conspicuous places available to employees and applicants for employment.

(5) The contractor will comply with all provisions of Executive Order 11246 of September 24, 1965, and of the rules, regulations, and relevant orders of the Secretary of Labor.

(6) The contractor will furnish all information and reports required by Executive Order 11246 of September 24, 1965, and by rules, regulations, and orders of the Secretary of Labor, or pursuant thereto, and will permit access to his books, records, and accounts by the administering agency and the Secretary of Labor for purposes of investigation to ascertain compliance with such rules, regulations, and orders.

(7) In the event of the contractor's noncompliance with the nondiscrimination clauses of this contract or with any of the said rules, regulations, or orders, this contract may be canceled, terminated, or suspended in whole or in part and the contractor may be declared ineligible for further Government contracts or federally assisted construction contracts in accordance with procedures authorized in Executive Order 11246 of September 24, 1965, and such other sanctions may be imposed and remedies invoked as provided in Executive Order 11246 of September 24, 1965, or by rule, regulation, or order of the Secretary of Labor, or as otherwise provided by law.

(8) The contractor will include the portion of the sentence immediately preceding paragraph (1) and the provisions of paragraphs (1) through (8) in every subcontract or purchase order unless exempted by rules, regulations, or orders of the Secretary of Labor issued pursuant to section 204 of Executive Order 11246 of September 24, 1965, so that such provisions will be binding upon each subcontractor or vendor. The contractor will take such action with respect to any subcontract or purchase order as the administering agency may direct as a means of enforcing such provisions, including sanctions for noncompliance:

Provided, however, that in the event a contractor becomes involved in, or is threatened with, litigation with a subcontractor or vendor as a result of such direction by the administering agency, the contractor may request the United States to enter into such litigation to protect the interests of the United States.

The applicant further agrees that it will be bound by the above equal opportunity clause with respect to its own employment practices when it

participates in federally assisted construction work: Provided, That if the applicant so participating is a State or local government, the above equal opportunity clause is not applicable to any agency, instrumentality or subdivision of such government which does not participate in work on or under the contract.

The applicant agrees that it will assist and cooperate actively with the administering agency and the Secretary of Labor in obtaining the compliance of contractors and subcontractors with the equal opportunity clause and the rules, regulations, and relevant orders of the Secretary of Labor, that it will furnish the administering agency and the Secretary of Labor such information as they may require for the supervision of such compliance, and that it will otherwise assist the administering agency in the discharge of the agency's primary responsibility for securing compliance.

The applicant further agrees that it will refrain from entering into any contract or contract modification subject to Executive Order 11246 of September 24, 1965, with a contractor debarred from, or who has not demonstrated eligibility for, Government contracts and federally assisted construction contracts pursuant to the Executive Order and will carry out such sanctions and penalties for violation of the equal opportunity clause as may be imposed upon contractors and subcontractors by the administering agency or the Secretary of Labor pursuant to Part II, Subpart D of the Executive Order. In addition, the applicant agrees that if it fails or refuses to comply with these undertakings, the administering agency may take any or all of the following actions: Cancel, terminate, or suspend in whole or in part this grant (contract, loan, insurance, guarantee); refrain from extending any further assistance to the applicant under the program with respect to which the failure or refund occurred until satisfactory assurance of future compliance has been received from such applicant; and refer the case to the Department of Justice for appropriate legal proceedings

CONTRACT WORK HOURS AND SAFETY STANDARDS ACT

1. Applicability: This requirement applies to all FEMA grant and cooperative agreement programs.

2. Where applicable (see 40 U.S.C §3701), all contracts awarded by the non-federal entity in excess of $100,000.00 that involve the employment of mechanics or labors must include a provision for compliance with 40 U.S.C.§ 3702 and 3704 as supplemented by Department of Labor regulations at 29 C.F.R. Part 5 See 2 C.F.R Part 200, Appendix II ¶ E

3. Under 40 U.S.C. § 3702, each contractor must be required to compute the wage of every mechanic and laborer on the basis of a stand work week of 40 hours. Work in excess of the standard work week is permissible provided that the worker is compensated at a rate of not less than one and half times the basic rate of pay for all hours worked in excess of 40 hours in the work week.

Contractor _____Owner _____

4. The requirements of 40 U.S.C. § 3704 are applicable to construction work and prove that no laborer or mechanic must be required to work in surroundings or under working conditions which are unsanitary, hazardous or dangerous. These requirements do not apply to the purchases of supplies or materials or articles ordinarily available on the open market, or contracts for transportation or transmission of intelligence.

5. The regulation at 29 C.F.R § 5.5 (b) provides the required contract clause concerning compliance with the Contract Work Hours and Safety Standards Act:

"Compliance with the Contract Work Hours and Safety Standards Act"

(1) *Overtime requirements.* ***YWCA Greater New Orleans will pay no overtime on this contract. This contract is a Lump Sum contract****.* No contractor or subcontractor contracting for any part of the contract work which may require or involve the employment of laborers or mechanics shall require or permit any such laborer or mechanic in any workweek in which he or she is employed on such work to work in excess of forty hours in such workweek unless such laborer or mechanic receives compensation at a rate not less than one and one-half times the basic rate of pay for all hours worked in excess of forty hours in such workweek.

(2) *Violation; liability for unpaid wages; liquidated damages.* In the event of any violation of the clause set forth in paragraph (b)(1) of this section the contractor and any subcontractor responsible therefor shall be liable for the unpaid wages. In addition, such contractor and subcontractor shall be liable to the United States (in the case of work done under contract for the District of Columbia or a territory, to such District or to such territory), for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer or mechanic, including watchmen and guards, employed in violation of the clause set forth in paragraph (b)(1) of this section, in the sum of $27 for each calendar day on which such individual was required or permitted to work in excess of the standard workweek of forty hours without payment of the overtime wages required by the clause set forth in paragraph (b)(1) of this section.

(3) *Withholding for unpaid wages and liquidated damages. YWCA* shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld, from any moneys payable on account of work performed by the contractor or subcontractor under any such contract or any other Federal contract with the same prime

Contractor _____Owner _____

contractor, or any other federally-assisted contract subject to the Contract Work Hours and Safety Standards Act, which is held by the same prime contractor, such sums as may be determined to be necessary to satisfy any liabilities of such contractor or subcontractor for unpaid wages and liquidated damages as provided in the clause set forth in paragraph (b)(2) of this section.

(4) *Subcontracts.* The contractor or subcontractor shall insert in any subcontracts the clauses set forth in paragraph (b)(1) through (4) of this section and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for compliance by any subcontractor or lower tier subcontractor with the clauses set forth in paragraphs (b)(1) through (4) of this section.

TERMINATION OF THIS CONTRACT FOR CAUSE

YWCA Greater New Orleans may terminate this Contract for cause as set forth in Article 14.2 of the General Conditions of the Contract for Construction," AIA Document A201-2017, as modified by the Supplementary Conditions, Document 00 73 00.

TERMINATION OF THIS CONTRACT FOR CONVENIENCE

YWCA may terminate this Contract at any time for convenience as set forth in Article 14.4 of the General Conditions of the Contract for Construction," AIA Document A201-2017, as modified by the Supplementary Conditions, Document 00 73 00.

OWNERSHIP

All records, reports, documents, or other material related to this contract and/or obtained or prepared by Contractor in connection with the performance of the services contracted for herein shall become the property of YWCA, and shall, upon request, be returned by Contractor to YWCA, at Contractor's expense, at termination or expiration of this contract.

All records, reports, documents and other material delivered or transmitted to Contractor by the YWCA shall remain the property of the YWCA, and shall be returned by Contractor to the YWCA at Contractor's expense, at termination or expiration of this contract.

CONTRACT CONTROVERSIES

A. ADMINISTRATIVE REMEDIES

1. **False Claims:** Contractor acknowledges that 31 U.S.C Chap. 38 § 3802 (Administrative Remedies for False Claims and Statements) applies to Contractor's actions pertaining to this Contract.

Contractor _____Owner _____

2. **Compensation:** The Contractor acknowledges that FEMA financial assistance will be used to fund the Agreement. Contractor will comply with all applicable federal law, regulations, executive orders, FEMA policies, procedures and directives. Compensation shall be governed by the Standard Form of Agreement Between Owner and Contractor, the General Conditions of the Contract for Construction," AIA Document A201-2017, as modified by the Supplementary Conditions, Document 00 73 00, and the other Contract Documents.

3. **Remedies:** Remedies, including contractual, administrative and legal remedies, for breach of the Contract and penalties therefore, shall be governed by the Standard Form of Agreement Between Owner and Contractor, the General Conditions of the Contract for Construction," AIA Document A201-2017, as modified by the Supplementary Conditions, Document 00 73 00, and the other Contract Documents.

B. PROVISIONS FOR CONTRACTUAL REMEDIES (44 C.F.R. § 13.36 (i ((1))

1. SUSPENSION OF WORK

1. YWCA may suspend the Work under this Contract as set forth in Article 14.3 of the General Conditions of the Contract for Construction," AIA Document A201-2017, as modified by the Supplementary Conditions, Document 00 73 00.

RIGHT TO AUDIT

The State Legislative auditor, DHS-OIG, FEMA and federal auditors and GOSHEP or State internal auditors shall have the option to audit all accounts directly pertaining to the contract for a period of three (3) years from the date of final payment or as required by applicable State and Federal Law. Records shall be made available during normal working hours for this purpose.

Access to Records. The following access to records requirements apply to this contract:

(1) The contractor agrees to provide GOHSEP, YWCA, the FEMA Administrator, the Comptroller General of the United States, or any of their authorized representatives access to any books, documents, papers, and records of the Contractor which are directly pertinent to this contract for the purposes of making audits, examinations, excerpts, and transcriptions.
(2) The Contractor agrees to permit any of the foregoing parties to reproduce by any means whatsoever or to copy excerpts and transcriptions as reasonably needed.
(3) The contractor agrees to provide the FEMA Administrator or his authorized representatives access to construction or other work sites pertaining to the work being completed under the contract.

CONTRACTOR'S CERTIFICATION OF NO FEDERAL SUSPENSION OR DEBARMENT

Contractor _____Owner _____

Contractor has a continuing obligation to disclose any suspensions or debarment by any government entity, including but not limited to General Services Administration (GSA). Failure to disclose may constitute grounds for suspension and/or termination of this Contract and debarment from future contracts.

COMPLIANCE WITH CIVIL RIGHTS LAWS

During the performance of this contract, the contractor agrees as follows:

(1) The contractor will not discriminate against any employee or applicant for employment because of race, color, religion, sex, or national origin. The contractor will take affirmative action to ensure that applicants are employed, and that employees are treated during employment without regard to their race, color, religion, sex, or national origin. Such action shall include, but not be limited to the following: Employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. The contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided setting forth the provisions of this nondiscrimination clause.

(2) The contractor will, in all solicitations or advertisements for employees placed by or on behalf of the contractor, state that all qualified applicants will receive considerations for employment without regard to race, color, religion, sex, or national origin.

(3) The contractor will send to each labor union or representative of workers with which he has a collective bargaining agreement or other contract or understanding, a notice to be provided advising the said labor union or workers' representatives of the contractor's commitments under this section, and shall post copies of the notice in conspicuous places available to employees and applicants for employment.

(4) The contractor will comply with all provisions of Executive Order 11246 of September 24, 1965, and of the rules, regulations, and relevant orders of the Secretary of Labor.

(5) The contractor will furnish all information and reports required by Executive Order 11246 of September 24, 1965, and by rules, regulations, and orders of the Secretary of Labor, or pursuant thereto, and will permit access to his books, records, and accounts by the administering YWCA and the Secretary of Labor for purposes of investigation to ascertain compliance with such rules, regulations, and orders.

(6) In the event of the contractor's noncompliance with the nondiscrimination clauses of this contract or with any of the said rules, regulations, or orders, this contract may be canceled, terminated, or suspended in whole or in part and the contractor may be declared ineligible for further Government contracts or federally assisted construction contracts in accordance with procedures authorized in Executive Order 11246 of September 24, 1965, and such other sanctions as may be imposed and remedies invoked as provided in Executive Order 11246 of September 24, 1965, or by rule, regulation, or order of the Secretary of Labor, or as otherwise provided by law.

Contractor _____Owner _____

(7) The contractor will include the portion of the sentence immediately preceding paragraph (1) and the provisions of paragraphs (1) through (7) in every subcontract or purchase order unless exempted by rules, regulations, or orders of the Secretary of Labor issued pursuant to section 204 of Executive Order 11246 of September 24, 1965, so that such provisions will be binding upon each subcontractor or vendor. The contractor will take such action with respect to any subcontract or purchase order as the administering YWCA may direct as a means of enforcing such provisions, including sanctions for noncompliance: Provided, however, That in the event a contractor becomes involved in, or is threatened with, litigation with a subcontractor or vendor as a result of such direction by the administering YWCA the contractor may request the United States to enter into such litigation to protect the interests of the United States.

RECORD RETENTION

The Contractor shall maintain all records in relation to this contract for a period of at least THREE (3) years after final payment.

CLEAN AIR ACT

(1) The contractor agrees to comply with all applicable standards, orders or regulations issued pursuant to the Clean Air Act, as amended, 42 U.S.C.§ 7401 et seq.

(2) The contractor agrees to report each violation to the YWCA and understands and agrees that the YWCA will, in turn, report each violation as required to assure notification to GOHSEP, FEMA, and the appropriate Environmental Protection Regional Office.

(3) The contractor agrees to include these requirements in each subcontract exceeding $150,000 financed in whole or in part with Federal assistance provided by FEMA.

ENERGY POLICY AND CONSERVATION ACT

The Contractor hereby recognizes the mandatory standards and policies relating to energy efficiency which are contained in the State energy conservation plan issued in compliance with the Energy Policy and Conservation Act (P.L. 94-163).

CLEAN WATER ACT

The Contractor hereby agrees to adhere to the provisions which require compliance with all applicable standards, orders, or requirements issued under Section 508 of the Clean Water Act which prohibits the use under non-exempt Federal contracts, grants or loans of facilities included on the EPA List of Violating Facilities.

FEDERAL WATER POLLUTION CONTROL ACT

(1) The contractor agrees to comply with all applicable standards, orders or regulations issued pursuant to the Federal Water Pollution Control Act, as amended, 33 U.S.C. 7401 et seq.

(2) The contractor agrees to report each violation to the YWCA and understands and agrees that the YWCA will, in turn, report each violation as required to assure notification to FEMA and the appropriate Environmental Protection Regional Office.

Contractor _____Owner _____

(3) The contractor agrees to include these requirements in each subcontract exceeding $150,000 financed in whole or in part with Federal assistance provided by FEMA."

ANTI-LOBBYING AND DEBARMENT ACT

The Contractor will be expected to comply with Federal statutes required in the Anti-Lobbying Act and the Debarment Act.

The Contractor hereby agrees to adhere to the mandate dictated by the Copeland "Anti-Kickback" Act which provides that each Contractor or subgrantee shall be prohibited from inducing, by any means, any person employed in the completion of work, to give up any part of the compensation to which he is otherwise entitled.

Suspension and Debarment

(1) This contract is a covered transaction for purposes of 2 C.F.R. pt. 180 and 2 C.F.R. pt. 3000. As such the contractor is required to verify that none of the contractor, its principals (defined at 2 C.F.R. § 180.995), or its affiliates (defined at 2 C.F.R. § 180.905) are excluded (defined at 2 C.F.R.
§ 180.940) or disqualified (defined at 2 C.F.R. § 180.935).

(2) The contractor must comply with 2 C.F.R. pt. 180, subpart C and 2 C.F.R. pt. 3000, subpart C and must include a requirement to comply with these regulations in any lower tier covered transaction it enters into.

(3) This certification is a material representation of fact relied upon by YWCA. If it is later determined that the contractor did not comply with 2 C.F.R. pt. 180, subpart C and 2 C.F.R. pt. 3000, subpart C, in addition to remedies available to State of Louisiana and YWCA, the Federal Government may pursue available remedies, including but not limited to suspension and/or debarment.

(4) The bidder or proposer agrees to comply with the requirements of 2 C.F.R. pt. 180, subpart C and 2 C.F.R. pt. 3000, subpart C while this offer is valid and throughout the period of any contract that may arise from this offer. The bidder or proposer further agrees to include a provision requiring such compliance in its lower tier covered transactions."

"Byrd Anti-Lobbying Amendment, 31 U.S.C. § 1352 (as amended)

The Contractor will be expected to comply with Federal statutes required in the Anti-Lobbying Act. Contractors who apply or bid for an award of $100,000 or more shall file the required certification. Each tier certifies to the tier above that it will not and has not used Federal appropriated funds to pay any person or organization for influencing or attempting to influence an officer or employee of any agency, a member of Congress, officer or employee of Congress, or an employee of a member of Congress in connection with obtaining any Federal contract, grant, or any other award covered by 31 U.S.C. § 1352. Each tier shall also disclose any lobbying with non-Federal funds that takes place in connection with obtaining any Federal award. Such disclosures are forwarded from tier to tier up to the recipient who in turn will forward the certification(s) to the federal awarding agency.

Certification for Contracts, Grants, Loans and Cooperative Agreements

Contractor _____Owner _____

The undersigned certifies, to the best of his or her knowledge and belief, that:

(1) No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of an agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.

(2) If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form-LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions.

(3) The undersigned shall require that the language of this certification be included in the award documents for all subawards at all tiers (including subcontracts, subgrants, and contracts under grants, loans, and cooperative agreements) and that all subrecipients shall certify and disclose accordingly.

This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by section 1352, title 31, U.S. Code. Any person who fails to file the required certification shall be subject to a civil penalty of not less than $10,000 and not more than $100,000 for each such failure.

The Contractor**,** certifies or affirms the truthfulness and accuracyof each statement of its certification and disclosure, if any. In addition, the Contractor understands and agrees that the provisions of 31 U.S.C. § 3801 *et seq*., apply to this certification and disclosure, if any

_____
_____

Signature of Contractor's Authorize Official: Date:

_____

Name and Title of Contractor's Authorized Official

PROCUREMENT OF RECOVERED MATERIALS

Contractor _____Owner _____

(1) In the performance of this contract, the Contractor shall make maximum use of products containing recovered materials that are EPA- designated items unless the product cannot be acquired—

(i) Competitively within a timeframe providing for compliance with the contract performance schedule;
(ii) Meeting contract performance requirements; or
(iii) At a reasonable price.

(2) Information about this requirement, along with the list of EPA-designate items, is available at EPA's Comprehensive Procurement Guidelines web site, https://www.epa.gov/smm/comprehensive-procurement-guideline-cpg-program.

PROHIBITION ON CONTRACTING FOR COVERED TELECOMMUNICATIONS EQUIPMENT OR SERVICES.

(a) *Definitions.* As used in this clause, the terms backhaul; covered foreign country; covered telecommunications equipment or services; interconnection arrangements; roaming; substantial or essential component; and telecommunications equipment or services have the meaning as defined in FEMA Policy 405-143-1, Prohibitions on Expending FEMA Award Funds for Covered Telecommunications Equipment or Services (Interim), as used in this clause—

(b) *Prohibitions.*

(1) Section 889(b) of the John S. McCain National Defense Authorization Act for Fiscal Year 2019, Pub. L. No. 115-232, and 2 C.F.R. § 200.216 prohibit the head of an executive agency on or after Aug.13, 2020, from obligating or expending grant, cooperative agreement, loan, or loan guarantee funds on certain telecommunications products or from certain entities for national security reasons.

(2) Unless an exception in paragraph (c) of this clause applies, the contractor and its subcontractors may not use grant, cooperative agreement, loan, or loan guarantee funds from the Federal Emergency Management Agency to:

(i) Procure or obtain any equipment, system, or service that uses covered telecommunications equipment or services as a substantial or essential component of any system, or as critical technology of any system;

(ii) Enter into, extend, or renew a contract to procure or obtain any equipment, system, or service that uses covered telecommunications equipment or services as a substantial or essential component of any system, or as critical technology of any system;

(iii) Enter into, extend, or renew contracts with entities that use covered telecommunications equipment or services as a substantial or essential component of any system, or as critical technology as part of any system; or

(iv) Provide, as part of its performance of this contract, subcontract, or other contractual instrument, any equipment, system, or service that uses covered telecommunications equipment or services as a substantial or essential component of any system, or as critical technology as part of any system.

(c) *Exceptions.*

(1) This clause does not prohibit contractors from providing—
(i) A service that connects to the facilities of a third-party, such as backhaul, roaming, or interconnection arrangements; or
(ii) Telecommunications equipment that cannot route or redirect user data traffic or permit visibility into any user data or packets that such equipment transmits or otherwise handles.

(2) By necessary implication and regulation, the prohibitions also do not apply to:
(i) Covered telecommunications equipment or services that:
i. Are *not used* as a substantial or essential component of any system; *and*
ii. Are *not used* as critical technology of any system.
(ii) Other telecommunications equipment or services that are not considered covered telecommunications equipment or services.

(d) *Reporting requirement.*

(1) In the event the contractor identifies covered telecommunications equipment or services used as a substantial or essential component of any system, or as critical technology as part of any system, during contract performance, or the contractor is notified of such by a subcontractor at any tier or by any other source, the contractor shall report the information in paragraph (d)(2) of this clause to the recipient or subrecipient, unless elsewhere in this contract are established procedures for reporting the information.

(2) The Contractor shall report the following information pursuant to paragraph (d)(1) of this clause:

(i) Within one business day from the date of such identification or notification: The contract number; the order number(s), if applicable; supplier name; supplier unique entity identifier (if known); supplier Commercial and Government Entity (CAGE) code (if known); brand; model number (original equipment manufacturer number, manufacturer part number, or wholesaler number); item description; and any readily available information about mitigation actions undertaken or recommended.

(ii) Within 10 business days of submitting the information in paragraph (d)(2)(i) of this clause: Any further available information about mitigation actions undertaken or recommended. In addition, the contractor shall describe the efforts it undertook to prevent use or submission of covered telecommunications equipment or services, and any additional efforts that will be incorporated to prevent future use or submission of covered telecommunications equipment or services.

(e) *Subcontracts.* The Contractor shall insert the substance of this clause, including this paragraph (e), in all subcontracts and other contractual instruments.

DOMESTIC PREFERENCES FOR PROCUREMENTS.

As appropriate, and to the extent consistent with law, the contractor should, to the greatest extent practicable, provide a preference for the purchase, acquisition, or use of goods, products, or materials produced in the United States. This includes, but is not limited to iron, aluminum, steel, cement, and other manufactured products.

Contractor _____Owner _____

For purposes of this clause:
Produced in the United States means, for iron and steel products, that all manufacturing processes, from the initial melting stage through the application of coatings, occurred in the United States.
Manufactured products mean items and construction materials composed in whole or in part of non-ferrous metals such as aluminum; plastics and polymer-based products such as polyvinyl chloride pipe; aggregates such as concrete; glass, including optical fiber; and lumber.

CHANGES

a. Standard. To be eligible for FEMA assistance under the non-Federal entity's FEMA grant or cooperative agreement, the cost of the change, modification, change order, or constructive change must be allowable, allocable, within the scope of its grant or cooperative agreement, and reasonable for the completion of project scope.
b. Therefore, changes to the Agreement between YWCA and Contractor
shall be only as specifically set forth in the Agreement, including but not limited to Article 7 of the General Conditions as amended by the Supplementary Conditions.

DHS SEAL, LOGO AND FLAGS

The contractor shall not use the DHS seal(s), logos, crests, or reproductions of flags or likenesses of DHS or YWCA officials without specific FEMA pre- approval.

COMPLIANCE WITH FEDERAL EXECUTIVE ORDERS

This is an acknowledgement that FEMA financial assistance will be used to fund the contract. The contractor will comply will all applicable federal law, regulations, executive orders, FEMA policies, procedures, and directives.

NO OBLIGATION BY FEDERAL GOVERNMENT

The Federal Government is not a party to this contract and is not subject to any obligations or liabilities to the non-Federal entity, contractor, or any other party pertaining to any matter resulting from the contract.

COMPLIANCE WITH FEDERAL LAW, REGULATIONS, AND EXECUTIVE ORDERS.

All non-Federal entities must place into their contracts an acknowledgement that FEMA financial assistance will be used to fund the contract along with the requirement that the contractor will comply with all applicable federal law, regulations, executive orders, and FEMA policies, procedures, and directives.

Contractor _____Owner _____

The following provides a contract clause regarding Compliance with Federal Law, Regulations, and Executive Orders: "This is an acknowledgement that FEMA financial assistance will be used to fund the contract only. The contractor will comply will all applicable federal law, regulations, executive orders, FEMA policies, procedures, and directives."

NO OBLIGATION BY FEDERAL GOVERNMENT.

The non-Federal entity must include a provision in its contract that states that the Federal Government is not a party to the contract and is not subject to any obligations or liabilities to the non-Federal entity, contractor, or any other party pertaining to any matter resulting from the contract.

The following provides a contract clause regarding no obligation by the Federal Government: "The Federal Government is not a party to this contract and is not subject to any obligations or liabilities to the non-Federal entity, contractor, or any other party pertaining to any matter resulting from the contract."

PROGRAM FRAUD AND FALSE OR FRAUDULENT STATEMENTS OR RELATED ACTS.

The non-Federal entity must include a provision in its contract that the contractor acknowledges that 31 U.S.C. Chap. 38 (Administrative Remedies for False Claims and Statements) applies to its actions pertaining to the contract.

The following provides a contract clause regarding Fraud and False or Fraudulent or Related Acts: "The contractor acknowledges that 31 U.S.C. Chap. 38 (Administrative Remedies for False Claims and Statements) applies to the contractor's actions pertaining to this contract."

CONTRACTING WITH SMALL AND MINORITY BUSINESSES, WOMEN'S BUSINESS ENTERPRISES, AND LABOR SURPLUS AREA FIRMS.

(a) Any party to this contract must take all necessary affirmative steps to assure that minority businesses, women's business enterprises, and labor surplus area firms are used when possible. These steps are also required for the hiring of any subcontractors under this contract.

(b) Affirmative steps must include:

(1) Placing qualified small and minority businesses and women's business enterprises on solicitation lists;

(2) Assuring that small and minority businesses, and women's business enterprises are solicited whenever they are potential sources;

(3) Dividing total requirements, when economically feasible, into smaller tasks or quantities to permit maximum participation by small and minority businesses, and women's business enterprises;

Contractor _____Owner _____

(4) Establishing delivery schedules, where the requirement permits, which encourage participation by small and minority businesses, and women's business enterprises; and

(5) Using the services and assistance, as appropriate, of such organizations as the Small Business Administration and the Minority Business Development Agency of the Department of Commerce.

COPYRIGHT AND DATA RIGHTS

The Contractor grants to the YWCA a paid-up, royalty-free, nonexclusive, irrevocable, worldwide license in data first produced in the performance of this contract to reproduce, publish, or otherwise use, including prepare derivative works, distribute copies to the public, and perform publicly and display publicly such data. For data required by the contract but not first produced in the performance of this contract, the Contractor will identify such data and grant to the YWCA or acquires on its behalf a license of the same scope as for data first produced in the performance of this contract. Data, as used herein, shall include any work subject to copyright under 17 U.S.C. § 102, for example, any written reports or literary works, software and/or source code, music, choreography, pictures or images, graphics, sculptures, videos, motion pictures or other audiovisual works, sound and/or video recordings, and architectural works. Upon or before the completion of this contract, the Contractor will deliver to the YWCA data first produced in the performance of this contract and data required by the contract but not first produced in the performance of this contract in formats acceptable by the YWCA.

Contractor _____Owner _____

EXHIBIT D

CONTRACTOR STATEMENT OF ASSURANCES & AGREEMENT REGARDING INSURANCES

Exhibit "D"

Contractor Statement of Assurances and Agreement Regarding Insurance

("**Contractor**") hereby assures and certifies to the State of Louisiana, Division of Administration, Office of Community Development ("OCD") that in connection with the construction of the new building for the YWCA Greater New Orleans to be located at 601-605 South Norman C. Francis Parkway, New Orleans LA 70119 (the construction and completion of the building being referred to herein as the "**Project**"), in relation to labor standards, it will comply with:

a. Section 110 of the Housing and Community Development Act of 1974, as amended and as set forth in 24 CFR §570.603.

b. Davis-Bacon Act, as amended (40 U.S.C. §3141 et seq.).

c. Contract Work Hours and Safety Standards Act (40 U.S.C. §327 et seq.).

d. Federal Fair Labor Standards Act (29 U.S.C. §201 et seq.)

The foregoing is not in limitation of but is rather in addition to CDBG Compliance Provisions for Construction Contracts (a copy of which is attached hereto) that have been a made a part of and included in the contract with the owner, YWCA Greater New Orleans, and hereby assures and certifies to the State of Louisiana that it will comply with all of those provisions and has initialed each page of the attachment.

Signing this Statement means that the Contractor agrees that failure to comply with provisions applicable to it can result in serious audit and/or monitoring findings that require repayment of funds to the State or expending Borrower or Contractor funds to correct deficiencies.

Contractor _____Owner _____

Contractor further agrees and acknowledges that it is required to (and hereby agrees to) have the State of Louisiana, Division of Administration, Office of Community Development ***named as an additional insured*** on each of its Commercial General Liability, Automobile Liability and Excess Liability policies, which may be accomplished by special endorsement or by an existing blanket endorsement sufficient to accomplish the same.

Executed this ____ day of _____, 2023

Contractor

By: _____
Name: _____
Title:_____

REFER TO

CDBG COMPLIANCE PROVISIONS
for
CONSTRUCTION CONTRACTS
INCLUDED IN BID DOCUMENTS

Contractor _____Owner _____

EXHIBIT E

CERTIFICATION REGARDING LOBBYING

Exhibit "E"

APPENDIX A, 44 C.F.R. PART 18 – CERTIFICATION REGARDING LOBBYING

Certification for Contracts, Grants, Loans, and Cooperative Agreements

The undersigned certifies, to the best of his or her knowledge and belief, that:

1. No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of an agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.

2. If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form-LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions.

3. The undersigned shall require that the language of this certification be included in the award documents for all subawards at all tiers (including subcontracts, subgrants, and contracts under grants, loans, and cooperative agreements) and that all subrecipients shall certify and disclose accordingly.

Contractor _____Owner _____

This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by section 1352, title 31, U.S. Code. Any person who fails to file the required certification shall be subject to a civil penalty of not less than $10,000 and not more than $100,000 for each such failure.

The Contractor, certifies or affirms the truthfulness and accuracy of each statement of its certification and disclosure, if any. In addition, the Contractor understands and agrees that the provisions of 31 U.S.C. Chap. 38, Administrative Remedies for False Claims and Statements, apply to this certification and disclosure, if any.

_____ _____

Date

Contractors

Contractor _____Owner _____

AIA 201

GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION

DRAFT

AIA® Document A201™ – 2017

General Conditions of the Contract for Construction

for the following PROJECT:
(Name and location or address)

YWCA Greater New Orleans
601- 605 South Norman C. Francis Parkway
New Orleans, LA 70119

THE OWNER:
(Name, legal status and address)

YWCA Greater New Orleans
601- 605 South Norman C. Francis Parkway
New Orleans, LA 70119

THE ARCHITECT:
(Name, legal status and address)

«Trapolin-Peer Architects»«, A Professional Corporation»
«850 Tchoupitoulas Street
New Orleans, LA 70130»

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ARTICLE 1 GENERAL PROVISIONS

§ 1.1 Basic Definitions

§ 1.1.1 The Contract Documents

The Contract Documents are enumerated in the Agreement between the Owner and Contractor (hereinafter the Agreement) and consist of the Agreement, Conditions of the Contract (General, Supplementary and other Conditions), Drawings, Specifications, Addenda issued prior to execution of the Contract, other documents listed in the Agreement, and Modifications issued after execution of the Contract. A Modification is (1) a written amendment to the Contract signed by both parties, (2) a Change Order, (3) a Construction Change Directive, or (4) a written order for a minor change in the Work issued by the Architect. Unless specifically enumerated in the Agreement, the Contract Documents do not include the advertisement or invitation to bid, Instructions to Bidders, sample forms, other information furnished by the Owner in anticipation of receiving bids or proposals, the Contractor's bid or proposal, or portions of Addenda relating to bidding or proposal requirements.

§ 1.1.2 The Contract

The Contract Documents form the Contract for Construction. The Contract represents the entire and integrated agreement between the parties hereto and supersedes prior negotiations, representations, or agreements, either written or oral. The Contract may be amended or modified only by a Modification. The Contract Documents shall not be construed to create a contractual relationship of any kind (1) between the Contractor and the Architect or the Architect's consultants, (2) between the Owner and a Subcontractor or a Sub-subcontractor, (3) between the Owner and the Architect or the Architect's consultants, or (4) between any persons or entities other than the Owner and the Contractor. The Architect shall, however, be entitled to performance and enforcement of obligations under the Contract intended to facilitate performance of the Architect's duties.

§ 1.1.3 The Work

The term "Work" means the construction and services required by the Contract Documents, whether completed or partially completed, and includes all other labor, materials, equipment, and services provided or to be provided by the Contractor to fulfill the Contractor's obligations. The Work may constitute the whole or a part of the Project.

§ 1.1.4 The Project

The Project is the total construction of which the Work performed under the Contract Documents may be the whole or a part and which may include construction by the Owner and by Separate Contractors.

§ 1.1.5 The Drawings

The Drawings are the graphic and pictorial portions of the Contract Documents showing the design, location and dimensions of the Work, generally including plans, elevations, sections, details, schedules, and diagrams.

§ 1.1.6 The Specifications

The Specifications are that portion of the Contract Documents consisting of the written requirements for materials, equipment, systems, standards and workmanship for the Work, and performance of related services.

§ 1.1.7 Instruments of Service

Instruments of Service are representations, in any medium of expression now known or later developed, of the tangible and intangible creative work performed by the Architect and the Architect's consultants under their respective professional services agreements. Instruments of Service may include, without limitation, studies, surveys, models, sketches, drawings, specifications, and other similar materials.

§ 1.1.8 Initial Decision Maker

The Initial Decision Maker is the person identified in the Agreement to render initial decisions on Claims in accordance with Section 15.2. The Initial Decision Maker shall not show partiality to the Owner or Contractor and shall not be liable for results of interpretations or decisions rendered in good faith.

§ 1.2 Correlation and Intent of the Contract Documents

§ 1.2.1 The intent of the Contract Documents is to include all items necessary for the proper execution and completion of the Work by the Contractor. The Contract Documents are complementary, and what is required by one shall be as binding as if required by all; performance by the Contractor shall be required only to the extent consistent with the Contract Documents and reasonably inferable from them as being necessary to produce the indicated results.

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§ 1.2.1.1 The invalidity of any provision of the Contract Documents shall not invalidate the Contract or its remaining provisions. If it is determined that any provision of the Contract Documents violates any law, or is otherwise invalid or unenforceable, then that provision shall be revised to the extent necessary to make that provision legal and enforceable. In such case the Contract Documents shall be construed, to the fullest extent permitted by law, to give effect to the parties' intentions and purposes in executing the Contract.

§ 1.2.2 Organization of the Specifications into divisions, sections and articles, and arrangement of Drawings shall not control the Contractor in dividing the Work among Subcontractors or in establishing the extent of Work to be performed by any trade.

§ 1.2.3 Unless otherwise stated in the Contract Documents, words that have well-known technical or construction industry meanings are used in the Contract Documents in accordance with such recognized meanings.

§ 1.3 Capitalization

Terms capitalized in these General Conditions include those that are (1) specifically defined, (2) the titles of numbered articles, or (3) the titles of other documents published by the American Institute of Architects.

§ 1.4 Interpretation

In the interest of brevity the Contract Documents frequently omit modifying words such as "all" and "any" and articles such as "the" and "an," but the fact that a modifier or an article is absent from one statement and appears in another is not intended to affect the interpretation of either statement.

§ 1.5 Ownership and Use of Drawings, Specifications, and Other Instruments of Service

§ 1.5.1 The Architect and the Architect's consultants shall be deemed the authors and owners of their respective Instruments of Service, including the Drawings and Specifications, and retain all common law, statutory, and other reserved rights in their Instruments of Service, including copyrights. The Contractor, Subcontractors, Sub-subcontractors, and suppliers shall not own or claim a copyright in the Instruments of Service. Submittal or distribution to meet official regulatory requirements or for other purposes in connection with the Project is not to be construed as publication in derogation of the Architect's or Architect's consultants' reserved rights.

§ 1.5.2 The Contractor, Subcontractors, Sub-subcontractors, and suppliers are authorized to use and reproduce the Instruments of Service provided to them, subject to any protocols established pursuant to Sections 1.7 and 1.8, solely and exclusively for execution of the Work. All copies made under this authorization shall bear the copyright notice, if any, shown on the Instruments of Service. The Contractor, Subcontractors, Sub-subcontractors, and suppliers may not use the Instruments of Service on other projects or for additions to the Project outside the scope of the Work without the specific written consent of the Owner, Architect, and the Architect's consultants.

§ 1.6 Notice

§ 1.6.1 Except as otherwise provided in Section 1.6.2, where the Contract Documents require one party to notify or give notice to the other party, such notice shall be provided in writing to the designated representative of the party to whom the notice is addressed and shall be deemed to have been duly served if delivered in person, by mail, by courier, or by electronic transmission if a method for electronic transmission is set forth in the Agreement.

§ 1.6.2 Notice of Claims as provided in Section 15.1.3 shall be provided in writing and shall be deemed to have been duly served only if delivered to the designated representative of the party to whom the notice is addressed by certified or registered mail, or by courier providing proof of delivery.

§ 1.7 Digital Data Use and Transmission

The parties shall agree upon protocols governing the transmission and use of Instruments of Service or any other information or documentation in digital form. The parties will use AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, to establish the protocols for the development, use, transmission, and exchange of digital data.

§ 1.8 Building Information Models Use and Reliance

Any use of, or reliance on, all or a portion of a building information model without agreement to protocols governing the use of, and reliance on, the information contained in the model and without having those protocols set forth in AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, and the requisite AIA Document G202™–2013, Project Building Information Modeling Protocol Form, shall be at the using or

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relying party's sole risk and without liability to the other party and its contractors or consultants, the authors of, or contributors to, the building information model, and each of their agents and employees.

ARTICLE 2 OWNER

§ 2.1 General

§ 2.1.1 The Owner is the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The Owner shall designate in writing a representative who shall have express authority to bind the Owner with respect to all matters requiring the Owner's approval or authorization. Except as otherwise provided in Section 4.2.1, the Architect does not have such authority. The term "Owner" means the Owner or the Owner's authorized representative.

§ 2.1.2 The Owner shall furnish to the Contractor, within fifteen days after receipt of a written request, information necessary and relevant for the Contractor to evaluate, give notice of, or enforce mechanic's lien rights. Such information shall include a correct statement of the record legal title to the property on which the Project is located, usually referred to as the site, and the Owner's interest therein.

§ 2.2 Evidence of the Owner's Financial Arrangements

§ 2.2.1 Prior to commencement of the Work and upon written request by the Contractor, the Owner shall furnish to the Contractor reasonable evidence that the Owner has made financial arrangements to fulfill the Owner's obligations under the Contract. The Contractor shall have no obligation to commence the Work until the Owner provides such evidence. If commencement of the Work is delayed under this Section 2.2.1, the Contract Time shall be extended appropriately.

§ 2.2.2 Following commencement of the Work and upon written request by the Contractor, the Owner shall furnish to the Contractor reasonable evidence that the Owner has made financial arrangements to fulfill the Owner's obligations under the Contract only if (1) the Owner fails to make payments to the Contractor as the Contract Documents require; (2) the Contractor identifies in writing a reasonable concern regarding the Owner's ability to make payment when due; or (3) a change in the Work materially changes the Contract Sum. If the Owner fails to provide such evidence, as required, within fourteen days of the Contractor's request, the Contractor may immediately stop the Work and, in that event, shall notify the Owner that the Work has stopped. However, if the request is made because a change in the Work materially changes the Contract Sum under (3) above, the Contractor may immediately stop only that portion of the Work affected by the change until reasonable evidence is provided. If the Work is stopped under this Section 2.2.2, the Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable costs of shutdown, delay and start-up, plus interest as provided in the Contract Documents.

§ 2.2.3 After the Owner furnishes evidence of financial arrangements under this Section 2.2, the Owner shall not materially vary such financial arrangements without prior notice to the Contractor.

§ 2.2.4 Where the Owner has designated information furnished under this Section 2.2 as "confidential," the Contractor shall keep the information confidential and shall not disclose it to any other person. However, the Contractor may disclose "confidential" information, after seven (7) days' notice to the Owner, where disclosure is required by law, including a subpoena or other form of compulsory legal process issued by a court or governmental entity, or by court or arbitrator(s) order. The Contractor may also disclose "confidential" information to its employees, consultants, sureties, Subcontractors and their employees, Sub-subcontractors, and others who need to know the content of such information solely and exclusively for the Project and who agree to maintain the confidentiality of such information.

§ 2.3 Information and Services Required of the Owner

§ 2.3.1 Except for permits and fees that are the responsibility of the Contractor under the Contract Documents, including those required under Section 3.7.1, the Owner shall secure and pay for necessary approvals, easements, assessments and charges required for construction, use or occupancy of permanent structures or for permanent changes in existing facilities.

§ 2.3.2 The Owner shall retain an architect lawfully licensed to practice architecture, or an entity lawfully practicing architecture, in the jurisdiction where the Project is located. That person or entity is identified as the Architect in the Agreement and is referred to throughout the Contract Documents as if singular in number.

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§ 2.3.3 If the employment of the Architect terminates, the Owner shall employ a successor to whom the Contractor has no reasonable objection and whose status under the Contract Documents shall be that of the Architect.

§ 2.3.4 The Owner shall furnish surveys describing physical characteristics, legal limitations and utility locations for the site of the Project, and a legal description of the site. The Contractor shall be entitled to rely on the accuracy of information furnished by the Owner but shall exercise proper precautions relating to the safe performance of the Work.

§ 2.3.5 The Owner shall furnish information or services required of the Owner by the Contract Documents with reasonable promptness. The Owner shall also furnish any other information or services under the Owner's control and relevant to the Contractor's performance of the Work with reasonable promptness after receiving the Contractor's written request for such information or services.

§ 2.3.6 Unless otherwise provided in the Contract Documents, the Owner shall furnish to the Contractor one copy of the Contract Documents for purposes of making reproductions pursuant to Section 1.5.2.

§ 2.4 Owner's Right to Stop the Work

If the Contractor fails to correct Work that is not in accordance with the requirements of the Contract Documents as required by Section 12.2 or repeatedly fails to carry out Work in accordance with the Contract Documents, the Owner may issue a written order to the Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, the right of the Owner to stop the Work shall not give rise to a duty on the part of the Owner to exercise this right for the benefit of the Contractor or any other person or entity, except to the extent required by Section 6.1.3.

§ 2.5 Owner's Right to Carry Out the Work

If the Contractor defaults or neglects to carry out the Work in accordance with the Contract Documents and fails within a ten-day period after receipt of notice from the Owner to commence and continue correction of such default or neglect with diligence and promptness, the Owner may, without prejudice to other remedies the Owner may have, correct such default or neglect. Such action by the Owner and amounts charged to the Contractor are both subject to prior approval of the Architect and the Architect may, pursuant to Section 9.5.1, withhold or nullify a Certificate for Payment in whole or in part, to the extent reasonably necessary to reimburse the Owner for the reasonable cost of correcting such deficiencies, including Owner's expenses and compensation for the Architect's additional services made necessary by such default, neglect, or failure. If current and future payments are not sufficient to cover such amounts, the Contractor shall pay the difference to the Owner. If the Contractor disagrees with the actions of the Owner or the Architect, or the amounts claimed as costs to the Owner, the Contractor may file a Claim pursuant to Article 15.

ARTICLE 3 CONTRACTOR

§ 3.1 General

§ 3.1.1 The Contractor is the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The Contractor shall be lawfully licensed, if required in the jurisdiction where the Project is located. The Contractor shall designate in writing a representative who shall have express authority to bind the Contractor with respect to all matters under this Contract. The term "Contractor" means the Contractor or the Contractor's authorized representative.

§ 3.1.2 The Contractor shall perform the Work in accordance with the Contract Documents.

§ 3.1.3 The Contractor shall not be relieved of its obligations to perform the Work in accordance with the Contract Documents either by activities or duties of the Architect in the Architect's administration of the Contract, or by tests, inspections or approvals required or performed by persons or entities other than the Contractor.

§ 3.2 Review of Contract Documents and Field Conditions by Contractor

§ 3.2.1 Execution of the Contract by the Contractor is a representation that the Contractor has visited the site, become generally familiar with local conditions under which the Work is to be performed, and correlated personal observations with requirements of the Contract Documents.

§ 3.2.2 Because the Contract Documents are complementary, the Contractor shall, before starting each portion of the Work, carefully study and compare the various Contract Documents relative to that portion of the Work, as well as

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the information furnished by the Owner pursuant to Section 2.3.4, shall take field measurements of any existing conditions related to that portion of the Work, and shall observe any conditions at the site affecting it. These obligations are for the purpose of facilitating coordination and construction by the Contractor and are not for the purpose of discovering errors, omissions, or inconsistencies in the Contract Documents; however, the Contractor shall promptly report to the Architect any errors, inconsistencies or omissions discovered by or made known to the Contractor as a request for information in such form as the Architect may require. It is recognized that the Contractor's review is made in the Contractor's capacity as a contractor and not as a licensed design professional, unless otherwise specifically provided in the Contract Documents.

§ 3.2.3 The Contractor is not required to ascertain that the Contract Documents are in accordance with applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of public authorities, but the Contractor shall promptly report to the Architect any nonconformity discovered by or made known to the Contractor as a request for information in such form as the Architect may require.

§ 3.2.4 If the Contractor believes that additional cost or time is involved because of clarifications or instructions the Architect issues in response to the Contractor's notices or requests for information pursuant to Sections 3.2.2 or 3.2.3, the Contractor shall submit Claims as provided in Article 15. If the Contractor fails to perform the obligations of Sections 3.2.2 or 3.2.3, the Contractor shall pay such costs and damages to the Owner, subject to Section 15.1.7, as would have been avoided if the Contractor had performed such obligations. If the Contractor performs those obligations, the Contractor shall not be liable to the Owner or Architect for damages resulting from errors, inconsistencies or omissions in the Contract Documents, for differences between field measurements or conditions and the Contract Documents, or for nonconformities of the Contract Documents to applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities.

§ 3.3 Supervision and Construction Procedures

§ 3.3.1 The Contractor shall supervise and direct the Work, using the Contractor's best skill and attention. The Contractor shall be solely responsible for, and have control over, construction means, methods, techniques, sequences, and procedures, and for coordinating all portions of the Work under the Contract. If the Contract Documents give specific instructions concerning construction means, methods, techniques, sequences, or procedures, the Contractor shall evaluate the jobsite safety thereof and shall be solely responsible for the jobsite safety of such means, methods, techniques, sequences, or procedures. If the Contractor determines that such means, methods, techniques, sequences or procedures may not be safe, the Contractor shall give timely notice to the Owner and Architect, and shall propose alternative means, methods, techniques, sequences, or procedures. The Architect shall evaluate the proposed alternative solely for conformance with the design intent for the completed construction. Unless the Architect objects to the Contractor's proposed alternative, the Contractor shall perform the Work using its alternative means, methods, techniques, sequences, or procedures.

§ 3.3.2 The Contractor shall be responsible to the Owner for acts and omissions of the Contractor's employees, Subcontractors and their agents and employees, and other persons or entities performing portions of the Work for, or on behalf of, the Contractor or any of its Subcontractors.

§ 3.3.3 The Contractor shall be responsible for inspection of portions of Work already performed to determine that such portions are in proper condition to receive subsequent Work.

§ 3.4 Labor and Materials

§ 3.4.1 Unless otherwise provided in the Contract Documents, the Contractor shall provide and pay for labor, materials, equipment, tools, construction equipment and machinery, water, heat, utilities, transportation, and other facilities and services necessary for proper execution and completion of the Work, whether temporary or permanent and whether or not incorporated or to be incorporated in the Work.

§ 3.4.2 Except in the case of minor changes in the Work approved by the Architect in accordance with Section 3.12.8 or ordered by the Architect in accordance with Section 7.4, the Contractor may make substitutions only with the consent of the Owner, after evaluation by the Architect and in accordance with a Change Order or Construction Change Directive.

§ 3.4.3 The Contractor shall enforce strict discipline and good order among the Contractor's employees and other persons carrying out the Work. The Contractor shall not permit employment of unfit persons or persons not properly skilled in tasks assigned to them.

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§ 3.5 Warranty

§ 3.5.1 The Contractor warrants to the Owner and Architect that materials and equipment furnished under the Contract will be of good quality and new unless the Contract Documents require or permit otherwise. The Contractor further warrants that the Work will conform to the requirements of the Contract Documents and will be free from defects, except for those inherent in the quality of the Work the Contract Documents require or permit. Work, materials, or equipment not conforming to these requirements may be considered defective. The Contractor's warranty excludes remedy for damage or defect caused by abuse, alterations to the Work not executed by the Contractor, improper or insufficient maintenance, improper operation, or normal wear and tear and normal usage. If required by the Architect, the Contractor shall furnish satisfactory evidence as to the kind and quality of materials and equipment.

§ 3.5.2 All material, equipment, or other special warranties required by the Contract Documents shall be issued in the name of the Owner, or shall be transferable to the Owner, and shall commence in accordance with Section 9.8.4.

§ 3.6 Taxes

The Contractor shall pay sales, consumer, use and similar taxes for the Work provided by the Contractor that are legally enacted when bids are received or negotiations concluded, whether or not yet effective or merely scheduled to go into effect.

§ 3.7 Permits, Fees, Notices and Compliance with Laws

§ 3.7.1 Unless otherwise provided in the Contract Documents, the Contractor shall secure and pay for the building permit as well as for other permits, fees, licenses, and inspections by government agencies necessary for proper execution and completion of the Work that are customarily secured after execution of the Contract and legally required at the time bids are received or negotiations concluded.

§ 3.7.2 The Contractor shall comply with and give notices required by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities applicable to performance of the Work.

§ 3.7.3 If the Contractor performs Work knowing it to be contrary to applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of public authorities, the Contractor shall assume appropriate responsibility for such Work and shall bear the costs attributable to correction.

§ 3.7.4 Concealed or Unknown Conditions

If the Contractor encounters conditions at the site that are (1) subsurface or otherwise concealed physical conditions that differ materially from those indicated in the Contract Documents or (2) unknown physical conditions of an unusual nature that differ materially from those ordinarily found to exist and generally recognized as inherent in construction activities of the character provided for in the Contract Documents, the Contractor shall promptly provide notice to the Owner and the Architect before conditions are disturbed and in no event later than 14 days after first observance of the conditions. The Architect will promptly investigate such conditions and, if the Architect determines that they differ materially and cause an increase or decrease in the Contractor's cost of, or time required for, performance of any part of the Work, will recommend that an equitable adjustment be made in the Contract Sum or Contract Time, or both. If the Architect determines that the conditions at the site are not materially different from those indicated in the Contract Documents and that no change in the terms of the Contract is justified, the Architect shall promptly notify the Owner and Contractor, stating the reasons. If either party disputes the Architect's determination or recommendation, that party may submit a Claim as provided in Article 15.

§ 3.7.5 If, in the course of the Work, the Contractor encounters human remains or recognizes the existence of burial markers, archaeological sites or wetlands not indicated in the Contract Documents, the Contractor shall immediately suspend any operations that would affect them and shall notify the Owner and Architect. Upon receipt of such notice, the Owner shall promptly take any action necessary to obtain governmental authorization required to resume the operations. The Contractor shall continue to suspend such operations until otherwise instructed by the Owner but shall continue with all other operations that do not affect those remains or features. Requests for adjustments in the Contract Sum and Contract Time arising from the existence of such remains or features may be made as provided in Article 15.

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§ 3.8 Allowances

§ 3.8.1 The Contractor shall include in the Contract Sum all allowances stated in the Contract Documents. Items covered by allowances shall be supplied for such amounts and by such persons or entities as the Owner may direct, but the Contractor shall not be required to employ persons or entities to whom the Contractor has reasonable objection.

§ 3.8.2 Unless otherwise provided in the Contract Documents,

- **.1** allowances shall cover the cost to the Contractor of materials and equipment delivered at the site and all required taxes, less applicable trade discounts;
- **.2** Contractor's costs for unloading and handling at the site, labor, installation costs, overhead, profit, and other expenses contemplated for stated allowance amounts shall be included in the Contract Sum but not in the allowances; and
- **.3** whenever costs are more than or less than allowances, the Contract Sum shall be adjusted accordingly by Change Order. The amount of the Change Order shall reflect (1) the difference between actual costs and the allowances under Section 3.8.2.1 and (2) changes in Contractor's costs under Section 3.8.2.2.

§ 3.8.3 Materials and equipment under an allowance shall be selected by the Owner with reasonable promptness.

§ 3.9 Superintendent

§ 3.9.1 The Contractor shall employ a competent superintendent and necessary assistants who shall be in attendance at the Project site during performance of the Work. The superintendent shall represent the Contractor, and communications given to the superintendent shall be as binding as if given to the Contractor.

§ 3.9.2 The Contractor, as soon as practicable after award of the Contract, shall notify the Owner and Architect of the name and qualifications of a proposed superintendent. Within 14 days of receipt of the information, the Architect may notify the Contractor, stating whether the Owner or the Architect (1) has reasonable objection to the proposed superintendent or (2) requires additional time for review. Failure of the Architect to provide notice within the 14-day period shall constitute notice of no reasonable objection.

§ 3.9.3 The Contractor shall not employ a proposed superintendent to whom the Owner or Architect has made reasonable and timely objection. The Contractor shall not change the superintendent without the Owner's consent, which shall not unreasonably be withheld or delayed.

§ 3.10 Contractor's Construction and Submittal Schedules

§ 3.10.1 The Contractor, promptly after being awarded the Contract, shall submit for the Owner's and Architect's information a Contractor's construction schedule for the Work. The schedule shall contain detail appropriate for the Project, including (1) the date of commencement of the Work, interim schedule milestone dates, and the date of Substantial Completion; (2) an apportionment of the Work by construction activity; and (3) the time required for completion of each portion of the Work. The schedule shall provide for the orderly progression of the Work to completion and shall not exceed time limits current under the Contract Documents. The schedule shall be revised at appropriate intervals as required by the conditions of the Work and Project.

§ 3.10.2 The Contractor, promptly after being awarded the Contract and thereafter as necessary to maintain a current submittal schedule, shall submit a submittal schedule for the Architect's approval. The Architect's approval shall not be unreasonably delayed or withheld. The submittal schedule shall (1) be coordinated with the Contractor's construction schedule, and (2) allow the Architect reasonable time to review submittals. If the Contractor fails to submit a submittal schedule, or fails to provide submittals in accordance with the approved submittal schedule, the Contractor shall not be entitled to any increase in Contract Sum or extension of Contract Time based on the time required for review of submittals.

§ 3.10.3 The Contractor shall perform the Work in general accordance with the most recent schedules submitted to the Owner and Architect.

§ 3.11 Documents and Samples at the Site

The Contractor shall make available, at the Project site, the Contract Documents, including Change Orders, Construction Change Directives, and other Modifications, in good order and marked currently to indicate field changes and selections made during construction, and the approved Shop Drawings, Product Data, Samples, and

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similar required submittals. These shall be in electronic form or paper copy, available to the Architect and Owner, and delivered to the Architect for submittal to the Owner upon completion of the Work as a record of the Work as constructed.

§ 3.12 Shop Drawings, Product Data and Samples

§ 3.12.1 Shop Drawings are drawings, diagrams, schedules, and other data specially prepared for the Work by the Contractor or a Subcontractor, Sub-subcontractor, manufacturer, supplier, or distributor to illustrate some portion of the Work.

§ 3.12.2 Product Data are illustrations, standard schedules, performance charts, instructions, brochures, diagrams, and other information furnished by the Contractor to illustrate materials or equipment for some portion of the Work.

§ 3.12.3 Samples are physical examples that illustrate materials, equipment, or workmanship, and establish standards by which the Work will be judged.

§ 3.12.4 Shop Drawings, Product Data, Samples, and similar submittals are not Contract Documents. Their purpose is to demonstrate how the Contractor proposes to conform to the information given and the design concept expressed in the Contract Documents for those portions of the Work for which the Contract Documents require submittals. Review by the Architect is subject to the limitations of Section 4.2.7. Informational submittals upon which the Architect is not expected to take responsive action may be so identified in the Contract Documents. Submittals that are not required by the Contract Documents may be returned by the Architect without action.

§ 3.12.5 The Contractor shall review for compliance with the Contract Documents, approve, and submit to the Architect, Shop Drawings, Product Data, Samples, and similar submittals required by the Contract Documents, in accordance with the submittal schedule approved by the Architect or, in the absence of an approved submittal schedule, with reasonable promptness and in such sequence as to cause no delay in the Work or in the activities of the Owner or of Separate Contractors.

§ 3.12.6 By submitting Shop Drawings, Product Data, Samples, and similar submittals, the Contractor represents to the Owner and Architect that the Contractor has (1) reviewed and approved them, (2) determined and verified materials, field measurements and field construction criteria related thereto, or will do so, and (3) checked and coordinated the information contained within such submittals with the requirements of the Work and of the Contract Documents.

§ 3.12.7 The Contractor shall perform no portion of the Work for which the Contract Documents require submittal and review of Shop Drawings, Product Data, Samples, or similar submittals, until the respective submittal has been approved by the Architect.

§ 3.12.8 The Work shall be in accordance with approved submittals except that the Contractor shall not be relieved of responsibility for deviations from the requirements of the Contract Documents by the Architect's approval of Shop Drawings, Product Data, Samples, or similar submittals, unless the Contractor has specifically notified the Architect of such deviation at the time of submittal and (1) the Architect has given written approval to the specific deviation as a minor change in the Work, or (2) a Change Order or Construction Change Directive has been issued authorizing the deviation. The Contractor shall not be relieved of responsibility for errors or omissions in Shop Drawings, Product Data, Samples, or similar submittals, by the Architect's approval thereof.

§ 3.12.9 The Contractor shall direct specific attention, in writing or on resubmitted Shop Drawings, Product Data, Samples, or similar submittals, to revisions other than those requested by the Architect on previous submittals. In the absence of such notice, the Architect's approval of a resubmission shall not apply to such revisions.

§ 3.12.10 The Contractor shall not be required to provide professional services that constitute the practice of architecture or engineering unless such services are specifically required by the Contract Documents for a portion of the Work or unless the Contractor needs to provide such services in order to carry out the Contractor's responsibilities for construction means, methods, techniques, sequences, and procedures. The Contractor shall not be required to provide professional services in violation of applicable law.

§ 3.12.10.1 If professional design services or certifications by a design professional related to systems, materials, or equipment are specifically required of the Contractor by the Contract Documents, the Owner and the Architect will

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specify all performance and design criteria that such services must satisfy. The Contractor shall be entitled to rely upon the adequacy and accuracy of the performance and design criteria provided in the Contract Documents. The Contractor shall cause such services or certifications to be provided by an appropriately licensed design professional, whose signature and seal shall appear on all drawings, calculations, specifications, certifications, Shop Drawings, and other submittals prepared by such professional. Shop Drawings, and other submittals related to the Work, designed or certified by such professional, if prepared by others, shall bear such professional's written approval when submitted to the Architect. The Owner and the Architect shall be entitled to rely upon the adequacy and accuracy of the services, certifications, and approvals performed or provided by such design professionals, provided the Owner and Architect have specified to the Contractor the performance and design criteria that such services must satisfy. Pursuant to this Section 3.12.10, the Architect will review and approve or take other appropriate action on submittals only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents.

§ 3.12.10.2 If the Contract Documents require the Contractor's design professional to certify that the Work has been performed in accordance with the design criteria, the Contractor shall furnish such certifications to the Architect at the time and in the form specified by the Architect.

§ 3.13 Use of Site

The Contractor shall confine operations at the site to areas permitted by applicable laws, statutes, ordinances, codes, rules and regulations, lawful orders of public authorities, and the Contract Documents and shall not unreasonably encumber the site with materials or equipment.

§ 3.14 Cutting and Patching

§ 3.14.1 The Contractor shall be responsible for cutting, fitting, or patching required to complete the Work or to make its parts fit together properly. All areas requiring cutting, fitting, or patching shall be restored to the condition existing prior to the cutting, fitting, or patching, unless otherwise required by the Contract Documents.

§ 3.14.2 The Contractor shall not damage or endanger a portion of the Work or fully or partially completed construction of the Owner or Separate Contractors by cutting, patching, or otherwise altering such construction, or by excavation. The Contractor shall not cut or otherwise alter construction by the Owner or a Separate Contractor except with written consent of the Owner and of the Separate Contractor. Consent shall not be unreasonably withheld. The Contractor shall not unreasonably withhold, from the Owner or a Separate Contractor, its consent to cutting or otherwise altering the Work.

§ 3.15 Cleaning Up

§ 3.15.1 The Contractor shall keep the premises and surrounding area free from accumulation of waste materials and rubbish caused by operations under the Contract. At completion of the Work, the Contractor shall remove waste materials, rubbish, the Contractor's tools, construction equipment, machinery, and surplus materials from and about the Project.

§ 3.15.2 If the Contractor fails to clean up as provided in the Contract Documents, the Owner may do so and the Owner shall be entitled to reimbursement from the Contractor.

§ 3.16 Access to Work

The Contractor shall provide the Owner and Architect with access to the Work in preparation and progress wherever located.

§ 3.17 Royalties, Patents and Copyrights

The Contractor shall pay all royalties and license fees. The Contractor shall defend suits or claims for infringement of copyrights and patent rights and shall hold the Owner and Architect harmless from loss on account thereof, but shall not be responsible for defense or loss when a particular design, process, or product of a particular manufacturer or manufacturers is required by the Contract Documents, or where the copyright violations are contained in Drawings, Specifications, or other documents prepared by the Owner or Architect. However, if an infringement of a copyright or patent is discovered by, or made known to, the Contractor, the Contractor shall be responsible for the loss unless the information is promptly furnished to the Architect.

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§ 3.18 Indemnification

§ 3.18.1 To the fullest extent permitted by law, the Contractor shall indemnify and hold harmless the Owner, Architect, Architect's consultants, and agents and employees of any of them from and against claims, damages, losses, and expenses, including but not limited to attorneys' fees, arising out of or resulting from performance of the Work, provided that such claim, damage, loss, or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself), but only to the extent caused by the negligent acts or omissions of the Contractor, a Subcontractor, anyone directly or indirectly employed by them, or anyone for whose acts they may be liable, regardless of whether or not such claim, damage, loss, or expense is caused in part by a party indemnified hereunder. Such obligation shall not be construed to negate, abridge, or reduce other rights or obligations of indemnity that would otherwise exist as to a party or person described in this Section 3.18.

§ 3.18.2 In claims against any person or entity indemnified under this Section 3.18 by an employee of the Contractor, a Subcontractor, anyone directly or indirectly employed by them, or anyone for whose acts they may be liable, the indemnification obligation under Section 3.18.1 shall not be limited by a limitation on amount or type of damages, compensation, or benefits payable by or for the Contractor or a Subcontractor under workers' compensation acts, disability benefit acts, or other employee benefit acts.

ARTICLE 4 ARCHITECT

§ 4.1 General

§ 4.1.1 The Architect is the person or entity retained by the Owner pursuant to Section 2.3.2 and identified as such in the Agreement.

§ 4.1.2 Duties, responsibilities, and limitations of authority of the Architect as set forth in the Contract Documents shall not be restricted, modified, or extended without written consent of the Owner, Contractor, and Architect. Consent shall not be unreasonably withheld.

§ 4.2 Administration of the Contract

§ 4.2.1 The Architect will provide administration of the Contract as described in the Contract Documents and will be an Owner's representative during construction until the date the Architect issues the final Certificate for Payment. The Architect will have authority to act on behalf of the Owner only to the extent provided in the Contract Documents.

§ 4.2.2 The Architect will visit the site at intervals appropriate to the stage of construction, or as otherwise agreed with the Owner, to become generally familiar with the progress and quality of the portion of the Work completed, and to determine in general if the Work observed is being performed in a manner indicating that the Work, when fully completed, will be in accordance with the Contract Documents. However, the Architect will not be required to make exhaustive or continuous on-site inspections to check the quality or quantity of the Work. The Architect will not have control over, charge of, or responsibility for the construction means, methods, techniques, sequences or procedures, or for the safety precautions and programs in connection with the Work, since these are solely the Contractor's rights and responsibilities under the Contract Documents.

§ 4.2.3 On the basis of the site visits, the Architect will keep the Owner reasonably informed about the progress and quality of the portion of the Work completed, and promptly report to the Owner (1) known deviations from the Contract Documents, (2) known deviations from the most recent construction schedule submitted by the Contractor, and (3) defects and deficiencies observed in the Work. The Architect will not be responsible for the Contractor's failure to perform the Work in accordance with the requirements of the Contract Documents. The Architect will not have control over or charge of, and will not be responsible for acts or omissions of, the Contractor, Subcontractors, or their agents or employees, or any other persons or entities performing portions of the Work.

§ 4.2.4 Communications

The Owner and Contractor shall include the Architect in all communications that relate to or affect the Architect's services or professional responsibilities. The Owner shall promptly notify the Architect of the substance of any direct communications between the Owner and the Contractor otherwise relating to the Project. Communications by and with the Architect's consultants shall be through the Architect. Communications by and with Subcontractors and suppliers shall be through the Contractor. Communications by and with Separate Contractors shall be through the Owner. The Contract Documents may specify other communication protocols.

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§ 4.2.5 Based on the Architect's evaluations of the Contractor's Applications for Payment, the Architect will review and certify the amounts due the Contractor and will issue Certificates for Payment in such amounts.

§ 4.2.6 The Architect has authority to reject Work that does not conform to the Contract Documents. Whenever the Architect considers it necessary or advisable, the Architect will have authority to require inspection or testing of the Work in accordance with Sections 13.4.2 and 13.4.3, whether or not the Work is fabricated, installed or completed. However, neither this authority of the Architect nor a decision made in good faith either to exercise or not to exercise such authority shall give rise to a duty or responsibility of the Architect to the Contractor, Subcontractors, suppliers, their agents or employees, or other persons or entities performing portions of the Work.

§ 4.2.7 The Architect will review and approve, or take other appropriate action upon, the Contractor's submittals such as Shop Drawings, Product Data, and Samples, but only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents. The Architect's action will be taken in accordance with the submittal schedule approved by the Architect or, in the absence of an approved submittal schedule, with reasonable promptness while allowing sufficient time in the Architect's professional judgment to permit adequate review. Review of such submittals is not conducted for the purpose of determining the accuracy and completeness of other details such as dimensions and quantities, or for substantiating instructions for installation or performance of equipment or systems, all of which remain the responsibility of the Contractor as required by the Contract Documents. The Architect's review of the Contractor's submittals shall not relieve the Contractor of the obligations under Sections 3.3, 3.5, and 3.12. The Architect's review shall not constitute approval of safety precautions or of any construction means, methods, techniques, sequences, or procedures. The Architect's approval of a specific item shall not indicate approval of an assembly of which the item is a component.

§ 4.2.8 The Architect will prepare Change Orders and Construction Change Directives, and may order minor changes in the Work as provided in Section 7.4. The Architect will investigate and make determinations and recommendations regarding concealed and unknown conditions as provided in Section 3.7.4.

§ 4.2.9 The Architect will conduct inspections to determine the date or dates of Substantial Completion and the date of final completion; issue Certificates of Substantial Completion pursuant to Section 9.8; receive and forward to the Owner, for the Owner's review and records, written warranties and related documents required by the Contract and assembled by the Contractor pursuant to Section 9.10; and issue a final Certificate for Payment pursuant to Section 9.10.

§ 4.2.10 If the Owner and Architect agree, the Architect will provide one or more Project representatives to assist in carrying out the Architect's responsibilities at the site. The Owner shall notify the Contractor of any change in the duties, responsibilities and limitations of authority of the Project representatives.

§ 4.2.11 The Architect will interpret and decide matters concerning performance under, and requirements of, the Contract Documents on written request of either the Owner or Contractor. The Architect's response to such requests will be made in writing within any time limits agreed upon or otherwise with reasonable promptness.

§ 4.2.12 Interpretations and decisions of the Architect will be consistent with the intent of, and reasonably inferable from, the Contract Documents and will be in writing or in the form of drawings. When making such interpretations and decisions, the Architect will endeavor to secure faithful performance by both Owner and Contractor, will not show partiality to either, and will not be liable for results of interpretations or decisions rendered in good faith.

§ 4.2.13 The Architect's decisions on matters relating to aesthetic effect will be final if consistent with the intent expressed in the Contract Documents.

§ 4.2.14 The Architect will review and respond to requests for information about the Contract Documents. The Architect's response to such requests will be made in writing within any time limits agreed upon or otherwise with reasonable promptness. If appropriate, the Architect will prepare and issue supplemental Drawings and Specifications in response to the requests for information.

ARTICLE 5 SUBCONTRACTORS

§ 5.1 Definitions

§ 5.1.1 A Subcontractor is a person or entity who has a direct contract with the Contractor to perform a portion of the Work at the site. The term "Subcontractor" is referred to throughout the Contract Documents as if singular in

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number and means a Subcontractor or an authorized representative of the Subcontractor. The term "Subcontractor" does not include a Separate Contractor or the subcontractors of a Separate Contractor.

§ 5.1.2 A Sub-subcontractor is a person or entity who has a direct or indirect contract with a Subcontractor to perform a portion of the Work at the site. The term "Sub-subcontractor" is referred to throughout the Contract Documents as if singular in number and means a Sub-subcontractor or an authorized representative of the Sub-subcontractor.

§ 5.2 Award of Subcontracts and Other Contracts for Portions of the Work

§ 5.2.1 Unless otherwise stated in the Contract Documents, the Contractor, as soon as practicable after award of the Contract, shall notify the Owner and Architect of the persons or entities proposed for each principal portion of the Work, including those who are to furnish materials or equipment fabricated to a special design. Within 14 days of receipt of the information, the Architect may notify the Contractor whether the Owner or the Architect (1) has reasonable objection to any such proposed person or entity or (2) requires additional time for review. Failure of the Architect to provide notice within the 14-day period shall constitute notice of no reasonable objection.

§ 5.2.2 The Contractor shall not contract with a proposed person or entity to whom the Owner or Architect has made reasonable and timely objection. The Contractor shall not be required to contract with anyone to whom the Contractor has made reasonable objection.

§ 5.2.3 If the Owner or Architect has reasonable objection to a person or entity proposed by the Contractor, the Contractor shall propose another to whom the Owner or Architect has no reasonable objection. If the proposed but rejected Subcontractor was reasonably capable of performing the Work, the Contract Sum and Contract Time shall be increased or decreased by the difference, if any, occasioned by such change, and an appropriate Change Order shall be issued before commencement of the substitute Subcontractor's Work. However, no increase in the Contract Sum or Contract Time shall be allowed for such change unless the Contractor has acted promptly and responsively in submitting names as required.

§ 5.2.4 The Contractor shall not substitute a Subcontractor, person, or entity for one previously selected if the Owner or Architect makes reasonable objection to such substitution.

§ 5.3 Subcontractual Relations

By appropriate written agreement, the Contractor shall require each Subcontractor, to the extent of the Work to be performed by the Subcontractor, to be bound to the Contractor by terms of the Contract Documents, and to assume toward the Contractor all the obligations and responsibilities, including the responsibility for safety of the Subcontractor's Work that the Contractor, by these Contract Documents, assumes toward the Owner and Architect. Each subcontract agreement shall preserve and protect the rights of the Owner and Architect under the Contract Documents with respect to the Work to be performed by the Subcontractor so that subcontracting thereof will not prejudice such rights, and shall allow to the Subcontractor, unless specifically provided otherwise in the subcontract agreement, the benefit of all rights, remedies, and redress against the Contractor that the Contractor, by the Contract Documents, has against the Owner. Where appropriate, the Contractor shall require each Subcontractor to enter into similar agreements with Sub-subcontractors. The Contractor shall make available to each proposed Subcontractor, prior to the execution of the subcontract agreement, copies of the Contract Documents to which the Subcontractor will be bound, and, upon written request of the Subcontractor, identify to the Subcontractor terms and conditions of the proposed subcontract agreement that may be at variance with the Contract Documents. Subcontractors will similarly make copies of applicable portions of such documents available to their respective proposed Sub-subcontractors.

§ 5.4 Contingent Assignment of Subcontracts

§ 5.4.1 Each subcontract agreement for a portion of the Work is assigned by the Contractor to the Owner, provided that

.1 assignment is effective only after termination of the Contract by the Owner for cause pursuant to Section 14.2 and only for those subcontract agreements that the Owner accepts by notifying the Subcontractor and Contractor; and

.2 assignment is subject to the prior rights of the surety, if any, obligated under bond relating to the Contract.

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When the Owner accepts the assignment of a subcontract agreement, the Owner assumes the Contractor's rights and obligations under the subcontract.

§ 5.4.2 Upon such assignment, if the Work has been suspended for more than 30 days, the Subcontractor's compensation shall be equitably adjusted for increases in cost resulting from the suspension.

§ 5.4.3 Upon assignment to the Owner under this Section 5.4, the Owner may further assign the subcontract to a successor contractor or other entity. If the Owner assigns the subcontract to a successor contractor or other entity, the Owner shall nevertheless remain legally responsible for all of the successor contractor's obligations under the subcontract.

ARTICLE 6 CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS

§ 6.1 Owner's Right to Perform Construction and to Award Separate Contracts

§ 6.1.1 The term "Separate Contractor(s)" shall mean other contractors retained by the Owner under separate agreements. The Owner reserves the right to perform construction or operations related to the Project with the Owner's own forces, and with Separate Contractors retained under Conditions of the Contract substantially similar to those of this Contract, including those provisions of the Conditions of the Contract related to insurance and waiver of subrogation.

§ 6.1.2 When separate contracts are awarded for different portions of the Project or other construction or operations on the site, the term "Contractor" in the Contract Documents in each case shall mean the Contractor who executes each separate Owner-Contractor Agreement.

§ 6.1.3 The Owner shall provide for coordination of the activities of the Owner's own forces and of each Separate Contractor with the Work of the Contractor, who shall cooperate with them. The Contractor shall participate with any Separate Contractors and the Owner in reviewing their construction schedules. The Contractor shall make any revisions to its construction schedule deemed necessary after a joint review and mutual agreement. The construction schedules shall then constitute the schedules to be used by the Contractor, Separate Contractors, and the Owner until subsequently revised.

§ 6.1.4 Unless otherwise provided in the Contract Documents, when the Owner performs construction or operations related to the Project with the Owner's own forces or with Separate Contractors, the Owner or its Separate Contractors shall have the same obligations and rights that the Contractor has under the Conditions of the Contract, including, without excluding others, those stated in Article 3, this Article 6, and Articles 10, 11, and 12.

§ 6.2 Mutual Responsibility

§ 6.2.1 The Contractor shall afford the Owner and Separate Contractors reasonable opportunity for introduction and storage of their materials and equipment and performance of their activities, and shall connect and coordinate the Contractor's construction and operations with theirs as required by the Contract Documents.

§ 6.2.2 If part of the Contractor's Work depends for proper execution or results upon construction or operations by the Owner or a Separate Contractor, the Contractor shall, prior to proceeding with that portion of the Work, promptly notify the Architect of apparent discrepancies or defects in the construction or operations by the Owner or Separate Contractor that would render it unsuitable for proper execution and results of the Contractor's Work. Failure of the Contractor to notify the Architect of apparent discrepancies or defects prior to proceeding with the Work shall constitute an acknowledgment that the Owner's or Separate Contractor's completed or partially completed construction is fit and proper to receive the Contractor's Work. The Contractor shall not be responsible for discrepancies or defects in the construction or operations by the Owner or Separate Contractor that are not apparent.

§ 6.2.3 The Contractor shall reimburse the Owner for costs the Owner incurs that are payable to a Separate Contractor because of the Contractor's delays, improperly timed activities or defective construction. The Owner shall be responsible to the Contractor for costs the Contractor incurs because of a Separate Contractor's delays, improperly timed activities, damage to the Work or defective construction.

§ 6.2.4 The Contractor shall promptly remedy damage that the Contractor wrongfully causes to completed or partially completed construction or to property of the Owner or Separate Contractor as provided in Section 10.2.5.

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§ 6.2.5 The Owner and each Separate Contractor shall have the same responsibilities for cutting and patching as are described for the Contractor in Section 3.14.

§ 6.3 Owner's Right to Clean Up

If a dispute arises among the Contractor, Separate Contractors, and the Owner as to the responsibility under their respective contracts for maintaining the premises and surrounding area free from waste materials and rubbish, the Owner may clean up and the Architect will allocate the cost among those responsible.

ARTICLE 7 CHANGES IN THE WORK

§ 7.1 General

§ 7.1.1 Changes in the Work may be accomplished after execution of the Contract, and without invalidating the Contract, by Change Order, Construction Change Directive or order for a minor change in the Work, subject to the limitations stated in this Article 7 and elsewhere in the Contract Documents.

§ 7.1.2 A Change Order shall be based upon agreement among the Owner, Contractor, and Architect. A Construction Change Directive requires agreement by the Owner and Architect and may or may not be agreed to by the Contractor. An order for a minor change in the Work may be issued by the Architect alone.

§ 7.1.3 Changes in the Work shall be performed under applicable provisions of the Contract Documents. The Contractor shall proceed promptly with changes in the Work, unless otherwise provided in the Change Order, Construction Change Directive, or order for a minor change in the Work.

§ 7.2 Change Orders

§ 7.2.1 A Change Order is a written instrument prepared by the Architect and signed by the Owner, Contractor, and Architect stating their agreement upon all of the following:

- **.1** The change in the Work;
- **.2** The amount of the adjustment, if any, in the Contract Sum; and
- **.3** The extent of the adjustment, if any, in the Contract Time.

§ 7.3 Construction Change Directives

§ 7.3.1 A Construction Change Directive is a written order prepared by the Architect and signed by the Owner and Architect, directing a change in the Work prior to agreement on adjustment, if any, in the Contract Sum or Contract Time, or both. The Owner may by Construction Change Directive, without invalidating the Contract, order changes in the Work within the general scope of the Contract consisting of additions, deletions, or other revisions, the Contract Sum and Contract Time being adjusted accordingly.

§ 7.3.2 A Construction Change Directive shall be used in the absence of total agreement on the terms of a Change Order.

§ 7.3.3 If the Construction Change Directive provides for an adjustment to the Contract Sum, the adjustment shall be based on one of the following methods:

- **.1** Mutual acceptance of a lump sum properly itemized and supported by sufficient substantiating data to permit evaluation;
- **.2** Unit prices stated in the Contract Documents or subsequently agreed upon;
- **.3** Cost to be determined in a manner agreed upon by the parties and a mutually acceptable fixed or percentage fee; or
- **.4** As provided in Section 7.3.4.

§ 7.3.4 If the Contractor does not respond promptly or disagrees with the method for adjustment in the Contract Sum, the Architect shall determine the adjustment on the basis of reasonable expenditures and savings of those performing the Work attributable to the change, including, in case of an increase in the Contract Sum, an amount for overhead and profit as set forth in the Agreement, or if no such amount is set forth in the Agreement, a reasonable amount. In such case, and also under Section 7.3.3.3, the Contractor shall keep and present, in such form as the Architect may prescribe, an itemized accounting together with appropriate supporting data. Unless otherwise provided in the Contract Documents, costs for the purposes of this Section 7.3.4 shall be limited to the following:

- **.1** Costs of labor, including applicable payroll taxes, fringe benefits required by agreement or custom, workers' compensation insurance, and other employee costs approved by the Architect;

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.2 Costs of materials, supplies, and equipment, including cost of transportation, whether incorporated or consumed;

.3 Rental costs of machinery and equipment, exclusive of hand tools, whether rented from the Contractor or others;

.4 Costs of premiums for all bonds and insurance, permit fees, and sales, use, or similar taxes, directly related to the change; and

.5 Costs of supervision and field office personnel directly attributable to the change.

§ 7.3.5 If the Contractor disagrees with the adjustment in the Contract Time, the Contractor may make a Claim in accordance with applicable provisions of Article 15.

§ 7.3.6 Upon receipt of a Construction Change Directive, the Contractor shall promptly proceed with the change in the Work involved and advise the Architect of the Contractor's agreement or disagreement with the method, if any, provided in the Construction Change Directive for determining the proposed adjustment in the Contract Sum or Contract Time.

§ 7.3.7 A Construction Change Directive signed by the Contractor indicates the Contractor's agreement therewith, including adjustment in Contract Sum and Contract Time or the method for determining them. Such agreement shall be effective immediately and shall be recorded as a Change Order.

§ 7.3.8 The amount of credit to be allowed by the Contractor to the Owner for a deletion or change that results in a net decrease in the Contract Sum shall be actual net cost as confirmed by the Architect. When both additions and credits covering related Work or substitutions are involved in a change, the allowance for overhead and profit shall be figured on the basis of net increase, if any, with respect to that change.

§ 7.3.9 Pending final determination of the total cost of a Construction Change Directive to the Owner, the Contractor may request payment for Work completed under the Construction Change Directive in Applications for Payment. The Architect will make an interim determination for purposes of monthly certification for payment for those costs and certify for payment the amount that the Architect determines, in the Architect's professional judgment, to be reasonably justified. The Architect's interim determination of cost shall adjust the Contract Sum on the same basis as a Change Order, subject to the right of either party to disagree and assert a Claim in accordance with Article 15.

§ 7.3.10 When the Owner and Contractor agree with a determination made by the Architect concerning the adjustments in the Contract Sum and Contract Time, or otherwise reach agreement upon the adjustments, such agreement shall be effective immediately and the Architect will prepare a Change Order. Change Orders may be issued for all or any part of a Construction Change Directive.

§ 7.4 Minor Changes in the Work

The Architect may order minor changes in the Work that are consistent with the intent of the Contract Documents and do not involve an adjustment in the Contract Sum or an extension of the Contract Time. The Architect's order for minor changes shall be in writing. If the Contractor believes that the proposed minor change in the Work will affect the Contract Sum or Contract Time, the Contractor shall notify the Architect and shall not proceed to implement the change in the Work. If the Contractor performs the Work set forth in the Architect's order for a minor change without prior notice to the Architect that such change will affect the Contract Sum or Contract Time, the Contractor waives any adjustment to the Contract Sum or extension of the Contract Time.

ARTICLE 8 TIME

§ 8.1 Definitions

§ 8.1.1 Unless otherwise provided, Contract Time is the period of time, including authorized adjustments, allotted in the Contract Documents for Substantial Completion of the Work.

§ 8.1.2 The date of commencement of the Work is the date established in the Agreement.

§ 8.1.3 The date of Substantial Completion is the date certified by the Architect in accordance with Section 9.8.

§ 8.1.4 The term "day" as used in the Contract Documents shall mean calendar day unless otherwise specifically defined.

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§ 8.2 Progress and Completion

§ 8.2.1 Time limits stated in the Contract Documents are of the essence of the Contract. By executing the Agreement, the Contractor confirms that the Contract Time is a reasonable period for performing the Work.

§ 8.2.2 The Contractor shall not knowingly, except by agreement or instruction of the Owner in writing, commence the Work prior to the effective date of insurance required to be furnished by the Contractor and Owner.

§ 8.2.3 The Contractor shall proceed expeditiously with adequate forces and shall achieve Substantial Completion within the Contract Time.

§ 8.3 Delays and Extensions of Time

§ 8.3.1 If the Contractor is delayed at any time in the commencement or progress of the Work by (1) an act or neglect of the Owner or Architect, of an employee of either, or of a Separate Contractor; (2) by changes ordered in the Work; (3) by labor disputes, fire, unusual delay in deliveries, unavoidable casualties, adverse weather conditions documented in accordance with Section 15.1.6.2, or other causes beyond the Contractor's control; (4) by delay authorized by the Owner pending mediation and binding dispute resolution; or (5) by other causes that the Contractor asserts, and the Architect determines, justify delay, then the Contract Time shall be extended for such reasonable time as the Architect may determine.

§ 8.3.2 Claims relating to time shall be made in accordance with applicable provisions of Article 15.

§ 8.3.3 This Section 8.3 does not preclude recovery of damages for delay by either party under other provisions of the Contract Documents.

ARTICLE 9 PAYMENTS AND COMPLETION

§ 9.1 Contract Sum

§ 9.1.1 The Contract Sum is stated in the Agreement and, including authorized adjustments, is the total amount payable by the Owner to the Contractor for performance of the Work under the Contract Documents.

§ 9.1.2 If unit prices are stated in the Contract Documents or subsequently agreed upon, and if quantities originally contemplated are materially changed so that application of such unit prices to the actual quantities causes substantial inequity to the Owner or Contractor, the applicable unit prices shall be equitably adjusted.

§ 9.2 Schedule of Values

Where the Contract is based on a stipulated sum or Guaranteed Maximum Price, the Contractor shall submit a schedule of values to the Architect before the first Application for Payment, allocating the entire Contract Sum to the various portions of the Work. The schedule of values shall be prepared in the form, and supported by the data to substantiate its accuracy, required by the Architect. This schedule, unless objected to by the Architect, shall be used as a basis for reviewing the Contractor's Applications for Payment. Any changes to the schedule of values shall be submitted to the Architect and supported by such data to substantiate its accuracy as the Architect may require, and unless objected to by the Architect, shall be used as a basis for reviewing the Contractor's subsequent Applications for Payment.

§ 9.3 Applications for Payment

§ 9.3.1 At least ten days before the date established for each progress payment, the Contractor shall submit to the Architect an itemized Application for Payment prepared in accordance with the schedule of values, if required under Section 9.2, for completed portions of the Work. The application shall be notarized, if required, and supported by all data substantiating the Contractor's right to payment that the Owner or Architect require, such as copies of requisitions, and releases and waivers of liens from Subcontractors and suppliers, and shall reflect retainage if provided for in the Contract Documents.

§ 9.3.1.1 As provided in Section 7.3.9, such applications may include requests for payment on account of changes in the Work that have been properly authorized by Construction Change Directives, or by interim determinations of the Architect, but not yet included in Change Orders.

§ 9.3.1.2 Applications for Payment shall not include requests for payment for portions of the Work for which the Contractor does not intend to pay a Subcontractor or supplier, unless such Work has been performed by others whom the Contractor intends to pay.

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§ 9.3.2 Unless otherwise provided in the Contract Documents, payments shall be made on account of materials and equipment delivered and suitably stored at the site for subsequent incorporation in the Work. If approved in advance by the Owner, payment may similarly be made for materials and equipment suitably stored off the site at a location agreed upon in writing. Payment for materials and equipment stored on or off the site shall be conditioned upon compliance by the Contractor with procedures satisfactory to the Owner to establish the Owner's title to such materials and equipment or otherwise protect the Owner's interest, and shall include the costs of applicable insurance, storage, and transportation to the site, for such materials and equipment stored off the site.

§ 9.3.3 The Contractor warrants that title to all Work covered by an Application for Payment will pass to the Owner no later than the time of payment. The Contractor further warrants that upon submittal of an Application for Payment all Work for which Certificates for Payment have been previously issued and payments received from the Owner shall, to the best of the Contractor's knowledge, information, and belief, be free and clear of liens, claims, security interests, or encumbrances, in favor of the Contractor, Subcontractors, suppliers, or other persons or entities that provided labor, materials, and equipment relating to the Work.

§ 9.4 Certificates for Payment

§ 9.4.1 The Architect will, within seven days after receipt of the Contractor's Application for Payment, either (1) issue to the Owner a Certificate for Payment in the full amount of the Application for Payment, with a copy to the Contractor; or (2) issue to the Owner a Certificate for Payment for such amount as the Architect determines is properly due, and notify the Contractor and Owner of the Architect's reasons for withholding certification in part as provided in Section 9.5.1; or (3) withhold certification of the entire Application for Payment, and notify the Contractor and Owner of the Architect's reason for withholding certification in whole as provided in Section 9.5.1.

§ 9.4.2 The issuance of a Certificate for Payment will constitute a representation by the Architect to the Owner, based on the Architect's evaluation of the Work and the data in the Application for Payment, that, to the best of the Architect's knowledge, information, and belief, the Work has progressed to the point indicated, the quality of the Work is in accordance with the Contract Documents, and that the Contractor is entitled to payment in the amount certified. The foregoing representations are subject to an evaluation of the Work for conformance with the Contract Documents upon Substantial Completion, to results of subsequent tests and inspections, to correction of minor deviations from the Contract Documents prior to completion, and to specific qualifications expressed by the Architect. However, the issuance of a Certificate for Payment will not be a representation that the Architect has (1) made exhaustive or continuous on-site inspections to check the quality or quantity of the Work; (2) reviewed construction means, methods, techniques, sequences, or procedures; (3) reviewed copies of requisitions received from Subcontractors and suppliers and other data requested by the Owner to substantiate the Contractor's right to payment; or (4) made examination to ascertain how or for what purpose the Contractor has used money previously paid on account of the Contract Sum.

§ 9.5 Decisions to Withhold Certification

§ 9.5.1 The Architect may withhold a Certificate for Payment in whole or in part, to the extent reasonably necessary to protect the Owner, if in the Architect's opinion the representations to the Owner required by Section 9.4.2 cannot be made. If the Architect is unable to certify payment in the amount of the Application, the Architect will notify the Contractor and Owner as provided in Section 9.4.1. If the Contractor and Architect cannot agree on a revised amount, the Architect will promptly issue a Certificate for Payment for the amount for which the Architect is able to make such representations to the Owner. The Architect may also withhold a Certificate for Payment or, because of subsequently discovered evidence, may nullify the whole or a part of a Certificate for Payment previously issued, to such extent as may be necessary in the Architect's opinion to protect the Owner from loss for which the Contractor is responsible, including loss resulting from acts and omissions described in Section 3.3.2, because of

- **.1** defective Work not remedied;
- **.2** third party claims filed or reasonable evidence indicating probable filing of such claims, unless security acceptable to the Owner is provided by the Contractor;
- **.3** failure of the Contractor to make payments properly to Subcontractors or suppliers for labor, materials or equipment;
- **.4** reasonable evidence that the Work cannot be completed for the unpaid balance of the Contract Sum;
- **.5** damage to the Owner or a Separate Contractor;
- **.6** reasonable evidence that the Work will not be completed within the Contract Time, and that the unpaid balance would not be adequate to cover actual or liquidated damages for the anticipated delay; or

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.7 repeated failure to carry out the Work in accordance with the Contract Documents.

§ 9.5.2 When either party disputes the Architect's decision regarding a Certificate for Payment under Section 9.5.1, in whole or in part, that party may submit a Claim in accordance with Article 15.

§ 9.5.3 When the reasons for withholding certification are removed, certification will be made for amounts previously withheld.

§ 9.5.4 If the Architect withholds certification for payment under Section 9.5.1.3, the Owner may, at its sole option, issue joint checks to the Contractor and to any Subcontractor or supplier to whom the Contractor failed to make payment for Work properly performed or material or equipment suitably delivered. If the Owner makes payments by joint check, the Owner shall notify the Architect and the Contractor shall reflect such payment on its next Application for Payment.

§ 9.6 Progress Payments

§ 9.6.1 After the Architect has issued a Certificate for Payment, the Owner shall make payment in the manner and within the time provided in the Contract Documents, and shall so notify the Architect.

§ 9.6.2 The Contractor shall pay each Subcontractor, no later than seven days after receipt of payment from the Owner, the amount to which the Subcontractor is entitled, reflecting percentages actually retained from payments to the Contractor on account of the Subcontractor's portion of the Work. The Contractor shall, by appropriate agreement with each Subcontractor, require each Subcontractor to make payments to Sub-subcontractors in a similar manner.

§ 9.6.3 The Architect will, on request, furnish to a Subcontractor, if practicable, information regarding percentages of completion or amounts applied for by the Contractor and action taken thereon by the Architect and Owner on account of portions of the Work done by such Subcontractor.

§ 9.6.4 The Owner has the right to request written evidence from the Contractor that the Contractor has properly paid Subcontractors and suppliers amounts paid by the Owner to the Contractor for subcontracted Work. If the Contractor fails to furnish such evidence within seven days, the Owner shall have the right to contact Subcontractors and suppliers to ascertain whether they have been properly paid. Neither the Owner nor Architect shall have an obligation to pay, or to see to the payment of money to, a Subcontractor or supplier, except as may otherwise be required by law.

§ 9.6.5 The Contractor's payments to suppliers shall be treated in a manner similar to that provided in Sections 9.6.2, 9.6.3 and 9.6.4.

§ 9.6.6 A Certificate for Payment, a progress payment, or partial or entire use or occupancy of the Project by the Owner shall not constitute acceptance of Work not in accordance with the Contract Documents.

§ 9.6.7 Unless the Contractor provides the Owner with a payment bond in the full penal sum of the Contract Sum, payments received by the Contractor for Work properly performed by Subcontractors or provided by suppliers shall be held by the Contractor for those Subcontractors or suppliers who performed Work or furnished materials, or both, under contract with the Contractor for which payment was made by the Owner. Nothing contained herein shall require money to be placed in a separate account and not commingled with money of the Contractor, create any fiduciary liability or tort liability on the part of the Contractor for breach of trust, or entitle any person or entity to an award of punitive damages against the Contractor for breach of the requirements of this provision.

§ 9.6.8 Provided the Owner has fulfilled its payment obligations under the Contract Documents, the Contractor shall defend and indemnify the Owner from all loss, liability, damage or expense, including reasonable attorney's fees and litigation expenses, arising out of any lien claim or other claim for payment by any Subcontractor or supplier of any tier. Upon receipt of notice of a lien claim or other claim for payment, the Owner shall notify the Contractor. If approved by the applicable court, when required, the Contractor may substitute a surety bond for the property against which the lien or other claim for payment has been asserted.

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§ 9.7 Failure of Payment

If the Architect does not issue a Certificate for Payment, through no fault of the Contractor, within seven days after receipt of the Contractor's Application for Payment, or if the Owner does not pay the Contractor within seven days after the date established in the Contract Documents, the amount certified by the Architect or awarded by binding dispute resolution, then the Contractor may, upon seven additional days' notice to the Owner and Architect, stop the Work until payment of the amount owing has been received. The Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable costs of shutdown, delay and start-up, plus interest as provided for in the Contract Documents.

§ 9.8 Substantial Completion

§ 9.8.1 Substantial Completion is the stage in the progress of the Work when the Work or designated portion thereof is sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work for its intended use.

§ 9.8.2 When the Contractor considers that the Work, or a portion thereof which the Owner agrees to accept separately, is substantially complete, the Contractor shall prepare and submit to the Architect a comprehensive list of items to be completed or corrected prior to final payment. Failure to include an item on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents.

§ 9.8.3 Upon receipt of the Contractor's list, the Architect will make an inspection to determine whether the Work or designated portion thereof is substantially complete. If the Architect's inspection discloses any item, whether or not included on the Contractor's list, which is not sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work or designated portion thereof for its intended use, the Contractor shall, before issuance of the Certificate of Substantial Completion, complete or correct such item upon notification by the Architect. In such case, the Contractor shall then submit a request for another inspection by the Architect to determine Substantial Completion.

§ 9.8.4 When the Work or designated portion thereof is substantially complete, the Architect will prepare a Certificate of Substantial Completion that shall establish the date of Substantial Completion; establish responsibilities of the Owner and Contractor for security, maintenance, heat, utilities, damage to the Work and insurance; and fix the time within which the Contractor shall finish all items on the list accompanying the Certificate. Warranties required by the Contract Documents shall commence on the date of Substantial Completion of the Work or designated portion thereof unless otherwise provided in the Certificate of Substantial Completion.

§ 9.8.5 The Certificate of Substantial Completion shall be submitted to the Owner and Contractor for their written acceptance of responsibilities assigned to them in the Certificate. Upon such acceptance, and consent of surety if any, the Owner shall make payment of retainage applying to the Work or designated portion thereof. Such payment shall be adjusted for Work that is incomplete or not in accordance with the requirements of the Contract Documents.

§ 9.9 Partial Occupancy or Use

§ 9.9.1 The Owner may occupy or use any completed or partially completed portion of the Work at any stage when such portion is designated by separate agreement with the Contractor, provided such occupancy or use is consented to by the insurer and authorized by public authorities having jurisdiction over the Project. Such partial occupancy or use may commence whether or not the portion is substantially complete, provided the Owner and Contractor have accepted in writing the responsibilities assigned to each of them for payments, retainage, if any, security, maintenance, heat, utilities, damage to the Work and insurance, and have agreed in writing concerning the period for correction of the Work and commencement of warranties required by the Contract Documents. When the Contractor considers a portion substantially complete, the Contractor shall prepare and submit a list to the Architect as provided under Section 9.8.2. Consent of the Contractor to partial occupancy or use shall not be unreasonably withheld. The stage of the progress of the Work shall be determined by written agreement between the Owner and Contractor or, if no agreement is reached, by decision of the Architect.

§ 9.9.2 Immediately prior to such partial occupancy or use, the Owner, Contractor, and Architect shall jointly inspect the area to be occupied or portion of the Work to be used in order to determine and record the condition of the Work.

§ 9.9.3 Unless otherwise agreed upon, partial occupancy or use of a portion or portions of the Work shall not constitute acceptance of Work not complying with the requirements of the Contract Documents.

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§ 9.10 Final Completion and Final Payment

§ 9.10.1 Upon receipt of the Contractor's notice that the Work is ready for final inspection and acceptance and upon receipt of a final Application for Payment, the Architect will promptly make such inspection. When the Architect finds the Work acceptable under the Contract Documents and the Contract fully performed, the Architect will promptly issue a final Certificate for Payment stating that to the best of the Architect's knowledge, information and belief, and on the basis of the Architect's on-site visits and inspections, the Work has been completed in accordance with the Contract Documents and that the entire balance found to be due the Contractor and noted in the final Certificate is due and payable. The Architect's final Certificate for Payment will constitute a further representation that conditions listed in Section 9.10.2 as precedent to the Contractor's being entitled to final payment have been fulfilled.

§ 9.10.2 Neither final payment nor any remaining retained percentage shall become due until the Contractor submits to the Architect (1) an affidavit that payrolls, bills for materials and equipment, and other indebtedness connected with the Work for which the Owner or the Owner's property might be responsible or encumbered (less amounts withheld by Owner) have been paid or otherwise satisfied, (2) a certificate evidencing that insurance required by the Contract Documents to remain in force after final payment is currently in effect, (3) a written statement that the Contractor knows of no reason that the insurance will not be renewable to cover the period required by the Contract Documents, (4) consent of surety, if any, to final payment, (5) documentation of any special warranties, such as manufacturers' warranties or specific Subcontractor warranties, and (6) if required by the Owner, other data establishing payment or satisfaction of obligations, such as receipts and releases and waivers of liens, claims, security interests, or encumbrances arising out of the Contract, to the extent and in such form as may be designated by the Owner. If a Subcontractor refuses to furnish a release or waiver required by the Owner, the Contractor may furnish a bond satisfactory to the Owner to indemnify the Owner against such lien, claim, security interest, or encumbrance. If a lien, claim, security interest, or encumbrance remains unsatisfied after payments are made, the Contractor shall refund to the Owner all money that the Owner may be compelled to pay in discharging the lien, claim, security interest, or encumbrance, including all costs and reasonable attorneys' fees.

§ 9.10.3 If, after Substantial Completion of the Work, final completion thereof is materially delayed through no fault of the Contractor or by issuance of Change Orders affecting final completion, and the Architect so confirms, the Owner shall, upon application by the Contractor and certification by the Architect, and without terminating the Contract, make payment of the balance due for that portion of the Work fully completed, corrected, and accepted. If the remaining balance for Work not fully completed or corrected is less than retainage stipulated in the Contract Documents, and if bonds have been furnished, the written consent of the surety to payment of the balance due for that portion of the Work fully completed and accepted shall be submitted by the Contractor to the Architect prior to certification of such payment. Such payment shall be made under terms and conditions governing final payment, except that it shall not constitute a waiver of Claims.

§ 9.10.4 The making of final payment shall constitute a waiver of Claims by the Owner except those arising from

- **.1** liens, Claims, security interests, or encumbrances arising out of the Contract and unsettled;
- **.2** failure of the Work to comply with the requirements of the Contract Documents;
- **.3** terms of special warranties required by the Contract Documents; or
- **.4** audits performed by the Owner, if permitted by the Contract Documents, after final payment.

§ 9.10.5 Acceptance of final payment by the Contractor, a Subcontractor, or a supplier, shall constitute a waiver of claims by that payee except those previously made in writing and identified by that payee as unsettled at the time of final Application for Payment.

ARTICLE 10 PROTECTION OF PERSONS AND PROPERTY

§ 10.1 Safety Precautions and Programs

The Contractor shall be responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with the performance of the Contract.

§ 10.2 Safety of Persons and Property

§ 10.2.1 The Contractor shall take reasonable precautions for safety of, and shall provide reasonable protection to prevent damage, injury, or loss to

- **.1** employees on the Work and other persons who may be affected thereby;

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.2 the Work and materials and equipment to be incorporated therein, whether in storage on or off the site, under care, custody, or control of the Contractor, a Subcontractor, or a Sub-subcontractor; and

.3 other property at the site or adjacent thereto, such as trees, shrubs, lawns, walks, pavements, roadways, structures, and utilities not designated for removal, relocation, or replacement in the course of construction.

§ 10.2.2 The Contractor shall comply with, and give notices required by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities, bearing on safety of persons or property or their protection from damage, injury, or loss.

§ 10.2.3 The Contractor shall implement, erect, and maintain, as required by existing conditions and performance of the Contract, reasonable safeguards for safety and protection, including posting danger signs and other warnings against hazards; promulgating safety regulations; and notifying the owners and users of adjacent sites and utilities of the safeguards.

§ 10.2.4 When use or storage of explosives or other hazardous materials or equipment, or unusual methods are necessary for execution of the Work, the Contractor shall exercise utmost care and carry on such activities under supervision of properly qualified personnel.

§ 10.2.5 The Contractor shall promptly remedy damage and loss (other than damage or loss insured under property insurance required by the Contract Documents) to property referred to in Sections 10.2.1.2 and 10.2.1.3 caused in whole or in part by the Contractor, a Subcontractor, a Sub-subcontractor, or anyone directly or indirectly employed by any of them, or by anyone for whose acts they may be liable and for which the Contractor is responsible under Sections 10.2.1.2 and 10.2.1.3. The Contractor may make a Claim for the cost to remedy the damage or loss to the extent such damage or loss is attributable to acts or omissions of the Owner or Architect or anyone directly or indirectly employed by either of them, or by anyone for whose acts either of them may be liable, and not attributable to the fault or negligence of the Contractor. The foregoing obligations of the Contractor are in addition to the Contractor's obligations under Section 3.18.

§ 10.2.6 The Contractor shall designate a responsible member of the Contractor's organization at the site whose duty shall be the prevention of accidents. This person shall be the Contractor's superintendent unless otherwise designated by the Contractor in writing to the Owner and Architect.

§ 10.2.7 The Contractor shall not permit any part of the construction or site to be loaded so as to cause damage or create an unsafe condition.

§ 10.2.8 Injury or Damage to Person or Property

If either party suffers injury or damage to person or property because of an act or omission of the other party, or of others for whose acts such party is legally responsible, notice of the injury or damage, whether or not insured, shall be given to the other party within a reasonable time not exceeding 21 days after discovery. The notice shall provide sufficient detail to enable the other party to investigate the matter.

§ 10.3 Hazardous Materials and Substances

§ 10.3.1 The Contractor is responsible for compliance with any requirements included in the Contract Documents regarding hazardous materials or substances. If the Contractor encounters a hazardous material or substance not addressed in the Contract Documents and if reasonable precautions will be inadequate to prevent foreseeable bodily injury or death to persons resulting from a material or substance, including but not limited to asbestos or polychlorinated biphenyl (PCB), encountered on the site by the Contractor, the Contractor shall, upon recognizing the condition, immediately stop Work in the affected area and notify the Owner and Architect of the condition.

§ 10.3.2 Upon receipt of the Contractor's notice, the Owner shall obtain the services of a licensed laboratory to verify the presence or absence of the material or substance reported by the Contractor and, in the event such material or substance is found to be present, to cause it to be rendered harmless. Unless otherwise required by the Contract Documents, the Owner shall furnish in writing to the Contractor and Architect the names and qualifications of persons or entities who are to perform tests verifying the presence or absence of the material or substance or who are to perform the task of removal or safe containment of the material or substance. The Contractor and the Architect will promptly reply to the Owner in writing stating whether or not either has reasonable objection to the persons or entities proposed by the Owner. If either the Contractor or Architect has an objection to a person or entity proposed

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by the Owner, the Owner shall propose another to whom the Contractor and the Architect have no reasonable objection. When the material or substance has been rendered harmless, Work in the affected area shall resume upon written agreement of the Owner and Contractor. By Change Order, the Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable additional costs of shutdown, delay, and start-up.

§ 10.3.3 To the fullest extent permitted by law, the Owner shall indemnify and hold harmless the Contractor, Subcontractors, Architect, Architect's consultants, and agents and employees of any of them from and against claims, damages, losses, and expenses, including but not limited to attorneys' fees, arising out of or resulting from performance of the Work in the affected area if in fact the material or substance presents the risk of bodily injury or death as described in Section 10.3.1 and has not been rendered harmless, provided that such claim, damage, loss, or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself), except to the extent that such damage, loss, or expense is due to the fault or negligence of the party seeking indemnity.

§ 10.3.4 The Owner shall not be responsible under this Section 10.3 for hazardous materials or substances the Contractor brings to the site unless such materials or substances are required by the Contract Documents. The Owner shall be responsible for hazardous materials or substances required by the Contract Documents, except to the extent of the Contractor's fault or negligence in the use and handling of such materials or substances.

§ 10.3.5 The Contractor shall reimburse the Owner for the cost and expense the Owner incurs (1) for remediation of hazardous materials or substances the Contractor brings to the site and negligently handles, or (2) where the Contractor fails to perform its obligations under Section 10.3.1, except to the extent that the cost and expense are due to the Owner's fault or negligence.

§ 10.3.6 If, without negligence on the part of the Contractor, the Contractor is held liable by a government agency for the cost of remediation of a hazardous material or substance solely by reason of performing Work as required by the Contract Documents, the Owner shall reimburse the Contractor for all cost and expense thereby incurred.

§ 10.4 Emergencies

In an emergency affecting safety of persons or property, the Contractor shall act, at the Contractor's discretion, to prevent threatened damage, injury, or loss. Additional compensation or extension of time claimed by the Contractor on account of an emergency shall be determined as provided in Article 15 and Article 7.

ARTICLE 11 INSURANCE AND BONDS

§ 11.1 Contractor's Insurance and Bonds

§ 11.1.1 The Contractor shall purchase and maintain insurance of the types and limits of liability, containing the endorsements, and subject to the terms and conditions, as described in the Agreement or elsewhere in the Contract Documents. The Contractor shall purchase and maintain the required insurance from an insurance company or insurance companies lawfully authorized to issue insurance in the jurisdiction where the Project is located. The Owner, Architect, and Architect's consultants shall be named as additional insureds under the Contractor's commercial general liability policy or as otherwise described in the Contract Documents.

§ 11.1.2 The Contractor shall provide surety bonds of the types, for such penal sums, and subject to such terms and conditions as required by the Contract Documents. The Contractor shall purchase and maintain the required bonds from a company or companies lawfully authorized to issue surety bonds in the jurisdiction where the Project is located.

§ 11.1.3 Upon the request of any person or entity appearing to be a potential beneficiary of bonds covering payment of obligations arising under the Contract, the Contractor shall promptly furnish a copy of the bonds or shall authorize a copy to be furnished.

§ 11.1.4 Notice of Cancellation or Expiration of Contractor's Required Insurance. Within three (3) business days of the date the Contractor becomes aware of an impending or actual cancellation or expiration of any insurance required by the Contract Documents, the Contractor shall provide notice to the Owner of such impending or actual cancellation or expiration. Upon receipt of notice from the Contractor, the Owner shall, unless the lapse in coverage arises from an act or omission of the Owner, have the right to stop the Work until the lapse in coverage has been cured by the

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procurement of replacement coverage by the Contractor. The furnishing of notice by the Contractor shall not relieve the Contractor of any contractual obligation to provide any required coverage.

§ 11.2 Owner's Insurance

§ 11.2.1 The Owner shall purchase and maintain insurance of the types and limits of liability, containing the endorsements, and subject to the terms and conditions, as described in the Agreement or elsewhere in the Contract Documents. The Owner shall purchase and maintain the required insurance from an insurance company or insurance companies lawfully authorized to issue insurance in the jurisdiction where the Project is located.

§ 11.2.2 Failure to Purchase Required Property Insurance. If the Owner fails to purchase and maintain the required property insurance, with all of the coverages and in the amounts described in the Agreement or elsewhere in the Contract Documents, the Owner shall inform the Contractor in writing prior to commencement of the Work. Upon receipt of notice from the Owner, the Contractor may delay commencement of the Work and may obtain insurance that will protect the interests of the Contractor, Subcontractors, and Sub-Subcontractors in the Work. When the failure to provide coverage has been cured or resolved, the Contract Sum and Contract Time shall be equitably adjusted. In the event the Owner fails to procure coverage, the Owner waives all rights against the Contractor, Subcontractors, and Sub-subcontractors to the extent the loss to the Owner would have been covered by the insurance to have been procured by the Owner. The cost of the insurance shall be charged to the Owner by a Change Order. If the Owner does not provide written notice, and the Contractor is damaged by the failure or neglect of the Owner to purchase or maintain the required insurance, the Owner shall reimburse the Contractor for all reasonable costs and damages attributable thereto.

§ 11.2.3 Notice of Cancellation or Expiration of Owner's Required Property Insurance. Within three (3) business days of the date the Owner becomes aware of an impending or actual cancellation or expiration of any property insurance required by the Contract Documents, the Owner shall provide notice to the Contractor of such impending or actual cancellation or expiration. Unless the lapse in coverage arises from an act or omission of the Contractor: (1) the Contractor, upon receipt of notice from the Owner, shall have the right to stop the Work until the lapse in coverage has been cured by the procurement of replacement coverage by either the Owner or the Contractor; (2) the Contract Time and Contract Sum shall be equitably adjusted; and (3) the Owner waives all rights against the Contractor, Subcontractors, and Sub-subcontractors to the extent any loss to the Owner would have been covered by the insurance had it not expired or been cancelled. If the Contractor purchases replacement coverage, the cost of the insurance shall be charged to the Owner by an appropriate Change Order. The furnishing of notice by the Owner shall not relieve the Owner of any contractual obligation to provide required insurance.

§ 11.3 Waivers of Subrogation

§ 11.3.1 The Owner and Contractor waive all rights against (1) each other and any of their subcontractors, sub-subcontractors, agents, and employees, each of the other; (2) the Architect and Architect's consultants; and (3) Separate Contractors, if any, and any of their subcontractors, sub-subcontractors, agents, and employees, for damages caused by fire, or other causes of loss, to the extent those losses are covered by property insurance required by the Agreement or other property insurance applicable to the Project, except such rights as they have to proceeds of such insurance. The Owner or Contractor, as appropriate, shall require similar written waivers in favor of the individuals and entities identified above from the Architect, Architect's consultants, Separate Contractors, subcontractors, and sub-subcontractors. The policies of insurance purchased and maintained by each person or entity agreeing to waive claims pursuant to this section 11.3.1 shall not prohibit this waiver of subrogation. This waiver of subrogation shall be effective as to a person or entity (1) even though that person or entity would otherwise have a duty of indemnification, contractual or otherwise, (2) even though that person or entity did not pay the insurance premium directly or indirectly, or (3) whether or not the person or entity had an insurable interest in the damaged property.

§ 11.3.2 If during the Project construction period the Owner insures properties, real or personal or both, at or adjacent to the site by property insurance under policies separate from those insuring the Project, or if after final payment property insurance is to be provided on the completed Project through a policy or policies other than those insuring the Project during the construction period, to the extent permissible by such policies, the Owner waives all rights in accordance with the terms of Section 11.3.1 for damages caused by fire or other causes of loss covered by this separate property insurance.

§ 11.4 Loss of Use, Business Interruption, and Delay in Completion Insurance

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The Owner, at the Owner's option, may purchase and maintain insurance that will protect the Owner against loss of use of the Owner's property, or the inability to conduct normal operations, due to fire or other causes of loss. The Owner waives all rights of action against the Contractor and Architect for loss of use of the Owner's property, due to fire or other hazards however caused.

§11.5 Adjustment and Settlement of Insured Loss

§ 11.5.1 A loss insured under the property insurance required by the Agreement shall be adjusted by the Owner as fiduciary and made payable to the Owner as fiduciary for the insureds, as their interests may appear, subject to requirements of any applicable mortgagee clause and of Section 11.5.2. The Owner shall pay the Architect and Contractor their just shares of insurance proceeds received by the Owner, and by appropriate agreements the Architect and Contractor shall make payments to their consultants and Subcontractors in similar manner.

§ 11.5.2 Prior to settlement of an insured loss, the Owner shall notify the Contractor of the terms of the proposed settlement as well as the proposed allocation of the insurance proceeds. The Contractor shall have 14 days from receipt of notice to object to the proposed settlement or allocation of the proceeds. If the Contractor does not object, the Owner shall settle the loss and the Contractor shall be bound by the settlement and allocation. Upon receipt, the Owner shall deposit the insurance proceeds in a separate account and make the appropriate distributions. Thereafter, if no other agreement is made or the Owner does not terminate the Contract for convenience, the Owner and Contractor shall execute a Change Order for reconstruction of the damaged or destroyed Work in the amount allocated for that purpose. If the Contractor timely objects to either the terms of the proposed settlement or the allocation of the proceeds, the Owner may proceed to settle the insured loss, and any dispute between the Owner and Contractor arising out of the settlement or allocation of the proceeds shall be resolved pursuant to Article 15. Pending resolution of any dispute, the Owner may issue a Construction Change Directive for the reconstruction of the damaged or destroyed Work.

ARTICLE 12 UNCOVERING AND CORRECTION OF WORK

§ 12.1 Uncovering of Work

§ 12.1.1 If a portion of the Work is covered contrary to the Architect's request or to requirements specifically expressed in the Contract Documents, it must, if requested in writing by the Architect, be uncovered for the Architect's examination and be replaced at the Contractor's expense without change in the Contract Time.

§ 12.1.2 If a portion of the Work has been covered that the Architect has not specifically requested to examine prior to its being covered, the Architect may request to see such Work and it shall be uncovered by the Contractor. If such Work is in accordance with the Contract Documents, the Contractor shall be entitled to an equitable adjustment to the Contract Sum and Contract Time as may be appropriate. If such Work is not in accordance with the Contract Documents, the costs of uncovering the Work, and the cost of correction, shall be at the Contractor's expense.

§ 12.2 Correction of Work

§ 12.2.1 Before Substantial Completion

The Contractor shall promptly correct Work rejected by the Architect or failing to conform to the requirements of the Contract Documents, discovered before Substantial Completion and whether or not fabricated, installed or completed. Costs of correcting such rejected Work, including additional testing and inspections, the cost of uncovering and replacement, and compensation for the Architect's services and expenses made necessary thereby, shall be at the Contractor's expense.

§ 12.2.2 After Substantial Completion

§ 12.2.2.1 In addition to the Contractor's obligations under Section 3.5, if, within one year after the date of Substantial Completion of the Work or designated portion thereof or after the date for commencement of warranties established under Section 9.9.1, or by terms of any applicable special warranty required by the Contract Documents, any of the Work is found to be not in accordance with the requirements of the Contract Documents, the Contractor shall correct it promptly after receipt of notice from the Owner to do so, unless the Owner has previously given the Contractor a written acceptance of such condition. The Owner shall give such notice promptly after discovery of the condition. During the one-year period for correction of Work, if the Owner fails to notify the Contractor and give the Contractor an opportunity to make the correction, the Owner waives the rights to require correction by the Contractor and to make a claim for breach of warranty. If the Contractor fails to correct nonconforming Work within a reasonable time during that period after receipt of notice from the Owner or Architect, the Owner may correct it in accordance with Section 2.5.

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§ 12.2.2.2 The one-year period for correction of Work shall be extended with respect to portions of Work first performed after Substantial Completion by the period of time between Substantial Completion and the actual completion of that portion of the Work.

§ 12.2.2.3 The one-year period for correction of Work shall not be extended by corrective Work performed by the Contractor pursuant to this Section 12.2.

§ 12.2.3 The Contractor shall remove from the site portions of the Work that are not in accordance with the requirements of the Contract Documents and are neither corrected by the Contractor nor accepted by the Owner.

§ 12.2.4 The Contractor shall bear the cost of correcting destroyed or damaged construction of the Owner or Separate Contractors, whether completed or partially completed, caused by the Contractor's correction or removal of Work that is not in accordance with the requirements of the Contract Documents.

§ 12.2.5 Nothing contained in this Section 12.2 shall be construed to establish a period of limitation with respect to other obligations the Contractor has under the Contract Documents. Establishment of the one-year period for correction of Work as described in Section 12.2.2 relates only to the specific obligation of the Contractor to correct the Work, and has no relationship to the time within which the obligation to comply with the Contract Documents may be sought to be enforced, nor to the time within which proceedings may be commenced to establish the Contractor's liability with respect to the Contractor's obligations other than specifically to correct the Work.

§ 12.3 Acceptance of Nonconforming Work

If the Owner prefers to accept Work that is not in accordance with the requirements of the Contract Documents, the Owner may do so instead of requiring its removal and correction, in which case the Contract Sum will be reduced as appropriate and equitable. Such adjustment shall be effected whether or not final payment has been made.

ARTICLE 13 MISCELLANEOUS PROVISIONS

§ 13.1 Governing Law

The Contract shall be governed by the law of the place where the Project is located, excluding that jurisdiction's choice of law rules. If the parties have selected arbitration as the method of binding dispute resolution, the Federal Arbitration Act shall govern Section 15.4.

§ 13.2 Successors and Assigns

§ 13.2.1 The Owner and Contractor respectively bind themselves, their partners, successors, assigns, and legal representatives to covenants, agreements, and obligations contained in the Contract Documents. Except as provided in Section 13.2.2, neither party to the Contract shall assign the Contract as a whole without written consent of the other. If either party attempts to make an assignment without such consent, that party shall nevertheless remain legally responsible for all obligations under the Contract.

§ 13.2.2 The Owner may, without consent of the Contractor, assign the Contract to a lender providing construction financing for the Project, if the lender assumes the Owner's rights and obligations under the Contract Documents. The Contractor shall execute all consents reasonably required to facilitate the assignment.

§ 13.3 Rights and Remedies

§ 13.3.1 Duties and obligations imposed by the Contract Documents and rights and remedies available thereunder shall be in addition to and not a limitation of duties, obligations, rights, and remedies otherwise imposed or available by law.

§ 13.3.2 No action or failure to act by the Owner, Architect, or Contractor shall constitute a waiver of a right or duty afforded them under the Contract, nor shall such action or failure to act constitute approval of or acquiescence in a breach thereunder, except as may be specifically agreed upon in writing.

§ 13.4 Tests and Inspections

§ 13.4.1 Tests, inspections, and approvals of portions of the Work shall be made as required by the Contract Documents and by applicable laws, statutes, ordinances, codes, rules, and regulations or lawful orders of public authorities. Unless otherwise provided, the Contractor shall make arrangements for such tests, inspections, and approvals with an independent testing laboratory or entity acceptable to the Owner, or with the appropriate public authority, and shall bear all related costs of tests, inspections, and approvals. The Contractor shall give the Architect

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timely notice of when and where tests and inspections are to be made so that the Architect may be present for such procedures. The Owner shall bear costs of tests, inspections, or approvals that do not become requirements until after bids are received or negotiations concluded. The Owner shall directly arrange and pay for tests, inspections, or approvals where building codes or applicable laws or regulations so require.

§ 13.4.2 If the Architect, Owner, or public authorities having jurisdiction determine that portions of the Work require additional testing, inspection, or approval not included under Section 13.4.1, the Architect will, upon written authorization from the Owner, instruct the Contractor to make arrangements for such additional testing, inspection, or approval, by an entity acceptable to the Owner, and the Contractor shall give timely notice to the Architect of when and where tests and inspections are to be made so that the Architect may be present for such procedures. Such costs, except as provided in Section 13.4.3, shall be at the Owner's expense.

§ 13.4.3 If procedures for testing, inspection, or approval under Sections 13.4.1 and 13.4.2 reveal failure of the portions of the Work to comply with requirements established by the Contract Documents, all costs made necessary by such failure, including those of repeated procedures and compensation for the Architect's services and expenses, shall be at the Contractor's expense.

§ 13.4.4 Required certificates of testing, inspection, or approval shall, unless otherwise required by the Contract Documents, be secured by the Contractor and promptly delivered to the Architect.

§ 13.4.5 If the Architect is to observe tests, inspections, or approvals required by the Contract Documents, the Architect will do so promptly and, where practicable, at the normal place of testing.

§ 13.4.6 Tests or inspections conducted pursuant to the Contract Documents shall be made promptly to avoid unreasonable delay in the Work.

§ 13.5 Interest

Payments due and unpaid under the Contract Documents shall bear interest from the date payment is due at the rate the parties agree upon in writing or, in the absence thereof, at the legal rate prevailing from time to time at the place where the Project is located.

ARTICLE 14 TERMINATION OR SUSPENSION OF THE CONTRACT

§ 14.1 Termination by the Contractor

§ 14.1.1 The Contractor may terminate the Contract if the Work is stopped for a period of 30 consecutive days through no act or fault of the Contractor, a Subcontractor, a Sub-subcontractor, their agents or employees, or any other persons or entities performing portions of the Work, for any of the following reasons:

- **.1** Issuance of an order of a court or other public authority having jurisdiction that requires all Work to be stopped;
- **.2** An act of government, such as a declaration of national emergency, that requires all Work to be stopped;
- **.3** Because the Architect has not issued a Certificate for Payment and has not notified the Contractor of the reason for withholding certification as provided in Section 9.4.1, or because the Owner has not made payment on a Certificate for Payment within the time stated in the Contract Documents; or
- **.4** The Owner has failed to furnish to the Contractor reasonable evidence as required by Section 2.2.

§ 14.1.2 The Contractor may terminate the Contract if, through no act or fault of the Contractor, a Subcontractor, a Sub-subcontractor, their agents or employees, or any other persons or entities performing portions of the Work, repeated suspensions, delays, or interruptions of the entire Work by the Owner as described in Section 14.3, constitute in the aggregate more than 100 percent of the total number of days scheduled for completion, or 120 days in any 365-day period, whichever is less.

§ 14.1.3 If one of the reasons described in Section 14.1.1 or 14.1.2 exists, the Contractor may, upon seven days' notice to the Owner and Architect, terminate the Contract and recover from the Owner payment for Work executed, as well as reasonable overhead and profit on Work not executed, and costs incurred by reason of such termination.

§ 14.1.4 If the Work is stopped for a period of 60 consecutive days through no act or fault of the Contractor, a Subcontractor, a Sub-subcontractor, or their agents or employees or any other persons or entities performing portions of the Work because the Owner has repeatedly failed to fulfill the Owner's obligations under the Contract

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Documents with respect to matters important to the progress of the Work, the Contractor may, upon seven additional days' notice to the Owner and the Architect, terminate the Contract and recover from the Owner as provided in Section 14.1.3.

§ 14.2 Termination by the Owner for Cause

§ 14.2.1 The Owner may terminate the Contract if the Contractor

- **.1** repeatedly refuses or fails to supply enough properly skilled workers or proper materials;
- **.2** fails to make payment to Subcontractors or suppliers in accordance with the respective agreements between the Contractor and the Subcontractors or suppliers;
- **.3** repeatedly disregards applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of a public authority; or
- **.4** otherwise is guilty of substantial breach of a provision of the Contract Documents.

§ 14.2.2 When any of the reasons described in Section 14.2.1 exist, and upon certification by the Architect that sufficient cause exists to justify such action, the Owner may, without prejudice to any other rights or remedies of the Owner and after giving the Contractor and the Contractor's surety, if any, seven days' notice, terminate employment of the Contractor and may, subject to any prior rights of the surety:

- **.1** Exclude the Contractor from the site and take possession of all materials, equipment, tools, and construction equipment and machinery thereon owned by the Contractor;
- **.2** Accept assignment of subcontracts pursuant to Section 5.4; and
- **.3** Finish the Work by whatever reasonable method the Owner may deem expedient. Upon written request of the Contractor, the Owner shall furnish to the Contractor a detailed accounting of the costs incurred by the Owner in finishing the Work.

§ 14.2.3 When the Owner terminates the Contract for one of the reasons stated in Section 14.2.1, the Contractor shall not be entitled to receive further payment until the Work is finished.

§ 14.2.4 If the unpaid balance of the Contract Sum exceeds costs of finishing the Work, including compensation for the Architect's services and expenses made necessary thereby, and other damages incurred by the Owner and not expressly waived, such excess shall be paid to the Contractor. If such costs and damages exceed the unpaid balance, the Contractor shall pay the difference to the Owner. The amount to be paid to the Contractor or Owner, as the case may be, shall be certified by the Initial Decision Maker, upon application, and this obligation for payment shall survive termination of the Contract.

§ 14.3 Suspension by the Owner for Convenience

§ 14.3.1 The Owner may, without cause, order the Contractor in writing to suspend, delay or interrupt the Work, in whole or in part for such period of time as the Owner may determine.

§ 14.3.2 The Contract Sum and Contract Time shall be adjusted for increases in the cost and time caused by suspension, delay, or interruption under Section 14.3.1. Adjustment of the Contract Sum shall include profit. No adjustment shall be made to the extent

- **.1** that performance is, was, or would have been, so suspended, delayed, or interrupted, by another cause for which the Contractor is responsible; or
- **.2** that an equitable adjustment is made or denied under another provision of the Contract.

§ 14.4 Termination by the Owner for Convenience

§ 14.4.1 The Owner may, at any time, terminate the Contract for the Owner's convenience and without cause.

§ 14.4.2 Upon receipt of notice from the Owner of such termination for the Owner's convenience, the Contractor shall

- **.1** cease operations as directed by the Owner in the notice;
- **.2** take actions necessary, or that the Owner may direct, for the protection and preservation of the Work; and
- **.3** except for Work directed to be performed prior to the effective date of termination stated in the notice, terminate all existing subcontracts and purchase orders and enter into no further subcontracts and purchase orders.

§ 14.4.3 In case of such termination for the Owner's convenience, the Owner shall pay the Contractor for Work

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properly executed; costs incurred by reason of the termination, including costs attributable to termination of Subcontracts; and the termination fee, if any, set forth in the Agreement.

ARTICLE 15 CLAIMS AND DISPUTES

§ 15.1 Claims

§ 15.1.1 Definition

A Claim is a demand or assertion by one of the parties seeking, as a matter of right, payment of money, a change in the Contract Time, or other relief with respect to the terms of the Contract. The term "Claim" also includes other disputes and matters in question between the Owner and Contractor arising out of or relating to the Contract. The responsibility to substantiate Claims shall rest with the party making the Claim. This Section 15.1.1 does not require the Owner to file a Claim in order to impose liquidated damages in accordance with the Contract Documents.

§ 15.1.2 Time Limits on Claims

The Owner and Contractor shall commence all Claims and causes of action against the other and arising out of or related to the Contract, whether in contract, tort, breach of warranty or otherwise, in accordance with the requirements of the binding dispute resolution method selected in the Agreement and within the period specified by applicable law, but in any case not more than 10 years after the date of Substantial Completion of the Work. The Owner and Contractor waive all Claims and causes of action not commenced in accordance with this Section 15.1.2.

§ 15.1.3 Notice of Claims

§ 15.1.3.1 Claims by either the Owner or Contractor, where the condition giving rise to the Claim is first discovered prior to expiration of the period for correction of the Work set forth in Section 12.2.2, shall be initiated by notice to the other party and to the Initial Decision Maker with a copy sent to the Architect, if the Architect is not serving as the Initial Decision Maker. Claims by either party under this Section 15.1.3.1 shall be initiated within 21 days after occurrence of the event giving rise to such Claim or within 21 days after the claimant first recognizes the condition giving rise to the Claim, whichever is later.

§ 15.1.3.2 Claims by either the Owner or Contractor, where the condition giving rise to the Claim is first discovered after expiration of the period for correction of the Work set forth in Section 12.2.2, shall be initiated by notice to the other party. In such event, no decision by the Initial Decision Maker is required.

§ 15.1.4 Continuing Contract Performance

§ 15.1.4.1 Pending final resolution of a Claim, except as otherwise agreed in writing or as provided in Section 9.7 and Article 14, the Contractor shall proceed diligently with performance of the Contract and the Owner shall continue to make payments in accordance with the Contract Documents.

§ 15.1.4.2 The Contract Sum and Contract Time shall be adjusted in accordance with the Initial Decision Maker's decision, subject to the right of either party to proceed in accordance with this Article 15. The Architect will issue Certificates for Payment in accordance with the decision of the Initial Decision Maker.

§ 15.1.5 Claims for Additional Cost

If the Contractor wishes to make a Claim for an increase in the Contract Sum, notice as provided in Section 15.1.3 shall be given before proceeding to execute the portion of the Work that is the subject of the Claim. Prior notice is not required for Claims relating to an emergency endangering life or property arising under Section 10.4.

§ 15.1.6 Claims for Additional Time

§ 15.1.6.1 If the Contractor wishes to make a Claim for an increase in the Contract Time, notice as provided in Section 15.1.3 shall be given. The Contractor's Claim shall include an estimate of cost and of probable effect of delay on progress of the Work. In the case of a continuing delay, only one Claim is necessary.

§ 15.1.6.2 If adverse weather conditions are the basis for a Claim for additional time, such Claim shall be documented by data substantiating that weather conditions were abnormal for the period of time, could not have been reasonably anticipated, and had an adverse effect on the scheduled construction.

§ 15.1.7 Waiver of Claims for Consequential Damages

The Contractor and Owner waive Claims against each other for consequential damages arising out of or relating to this Contract. This mutual waiver includes

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.1 damages incurred by the Owner for rental expenses, for losses of use, income, profit, financing, business and reputation, and for loss of management or employee productivity or of the services of such persons; and

.2 damages incurred by the Contractor for principal office expenses including the compensation of personnel stationed there, for losses of financing, business and reputation, and for loss of profit, except anticipated profit arising directly from the Work.

This mutual waiver is applicable, without limitation, to all consequential damages due to either party's termination in accordance with Article 14. Nothing contained in this Section 15.1.7 shall be deemed to preclude assessment of liquidated damages, when applicable, in accordance with the requirements of the Contract Documents.

§ 15.2 Initial Decision

§ 15.2.1 Claims, excluding those where the condition giving rise to the Claim is first discovered after expiration of the period for correction of the Work set forth in Section 12.2.2 or arising under Sections 10.3, 10.4, and 11.5, shall be referred to the Initial Decision Maker for initial decision. The Architect will serve as the Initial Decision Maker, unless otherwise indicated in the Agreement. Except for those Claims excluded by this Section 15.2.1, an initial decision shall be required as a condition precedent to mediation of any Claim. If an initial decision has not been rendered within 30 days after the Claim has been referred to the Initial Decision Maker, the party asserting the Claim may demand mediation and binding dispute resolution without a decision having been rendered. Unless the Initial Decision Maker and all affected parties agree, the Initial Decision Maker will not decide disputes between the Contractor and persons or entities other than the Owner.

§ 15.2.2 The Initial Decision Maker will review Claims and within ten days of the receipt of a Claim take one or more of the following actions: (1) request additional supporting data from the claimant or a response with supporting data from the other party, (2) reject the Claim in whole or in part, (3) approve the Claim, (4) suggest a compromise, or (5) advise the parties that the Initial Decision Maker is unable to resolve the Claim if the Initial Decision Maker lacks sufficient information to evaluate the merits of the Claim or if the Initial Decision Maker concludes that, in the Initial Decision Maker's sole discretion, it would be inappropriate for the Initial Decision Maker to resolve the Claim.

§ 15.2.3 In evaluating Claims, the Initial Decision Maker may, but shall not be obligated to, consult with or seek information from either party or from persons with special knowledge or expertise who may assist the Initial Decision Maker in rendering a decision. The Initial Decision Maker may request the Owner to authorize retention of such persons at the Owner's expense.

§ 15.2.4 If the Initial Decision Maker requests a party to provide a response to a Claim or to furnish additional supporting data, such party shall respond, within ten days after receipt of the request, and shall either (1) provide a response on the requested supporting data, (2) advise the Initial Decision Maker when the response or supporting data will be furnished, or (3) advise the Initial Decision Maker that no supporting data will be furnished. Upon receipt of the response or supporting data, if any, the Initial Decision Maker will either reject or approve the Claim in whole or in part.

§ 15.2.5 The Initial Decision Maker will render an initial decision approving or rejecting the Claim, or indicating that the Initial Decision Maker is unable to resolve the Claim. This initial decision shall (1) be in writing; (2) state the reasons therefor; and (3) notify the parties and the Architect, if the Architect is not serving as the Initial Decision Maker, of any change in the Contract Sum or Contract Time or both. The initial decision shall be final and binding on the parties but subject to mediation and, if the parties fail to resolve their dispute through mediation, to binding dispute resolution.

§ 15.2.6 Either party may file for mediation of an initial decision at any time, subject to the terms of Section 15.2.6.1.

§ 15.2.6.1 Either party may, within 30 days from the date of receipt of an initial decision, demand in writing that the other party file for mediation. If such a demand is made and the party receiving the demand fails to file for mediation within 30 days after receipt thereof, then both parties waive their rights to mediate or pursue binding dispute resolution proceedings with respect to the initial decision.

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§ 15.2.7 In the event of a Claim against the Contractor, the Owner may, but is not obligated to, notify the surety, if any, of the nature and amount of the Claim. If the Claim relates to a possibility of a Contractor's default, the Owner may, but is not obligated to, notify the surety and request the surety's assistance in resolving the controversy.

§ 15.2.8 If a Claim relates to or is the subject of a mechanic's lien, the party asserting such Claim may proceed in accordance with applicable law to comply with the lien notice or filing deadlines.

§ 15.3 Mediation

§ 15.3.1 Claims, disputes, or other matters in controversy arising out of or related to the Contract, except those waived as provided for in Sections 9.10.4, 9.10.5, and 15.1.7, shall be subject to mediation as a condition precedent to binding dispute resolution.

§ 15.3.2 The parties shall endeavor to resolve their Claims by mediation which, unless the parties mutually agree otherwise, shall be administered by the American Arbitration Association in accordance with its Construction Industry Mediation Procedures in effect on the date of the Agreement. A request for mediation shall be made in writing, delivered to the other party to the Contract, and filed with the person or entity administering the mediation. The request may be made concurrently with the filing of binding dispute resolution proceedings but, in such event, mediation shall proceed in advance of binding dispute resolution proceedings, which shall be stayed pending mediation for a period of 60 days from the date of filing, unless stayed for a longer period by agreement of the parties or court order. If an arbitration is stayed pursuant to this Section 15.3.2, the parties may nonetheless proceed to the selection of the arbitrator(s) and agree upon a schedule for later proceedings.

§ 15.3.3 Either party may, within 30 days from the date that mediation has been concluded without resolution of the dispute or 60 days after mediation has been demanded without resolution of the dispute, demand in writing that the other party file for binding dispute resolution. If such a demand is made and the party receiving the demand fails to file for binding dispute resolution within 60 days after receipt thereof, then both parties waive their rights to binding dispute resolution proceedings with respect to the initial decision.

§ 15.3.4 The parties shall share the mediator's fee and any filing fees equally. The mediation shall be held in the place where the Project is located, unless another location is mutually agreed upon. Agreements reached in mediation shall be enforceable as settlement agreements in any court having jurisdiction thereof.

§ 15.4 Arbitration

§ 15.4.1 If the parties have selected arbitration as the method for binding dispute resolution in the Agreement, any Claim subject to, but not resolved by, mediation shall be subject to arbitration which, unless the parties mutually agree otherwise, shall be administered by the American Arbitration Association in accordance with its Construction Industry Arbitration Rules in effect on the date of the Agreement. The Arbitration shall be conducted in the place where the Project is located, unless another location is mutually agreed upon. A demand for arbitration shall be made in writing, delivered to the other party to the Contract, and filed with the person or entity administering the arbitration. The party filing a notice of demand for arbitration must assert in the demand all Claims then known to that party on which arbitration is permitted to be demanded.

§ 15.4.1.1 A demand for arbitration shall be made no earlier than concurrently with the filing of a request for mediation, but in no event shall it be made after the date when the institution of legal or equitable proceedings based on the Claim would be barred by the applicable statute of limitations. For statute of limitations purposes, receipt of a written demand for arbitration by the person or entity administering the arbitration shall constitute the institution of legal or equitable proceedings based on the Claim.

§ 15.4.2 The award rendered by the arbitrator or arbitrators shall be final, and judgment may be entered upon it in accordance with applicable law in any court having jurisdiction thereof.

§ 15.4.3 The foregoing agreement to arbitrate and other agreements to arbitrate with an additional person or entity duly consented to by parties to the Agreement, shall be specifically enforceable under applicable law in any court having jurisdiction thereof.

§ 15.4.4 Consolidation or Joinder

§ 15.4.4.1 Subject to the rules of the American Arbitration Association or other applicable arbitration rules, either party may consolidate an arbitration conducted under this Agreement with any other arbitration to which it is a party

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provided that (1) the arbitration agreement governing the other arbitration permits consolidation, (2) the arbitrations to be consolidated substantially involve common questions of law or fact, and (3) the arbitrations employ materially similar procedural rules and methods for selecting arbitrator(s).

§ 15.4.4.2 Subject to the rules of the American Arbitration Association or other applicable arbitration rules, either party may include by joinder persons or entities substantially involved in a common question of law or fact whose presence is required if complete relief is to be accorded in arbitration, provided that the party sought to be joined consents in writing to such joinder. Consent to arbitration involving an additional person or entity shall not constitute consent to arbitration of any claim, dispute or other matter in question not described in the written consent.

§ 15.4.4.3 The Owner and Contractor grant to any person or entity made a party to an arbitration conducted under this Section 15.4, whether by joinder or consolidation, the same rights of joinder and consolidation as those of the Owner and Contractor under this Agreement.

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SUPPLEMENTAL CONDITIONS TO AIA 201

DOCUMENT 00 73 00 – SUPPLEMENTARY CONDITIONS

The following supplements modify the "General Conditions of the Contract for Construction," AIA Document A201-2017. Where a portion of the General Conditions is modified or deleted by these Supplementary Conditions, the unaltered portions of the General Conditions shall remain in effect.

ARTICLE 1 GENERAL PROVISIONS

§ 1.1 BASIC DEFINITIONS

Delete § 1.1.1 in its entirety and replace with the following new § 1.1.1:

> The Contract Documents are enumerated in the Agreement between the Owner and Contractor (hereinafter the Agreement) and consist of the Agreement, Conditions of the Contract (General, Supplementary and other Conditions), Drawings, Specifications, Addenda issued prior to execution of the Agreement; the Bidding Documents, as listed in Instructions to Bidders (specifically including without limitation the Instructions to Bidders, the Advertisement for Bids, all sample forms including in the Project Manual, and any addenda related to the Bidding Documents);the completed Louisiana Uniform Public Work Bid form; the completed Bid Bond; the completed Performance Bond, AIA Document A312 (2010 Edition), as modified by the Owner; the completed Payment Bond, AIA Document A312 (2010 Edition), as modified by the Owner, all other completed forms submitted by the Contractor as required by the Instructions to Bidders and the terms of the Project Manual;

Delete the second sentence of Subparagraph 1.1.1.

Add the following new Subparagraph .1 after § 1.1.1:

> **1.1.1.1** The Contract Documents executed or identified in accordance with Paragraph 1.5.1 shall prevail in case of an inconsistency with subsequent versions made through manipulable electronic operations involving computers.

§ 1.1.2 THE CONTRACT

Delete § 1.1.2 in its entirety and replace with the following new § 1.1.2:

> **§ 1.1.2 THE CONTRACT**
>
> The Contract Documents form the Contract for Construction. The Contract represents the entire and integrated agreement between the parties hereto and supersedes prior negotiations, representations, or agreements, either written or oral. The Contract may be amended or modified only by a Modification. The Contract Documents shall not be construed to create a contractual relationship of any kind (1) between the Contractor and the Architect or the Architect's consultants, (2) between the Contractor and the Owner's representative; (3) between the Owner and a Subcontractor or a Sub-subcontractor, (4) between the Owner and the Architect or the Architect's consultants or (5) between any persons or entities other than the Owner and the Contractor. The Architect shall, however, be entitled to performance and enforcement of obligations under the Contract to facilitate performance of the Architect's duties.

§ 1.1.5 THE DRAWINGS

Add the following new Subparagraph 1.1.5.1 after § 1.1.5:

> **1.1.5.1** Where only part of the Work is indicated, similar parts are considered repetitive. Where any detail is shown and components thereof are fully described, similar details not fully described are deemed to incorporate similar material and construction.

§ 1.1.6 THE SPECIFICATIONS

Add the following new language to the end of § 1.1.6:

> At various sections of the Specifications, related work is identified. Such listing is to serve solely as a guideline and is not to be construed as the only areas of related work or otherwise limit the duties of the Contractor under the Contract Documents. It shall be the Contractor's responsibility to identify all related work and to properly

coordinate the performance of all Work, provided however, that Owner acknowledges that Contractor is not an architect nor a design professional and is not providing those services unless otherwise expressly provided for herein.

§ 1.1.8 INITIAL DECISION MAKER

Delete § 1.1.8 in its entirety and replace with the following new § 1.1.8:

§ 1.1.8 INITIAL DECISION MAKER

The Initial Decision Maker is the person identified in the Agreement to render initial decisions on Claims in accordance with Section 15.2. Unless explicitly stated otherwise in Section 6.1 of the Agreement, the Architect will serve as the Initial Decision Maker. The Initial Decision Maker shall not show partiality to the Owner or Contractor and shall not be liable for results of interpretations or decisions rendered in good faith.

Add the following new § 1.1.9:

§ 1.1.9 FAILURE TO PERFORM

"Failure to Perform", as used herein, is defined to mean non-performance, defective performance or delay in performance.

Add the following new § 1.1.10:

§ 1.1.10 PROJECT MANUAL

The Project Manual is a volume assembled for the Work which may include the Bidding Documents, the bidding requirements, the Advertisement for Bids, the Instructions to Bidders, sample forms, the Agreement, the Conditions of the Contract and Specifications. The Project Manual may exist in electronic format only, or in paper format or both.

Add the following new § 1.1.11:

§ 1.1.11 DAYS

All references to days in the Contract Documents shall mean calendar days, and not business days.

§ 1.2 CORRELATION AND INTENT OF THE CONTRACT DOCUMENTS

Add the following new language to the end of § 1.2.1:

The Contractor acknowledges and agrees that the Contract Documents illustrate the Project's design intent and are sufficient to provide for the completion of the Work, including Work, whether or not shown or described, which may reasonably be inferred to be required for the completion of the Work in accordance with information given in the Contract Documents; provided however, that Owner acknowledges that Contractor is not an architect nor a design professional and is not providing those services unless otherwise expressly provided for herein.

Delete § 1.2.3 in its entirety and replace with the following new § 1.2.3:

Any references in the Contract Documents to standard specifications, manuals, or codes of any technical society, organization, or association or to the laws, statutes or regulations of any governmental body, whether such reference is specific or by implication, shall mean those in effect on the date and time of the opening of the bids, or, in the absence of bids, those in effect on the date the Agreement is executed.

Add the following new § 1.2.4 and its Subparagraphs:

§ 1.2.4 If there should be a conflict between two or more of the Contract Documents, the following order of interpretation shall apply

.1 Where requirements specifically set forth in the Owner-Contractor Agreement are in conflict with other Contract Documents, the Owner-Contractor Agreement shall govern.

.2 Where there is a conflict between the requirements of the General Conditions of the Contract and the Supplementary Conditions, the requirements of the Supplementary Conditions shall govern, except where the requirements set forth in the Supplementary conditions are contrary to law, in which case the

legal requirements shall govern. The General Conditions of the Contract shall take precedence over the other Contract Documents except for the Owner-Contractor Agreement.

.3 Where there is a conflict between the Drawings and Specifications or a conflict within the Drawings or within the Specifications, the conflict shall be brought to the attention of the Architect for determination and resolution of the conflict and may be resolved by the Architect as provided in the General Conditions, Clause 4.2.11.

.4 In the event of any discrepancy or inconsistency among the Contract Documents, the most recent Contract Document as issued by the Architect shall prevail.

.5 In the event of a discrepancy, in the Contract Documents, the more specific and more detailed descriptive information will take precedence over the general and less detailed description. In case of doubt, Contractor shall assume that Owner intends that the more complete method, system, or process is required.

If there is any inconsistency in the Drawings or between the Drawings and the Specifications or between or within any of the Contract Documents that is not resolved by the order of precedence set forth above, unless otherwise ordered in writing by the Owner, the Contractor shall provide or abide by the better quality of or the greater quantity of Work, product, or services for the benefit of the Owner unless the result would be unreasonably or inequitable to the Contractor.

Add the following new § 1.2.5 :

§ 1.2.5 Any work, labor, materials or equipment that may reasonably be inferred from the Contract Documents as being required to produce a functionally complete and properly constructed Project or part thereof, or reasonably required to produce a functionally complete and properly constructed Project or part thereof shall be furnished by the Contractor at no additional cost, whether or not specifically stated or identified in the Contract Documents.

§ 1.7 DIGITAL DATA USE AND TRANSMISSION

Add the following new § 1.7.1 and § 1.7.2 after § 1.7:

§ 1.7.1 If the Contractor requires information or documentation in digital format, it agrees to execute the Architect's data licensing agreement as required in Division 01 General Requirements.

§ 1.7.2 The Contractor shall not transfer or reuse Instruments of Service in electronic or machine-readable form without the prior written consent of the Architect.

ARTICLE 2 OWNER

Delete § 2.2.1 in its entirety.

§ 2.2.1 INFORMATION AND SERVICES REQUIRED OF THE OWNER

Delete § 2.3.1 in its entirety and replace with the following new § 2.3.1:

§ 2.3.1 Except for permits and fees that are the responsibility of the Contractor under the Contract Documents, including those required under Section 3.7.1, the Owner shall secure and pay for necessary zoning approvals, easements, and assessments.

Add the following new language to the end of § 2.2.2:

Neither the Owner or Architect, nor any consultant engaged by them, guarantee the accuracy of any geotechnical, subsurface, or survey information provided regarding features of the site including, but not limited to, the location or elevation of utilities, cables, pipes, manholes or underground pipes, or the presence or absence of easements, topography or any underground feature or obstruction. The Contractor shall confirm all site information and the location of each utility, and make further investigation of all surface and subsurface conditions including any soil borings of the site of the Project and the conditions of any existing structures. Notwithstanding the foregoing, Owner acknowledges that Contractor is entitled to equitable adjustment in the event of unknown materially different conditions as more fully described in Article 3.7.4.

Delete all of § 2.3.5 except for the first sentence.

Delete § 2.4 in its entirety and replace with the following new § 2.4:

§ 2.3 OWNER'S RIGHT TO STOP THE WORK

If the Contractor fails to correct Work that is not in accordance with the requirements of the Contract Documents as required by Section 12.2, or repeatedly fails to carry out Work in accordance with the Contract Documents, or at any time fails to carry out Work in accordance with the Contract Documents in a manner that causes a material adverse effect to the Project or the Owner, the Owner may issue a written order to the Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, the right of the Owner to stop the Work shall not give rise to a duty on the part of the Owner to exercise this right for the benefit of the Contractor or any other person or entity, except to the extent provided by Section 2.5 and Section 6.1.3.

Delete § 2.4 in its entirety and replace with the following new § 2.5:

§ 2.4 OWNER'S RIGHT TO CARRY OUT THE WORK

If the Owner determines that there has been a failure to perform by the Contractor, or the Owner has determined that the Contractor has neglected to diligently carry out the Work in accordance with the Contract Documents, and the Contractor fails to commence and continue correction of such failure to perform by the Contractor within ten (10) calendar days after receipt of written notice, the Owner may, without prejudice to any other rights or remedies which the Owner may have, stop the Contractor's Work, in whole or in part, and correct such failure to perform. In such case, the Owner may deduct from payments then, or thereafter due the Contractor, the cost of correcting such failure to perform, including but not limited to, any costs, expenses, fees and attorney's fees, as well as compensation for any additional services performed by the Architect and other design professionals made necessary by such failure to perform. If payments then or thereafter due the Contractor are not sufficient to cover such amounts, the Contractor and/or its surety shall pay the difference to the Owner. The right to stop the Work shall not give rise to a duty on the part of the Owner to exercise this right for the benefit of the Contractor or any other person or entity. Contractor stipulates and agrees that in the event such work stoppage arises in any manner due to the Contractor's failure to perform, Contractor shall have no claim for delay or acceleration arising from the stoppage of the Work pursuant to this subsection. If the Contractor disagrees with the actions of the Owner, the Contractor may file a Claim pursuant to Article 15 and the results of that Claim shall be binding upon the Owner and Contractor.

Add the following new § 2.6 and its subparagraphs:

§ 2.6 OWNER'S RIGHT TO AUDIT AND REQUIRE RECORD RETENTION

§ 2.6.1 The Contractor shall keep full and accurate records of all costs incurred and items invoiced in connection with the Work, and shall keep and maintain all records related to this Project, for a period of five (5) years after Final Payment, or five (5) years after Grant close-out, as described further in Section 3.23.2 below, whichever is longer. Such records shall be open to audit by the Owner and/or its authorized representatives, and the Legislative Auditor for the State of Louisiana, during the performance of the Work and during the referenced five (5) year period.

§ 2.6.2 For Projects that are funded in full or in part with Federal or State funds, the Contractor shall maintain all records associated with said Project for five (5) calendar years after the Federal or State Grants associated with said Project have been closed by the respective Grantor agency. Due to the possibility of multiple funding streams for a single Project, the Contract may be subject to multiple Grant close-out periods. The Grantor agency will notify the Owner when close-out is complete. The Owner will then notify the Contractor when close-out is complete and when the five (5) year retention period or periods commence.

ARTICLE 3 CONTRACTOR

§ 3.1 GENERAL

Replace the second sentence of § 3.1.1:

The Contractor shall be licensed and authorized to do business in the State and Parish where the Project is located. The requirements to be licensed and authorized to do business in the State and Parish where the Project is located apply to every General Contractor doing business with the Owner, regardless of the size of the Project/Contract sum.

Delete § 3.1.3 in its entirety and replace with the following new § 3.1.3:

§ 3.1.3 The Contractor shall not be relieved of its obligations to perform the work in accordance with the Contract Documents either by the performance or failure to perform by the Architect or any of its Consultants, or by tests, inspections or approvals required or performed by or on behalf of the Architect or its Consultants, the Owner or its consultants, or any governmental entity. Quality control (i.e. - Ensuring compliance with the Contract Documents) is the sole responsibility of the Contractor. Testing, observations and or inspections performed or provided by the Owner or Architect or its Consultants are solely for information purposes for the exclusive benefit of the Owner to determine compliance with the Contract Documents. Notwithstanding the foregoing, Owner acknowledges that Contractor is entitled to equitable adjustments arising out of acts of Owner or Architect as more fully described in Article 8.3.

§ 3.2 REVIEW OF CONTRACT DOCUMENTS AND FIELD CONDITIONS BY CONTRACTOR

Add the following new Subparagraphs .1 and .2 to § 3.2.1:

.1 The Owner assumes no responsibility or liability for the physical condition or safety of the project site or any improvements located on the site. The Contractor is solely responsible for providing a safe place for the performance of the work.

.2 Contractor shall comply with the provisions of the Louisiana underground utilities and facilities damage prevention law, R.S. 40:1749.11 et al, as amended prior to any portion of the work which may require excavation including, but not limited to pile driving, digging, auguring, boring, backfilling, dredging, compressing, plowing-in, trenching, ditching, tunneling, land leveling, grading and or mechanical probing. Damage to underground utilities by Contractor shall be repaired at Contractor's expense. Such damage must be reported immediately to the Architect and the Owner. The Contractor shall undertake to make such further investigations, including without limitation, all structural, surface and subsurface conditions, including soil borings and otherwise of the project site.

Delete § 3.2.2 in its entirety and replace with the following new § 3.2.2:

§ 3.2.2 The Contractor is solely responsible for providing a safe place for the performance of the Work. Neither the Owner nor the Owner's representatives assume any responsibility or liability for the physical condition or safety of the Project site or for any improvements located on the site. Contractor shall comply with the provisions of the Louisiana Underground Utilities and Facilities Damage Prevention Law, La. RS. § 40:1749.11 et seq., prior to performing any portion of the Work which may require excavation, including but not limited to pile driving, digging, auguring, boring, backfilling, dredging, compressing, plowing-in, trenching, ditching, tunneling, land leveling, grading and or mechanical probing. Damage to underground utilities caused by Contractor or anyone performing work for or on behalf of Contractor shall be repaired at Contractor's sole cost and expense. Such damage must be reported immediately to the Architect and the Owner. These requirements regarding utilities shall apply in all cases, regardless of whether or not utilities are shown in the Contract Documents. Notwithstanding anything provided in Section 3.2.1 or 3.2.2, Contractor shall not be responsible for any damage, claim or loss occasioned by the acts or omissions of Owner, Architect, or any agents, employees, consultants or otherwise associated with either, and Owner further acknowledges that Contractor is entitled to equitable adjustments as more fully described in Article 3.7.4 and 8.3.

Delete § 3.2.4 in its entirety and replace with the following new § 3.2.4:

§ 3.2.4 In order for the Contractor to have any right to assert or make a claim for any additional time or money associated with or arising from any clarification or instruction issued by the Architect, the Contractor shall, prior to commencing any work involving additional time or additional money, make a claim as provided in article 15.

§ 3.3 SUPERVISION AND CONSTRUCTION PROCEDURES

Delete the 3rd and 4th sentences from **§** 3.3.1 in their entirety and replace with the following new language:

If the Contractor determines that such means, methods, techniques, sequences or procedures may not be safe, the Contractor shall give advance written notice to the Owner and Architect, informing the Owner and the Architect of the alternate means, methods, techniques, sequences or procedures the Contractor intends to utilize in the performance of the Work, and, unless the Owner or the Architect takes exception to the proposed means, methods, techniques, sequences or procedures, the Contractor shall proceed with the Work.

Delete § 3.3.3 in its entirety and replace with the following new § 3.3.3:

§ 3.3.3 The Contractor shall be solely responsible for inspection of portions of the work already performed to determine and ensure that such portions are in proper condition to receive subsequent portions of the work.

Add the following new § 3.3.4 and § 3.3.5:

§ 3.3.4 Building materials to be incorporated into the Work shall either be certified, in writing, by the manufacturer to be asbestos free or be inspected and tested by accredited testing laboratories and certified to be free of asbestos content in accordance with the applicable federal standards, including but not limited to the Asbestos Hazard Emergency Response Act (AHEARA) and the Toxic Substance Control Act (TSCA). "Asbestos" includes Asbestiform, Tremolite, and Actinolite. Copies of test reports shall be furnished to the Architect and the Owner. Material discovered to contain asbestos shall be removed immediately at the Contractor' s sole cos t and expense using current standards of the Louisiana Department of Environmental Quality (LDEQ).

§ 3.4 LABOR AND MATERIALS

Delete **§** 3.4.2 in its entirety and replace with the following new § 3.4.2:

§ 3.4.2 After the Contract has been executed, the Architect will consider a formal request for the substitution of comparable products in place of those specified only under the conditions and limitations set forth in Division 01 General Requirements.

Add the following new § 3.4.4:

§ 3.4.4 Prior to commencement of any Work, Contractor shall deliver to the Owner a complete list of all materialmen, laborers and employees who are to furnish any material or perform any labor or any service or who may be under any contract or engagement to furnish any material, or to do or perform any service for Contractor in connection with this Project, with the terms and price thereof. Contractor shall update such list and deliver an updated list with each application for payment identifying all materialmen, laborers and employees who have furnished any material or performed any labor or any service or who are under any contract or engagement to furnish any material, or to do or perform any service for Contractor in connection with this Project, with the terms, amount paid, and balance owed.

§ 3.5 WARRANTY

Delete the second sentence of § 3.5.1 in its entirety.

Add the following new § 3.5.2 through 3.5.8:

§ 3.5.2 The Contractor warrants to the Owner that materials and equipment furnished under the Contract will be of good quality and new unless the Contract Documents require or permit otherwise. The Contractor further warrants that the Work will conform to the requirements of the Contract Documents and will be free from defects, except for those inherent in the quality of the Work the Contract Documents require or permit. Work, materials, or equipment not conforming to these requirements will be considered defective. The Contractor's warranty excludes remedy for damage or defect to the extent caused by abuse, alterations to the Work not executed by the Contractor, improper or insufficient maintenance, improper operation, or normal wear and tear and normal usage. If required by the Owner or Architect, the Contractor shall furnish satisfactory evidence as to the kind and quality of materials and equipment.

§ 3.5.3 All manufacturers and vendors' warranties for products and other Work incorporated into the Project will be assigned and transferred without loss or limitation to Owner. Except as otherwise provided in the Contract Documents, all workmanship and product and other Work shall be warranted for one year following the date of Substantial Completion and its acceptance by the Owner or for the period of time stated in the applicable manufacturer or vendor's warranty, whichever is longer, to be new upon installation (and not of such age as to affect durability), free from faults and defects in material and workmanship that is not inherent in the quality required or permitted in the Contract Documents, except to the extent any deficiency arises from Owner's failure to maintain product and other Work as required hereunder. The warranty shall include all parts and labor and other replacement costs, both on and off site, together with all necessary transportation and shipping charges. This warranty shall be extended insofar as a vendor or manufacturer's standard guarantees exceed those specified.

§ 3.5.4 The Contractor (and vendor or manufacturer for extended guarantees) shall warrant throughout the warranty period described in Section 3.5.3 that the Work shall continue to function in conformance with the

Contract Documents (including the performance standards set forth in the Specifications), provided, however, that Contractor shall assume no responsibility for design services, and the provisions of any applicable user/maintenance manuals. Contractor shall, at its expense (including, without limitation, all in and out costs, etc.) remedy all deficiencies appearing within the warranty period and, at its option, repair or replace all defective Work as required to accomplish this. If a manufacturer or vendor's warranty, which has been assigned to Owner by Contractor, is available, Owner shall first diligently pursue its remedies under such warranty, although Contractor shall reasonably assist Owner in such effort. During such effort the warranty period, with respect to the applicable breach of warranty, shall be tolled. If the Contractor fails to remedy such deficiencies within a reasonable time after written notice from Owner, the Owner may cause such remedies to be performed and charge the expense thereof to the Contractor.

§ 3.5.5 Contractor warrants that the installation of any and all product shall be in strict accordance with manufacturer's requirements, unless the Architect has specified otherwise. If the Architect has specified a different method of installation ("Alternate Installation Method"), Contractor shall notify Owner in writing. No exception, limitation or exclusion from Contactor's or manufacturer's warranty shall be based on the Alternate Installation Method, unless (i) Contractor has notified Owner and Architect, in writing that the Alternate Installation Method shall limit Contractor's or manufacturer's warranty, (ii) Contractor has specified, in detail, the limitations to Contractor's or manufacturer's warranty that will result from the Alternate Installation Method and (iii) Owner has directed Contractor, in writing, to proceed with the Alternate Installation Method. In the event Owner seeks to enforce a claim based upon a manufacturer's warranty and should such manufacturer then fail to honor its warranty due to defective installation by Contractor or other fault of Contractor or its employees, agents or subcontractors, Owner shall be entitled to enforce said warranty against Contractor in accordance with the terms of said warranty, except that a claim of defective installation shall not be a defense to any such warranty claim by Owner against Contractor.

§ 3.5.6 All required maintenance of Work shall be the Contractor's responsibility until Substantial Completion, all material maintenance and user's manuals have been turned over to the Owner, and until the Owner's designated personnel (whom Owner shall cause to attend the meeting specified below) have been instructed in the maintenance and operation of all applicable product, which meeting shall not be unreasonably delayed by Owner. This maintenance shall include a complete turnover procedure at the time of Substantial Completion, including reasonable cleaning, testing and adjustment and at a meeting called by Contractor to explain such procedures and related matter to Owner and its designated representatives.

§ 3.5.7 Owner originated service calls which are demonstrated as not covered by warranty will be compensated at the Contractor's direct costs for materials and labor plus any agreed allowance for overhead and profit, provided they are approved in writing after submission of a detailed not-to-exceed estimate and schedule. The Owner will designate persons authorized to request service and will not compensate the Contractor for unauthorized calls. Contractor will only be responsible for the cost of such service calls that are not covered by warranty if the defect at issue arises out of defective installation by Contractor or the warranty denial is otherwise caused by Contractor or its employees, agents or subcontractors.

§ 3.5.8 The Warranties provided by this Section are not limited by the remedy provisions of Article 12. The Contractor further warrants that the work will conform to the requirements of the Contract Documents, and will be free from defects, both apparent and latent, to the fullest extent and duration of the applicable period for bringing claims against a contractor provided by law unless otherwise provided herein.

§ 3.6 TAXES

Delete § 3.6.1 in its entirety and replace with the following new § 3.6 and subparagraphs:

§ 3.6 TAXES The Contractor shall pay all sales, consumer, use and similar taxes associated with the Contractor's performance of the work.

§ 3.6.1 The Contractor is informed that La. R S. 47:301(8)(c) exempts the State of Louisiana, cities. parishes and other political subdivisions and their agencies, boards and commissions from state and local sales and use taxes. The Contractor is hereby made aware that materials and equipment which are affixed to and made a part of the Project such that they become immovable property and permanently incorporated into the Project or Work may qualify for the exemption. The Contractor shall execute any documentation required to effectuate this exemption. The Contractor is still responsible for payment of all taxes on nonexempt items necessary in the construction of the Project

§ 3.6.2 In accordance with La. R. S. 47:301(8){c), the Contractor shall not pay any State or local sales taxes or State or local use taxes on materials and equipment which are affixed to and made a part of the real estate of the Project or Work {hereinafter referred to as "exempt items").

§ 3.6.3 All purchases of "exempt items" for the Project shall be made by the Contractor on behalf of and for the Owner.

§ 3.6.4 The Contractor and all Subcontractors shall record all purchases of materials and equipment to be permanently installed or permanently incorporated into the Work. Preparing. maintaining and preserving these records shall be in accordance with applicable State laws and local ordinances and resolutions except that the records shall be preserved for not less than three (3) years from date of Final Payment. In addition to making the records available to the Louisiana Department of Revenue and Taxation and/or local taxing authorities, co pies of the records shall also be made available to the Owner upon request.

§ 3.6.5 The Contractor and all Subcontractors shall pay all other taxes which are required to be paid on materials. equipment and services supplied or purchased by the Contractor or Subcontractors for use on the Project.

§ 3.6.6 A separate contract (Sales Tax Exemption Contract, in the form included with the Bidding Documents) shall be executed between the Owner and the Contractor on this Project, which will certify that the Contractor is an Agent of the Owner and therefore not subject to state and local sales or use taxes for the purchase of exempt items for the Project. After the Sales Tax Exemption Contract is executed, the Owner will furnish the Contractor a Louisiana Department of Revenue Form R-1020 entitled "Designation of Construction Contractor as Agent of Governmental Entity and Exemption Certificate" for use by the Contractor, Subcontractors, and Material Suppliers for the Project which is required by the State of Louisiana Department of Revenue and Taxation, Sales Tax Division.

§ 3.7 PERMITS, FEES AND NOTICES

Delete § 3.7.3 in its entirety and replace with the following new § 3.7.3:

§ 3.7.3 If the Contractor performs any portion of the work when the Contractor knows or should have known that it would be contrary to applicable laws, statutes, ordinances, codes, standards referenced in the Contract Documents, rules or regulations, lawful orders of public authorities, or any of the requirements of the Contract Documents, and the Contractor proceeds to perform without the prior express written consent of the Architect after full disclosure to the Architect, the Contractor shall be solely responsible for and shall pay for any and all costs, expenses, fees, damages and attorney's fees incurred by the owner arising from the performance of such portion of work, including, but not limited to, all costs attributable for any corrective work.

Add the following new **§** 3.7.6:

§ 3.7.6 Upon issuance of the Notice to Proceed Letter or upon request by Owner, the Contractor, at its own expense, shall record the Notice of Contract with Bond or Bonds and legal description required with the Clerk of Court or Recorder of Mortgages of the Parish where the work is to be performed. Contractor shall furnish the Architect and Owner with all recordation information, including date, time, book and folio number. Owner shall furnish the legal description of the property which shall be attached to the Notice of Contract.

Change heading of § 3.9 to read, "**SUPERINTENDENT AND PROJECT MANAGER**"

§ 3.9 SUPERINTENDENT AND PROJECT MANAGER

Under § 3.9 and its subsections, wherever the word "superintendent" is found, substitute the language "project manager and superintendent".

Add the following new Subparagraph 3.9.1.1 to § 3.9.1:

§ 3.9.1.1 The Contractor shall maintain the same approved project manager and superintendent from the date of issuance of the Notice to Proceed until the Date of Final Completion, except in cases of separation from company or documented medical reasons. Neither the project manager nor the superintendent shall be reassigned to any other project or assignment within the company without the Owner's written permission. If a change to the project manager or superintendent is authorized, the Contractor shall submit proposed changes in personnel to the Architect in accordance with 3.9.2.

Add the following new § 3.9.4 to § 3.9:

§ 3.9.4 The contractor shall, except for sickness or separation from the company, maintain the same approved project manager and field superintendent from the time of issuance of the notice to proceed until the date of substantial completion. Any change in personnel shall be proposed in accordance with § 3.9.2.

§ 3.10 CONTRACTOR'S CONSTRUCTION AND SUBMITTAL SCHEDULES

Add the following new language to § 3.10.1:

Payments which may otherwise be due the Contractor may, at the Owner's option, be withheld until the Contractor delivers a construction schedule in accordance with Section 01290. The Contractor shall submit a paper, an electronic (PDF) and native version of its schedule, along with a written narrative, with each application for payment demonstrating and explaining work progress and any schedule delays or impacts. The first schedule submitted shall be deemed the "base-line schedule." For projects with a contract sum greater than $1,000,000.00, the Contractor shall include with the schedule, for the Owner's and Architect's information, a network analysis to identify those tasks which are on the critical path, i.e. where any delay in the completion of these tasks will lengthen the project timescale, unless action is taken. A revised schedule shall be submitted with each Application and Certificate for Payment. No payment will be made until this schedule is received.

Delete the last sentence of § 3.10.2 and replace with the following new language:

If the Contractor fails to timely submit to the Architect a submittal schedule in accordance with Section 01330, the Contractor shall not be entitled to any increase in the Contract Sum or extension of time based on the time required for the Architect to review the Contractor's submittals. Payments which may otherwise be due the Contractor may, at the Owner's option, be withheld until the Contractor delivers a submittal schedule in accordance with Section 013330 to the Architect.

Add the following new language to the end of § 3.10.3:

If the work is not on schedule, as determined by the Architect, and the Contractor fails to take action to bring the work on schedule, within a reasonable time considering the circumstances, then the Contractor shall be deemed in default under this Contract and the progress of the work shall be deemed unsatisfactory. Such default may be considered grounds for termination by the Owner for cause in accordance with 14.2.

Add the following new § 3.10.4 and § 3.10.5:

§ 3.10.4 Schedules submitted by the Contractor under § 3.10.1 through § 3.10.3 are not to be considered, nor interpreted to be, Contract Documents. The Contractor stipulates and agrees that the schedules shall not form the basis of any delay claim as the schedules are submitted solely for information purposes. Contractor further stipulates that any construction schedule float shall belong to the Owner. Submittal by the contractor of a schedule or other documentation showing a completion date for his work prior to the completion date stated in the contract shall not impose any obligation or responsibility on the Owner or Architect for the earlier completion date.

§ 3.10.5 In the event the Owner, reasonably and approved by Architect, determines that the performance of the Work, as of a Milestone Date, has not progressed or reached the level of completion required by the Contract Documents, the Owner shall have the right to order the Contractor to take corrective measures necessary to expedite the progress of construction, including, without limitation, (i) working additional shifts or overtime, (ii) supplying additional manpower, equipment, and facilities, and (iii) other similar measures (hereinafter referred to collectively as "Extraordinary Measures"). Such Extraordinary Measures shall continue until the progress of the Work complies with the stage of completion required by the Contract Documents. The Owner's right to require Extraordinary Measures is solely for the purpose of ensuring the Contractor's compliance with the construction schedule.

.1 The Contractor shall not be entitled to an adjustment in the Contract Sum in connection with Extraordinary Measures required by the Owner under or pursuant to this Subparagraph 3.10.5.

.2 The Owner may exercise the rights furnished the Owner under or pursuant to this Subparagraph 3.10.5 as frequently as the Owner deems necessary to ensure that the Contractor's performance of the Work will comply with any Milestone Date or completion date set forth in the Contract Documents.

Notwithstanding anything provided in this Section 3.10, the Contractor shall be entitled to equitable adjustments in Contract Time and Sum as set forth in Article 8.3 and elsewhere herein.

3.11 DOCUMENTS AND SAMPLES AT THE SITE

Add the following new language to the end of § 3.11:

The Contractor shall also maintain at the site for the Owner record sets of approved permit documents as stamped by governmental officials having jurisdiction over the work.

§ 3.12 SHOP DRAWINGS, PRODUCT DATA AND SAMPLES

Add the following new language to the end of § 3.12.8:

Any deviation from the requirements of the Contract Documents shall also be stipulated by the Contractor as deviations in the written correspondence transmitting the shop drawings, product data, samples or similar submittals by the Contractor to the Architect. The Architect shall have no obligation in its review of the Contractor's submittal(s) to identify deviations not identified by the Contractor as deviations and the Architect's review shall not constitute Architect's acceptance of such deviations."

Delete the 1st, 2nd and 3rd sentences of § 3.12.10.1, and replace with the following new language:

If professional design services ("delegated design") or certifications by a design professional related to systems, materials or equipment are specifically required of the Contractor by the Contract Documents, the Owner and the Architect will specify the minimum performance and design criteria that such services must satisfy. The Contractor shall cause such services or certifications to be provided by a properly licensed and insured design professional, whose signature and seal shall appear on all drawings, calculations, specifications, certifications, Shop Drawings and other submittals prepared by such design professional.

Delete the 5th sentence of § 3.12.10.1, and replace with the following new language:

The Owner and the Architect shall be entitled to rely upon the adequacy, accuracy and completeness of the services, certifications and approvals performed or provided by the such design professionals, provided the Owner and Architect have specified to the Contractor the minimum performance and design criteria that such services must satisfy; however, the Contractor and its design professional shall further be responsible for all additional code, regulatory and industry standards that are applicable to such systems, materials or equipment. This section shall also be applicable to any subcontractor or supplier engaged by the Contractor for performance of any portion of the work which requires any professional design services including, but not limited to, structural components, fire protection, and exterior envelope components.

§ 3.15 CLEANING UP

Delete § 3.15.2 in its entirety and replace with the following new § 3.15.2:

§ 3.15.2 If the Contractor fails to clean up as provided in the Contract Documents within five (5) calendar days after receiving written notice from the Owner or the Architect to do so, or such reasonable time considering the circumstances, the Owner may, at its option, perform such cleanup work, and the Contractor shall be liable to pay to the Owner for all such costs, expenses and fees.

§ 3.18 INDEMNIFICATION

Delete § 3.18.1 in its entirety and replace with the following new § 3.18.1:

§ 3.18.1 To the fullest extent permitted by law the Contractor shall indemnify, defend and hold harmless the Owner, Architect, Architect's consultants, and agents and employees of any of them, from and against any and all claims, damages, losses and expenses, including but not limited to the payment of attorneys' fees and expenses incurred by any of them, arising out of or resulting the negligence of the Contractor, from any failure to perform, breach of the Contract by or attributable to Contractor or anyone for whom the Contractor is responsible. Such obligation shall not be construed to negate, abridge, or reduce other rights or obligations of indemnity which would otherwise exist under any other provision of the Contract Documents.

Add the following new § 3.19, § 3.20, § 3.21 including § 3.21.1, and § 3.22:

§ 3.19 LOG OF CHANGES

The Contractor shall maintain a current log of changes and shall upon request of Owner, during the construction of the Project, incorporate into a set of the Contract Documents maintained at the project site all Requests for Information (RFIs), Architect's Supplementary Instructions (ASIs), Contractor's Requests for Change orders (RCOs), Change Orders and Construction Change Directives, and shall allow the Owner and Architect access to the same at any time upon request.

§ 3.20 FAILURE TO PERFORM WORK

Subject to Article 8.3 below, Contractor shall be liable to the Owner and pay for all costs, expenses, fees (including attorney fees and expenses) and/or damages that the Owner incurs arising from or connected with the Contractor's failure to perform the work, or any part thereof, in accordance with Contract Documents. Contractor's failure to perform shall include, but not be limited to, the failure of its subcontractors and/or suppliers of any tier to perform. The Contractor's liability to the Owner shall include, but not be limited to (1) the increase costs of performance, including services of the Architect and other consultants, resulting from the Contractor's failure to comply with the Contract Documents; (2) costs of corrective or warranty work; (3) liability to third parties; (4) re-procurement costs; (5) attorney fees and related costs, including costs incurred in enforcing Owner's rights under the Contract Documents; and (6) liquidated damages.

§ 3.21 LIENS

Subject to Owner's proper payment under this Contract, in the event a claim is asserted or a lien is filed by anyone in relation to the Work asserting that work, labor, materials equipment or supplies have been furnished but not paid for, the Owner shall have the right, but not the obligation to: (1) require the Contractor to furnish to the Owner a release of a lien or claim; (2) require the Contractor to discharge the lien by positing a bond within five (5) calendar days of notice by the Owner to the Contractor; (3) issue payment in the form of a joint check to Contractor and claimant to pay the amount claimed and/or (4) retain out of any payment due or thereafter to become due 150% of the amount of the claim/lien and to apply the same in such manner as Owner deems necessary to satisfy such claim/liens and to compensate Owner for attorneys' fees, expenses and/or administrative costs. In the event such claim/lien is not discharged, the Contractor at its sole cost and expense, including attorneys' fees and expenses, shall hold harmless, indemnify and defend the Owner from any and all claims, lawsuits, causes of actions and demands of any person or entity asserting or claiming any right as a result of any lien or claim recorded or unrecorded, against the Owner, Project, or the Owner's property. The Owner shall have the right to terminate the Contractor for cause or to bond off said lien(s), and Contractor shall be liable for and pay to Owner all costs, expenses and fees including but not limited to, bond premiums and attorneys' fees and expenses incurred as a result thereof. Prior to the receipt of partial or final payment, Contractor shall provide the owner a final release of any liens and claims of all persons furnishing labor and/or materials to the Work with satisfactory evidence that there are no other liens or claims whatsoever outstanding against the Work or Contract.

§ 3.21.1 The term "lien" as used in this Section 3.21 and in Article 9 of these General Conditions, and in Article 5 of the Agreement Between Owner and Contractor, AIA 101 refers to "claims" as provided in La. R.S. 38:2242. which authorizes "claimants" who perform work, labor, or provide materials or suppliers for a public work to file "claims" with the governing authority. The term "lien" is used in the referenced sections instead of the word "claim" solely to avoid confusion with the "Claims" that may be filed by the Contactor and/or Owner pursuant to the Contract Documents, as provided in Article 15 of these General Conditions.

§ 3.22 FEDERAL COMPLIANCE PROVISIONS

Contractor and all Subcontractors shall comply with all of the applicable requirements set forth in the Federal Compliance Provisions for Construction Contracts, which are herby made part of the Contract Documents for this Project, a copy of which is included in the Project Manual.

ARTICLE 4 ARCHITECT

§ 4.1 GENERAL

Add the following new Subparagraph 4.1.1.1 after § 4.1.1:

4.1.1.1 The term "Architect," "Architect/Engineer," "Engineer", Consultant or Architect's Consultant as used in the Contract Documents means the Architect or his authorized representative.

§ 4.2 ADMINISTRATION OF THE CONTRACT

Delete § 4.2.1 in its entirety and replace with the following new § 4.2.1:

§ 4.2.1 The Architect will provide administration of the Contract as described in the Contract Documents, not as the agent for the Owner but as an independent design professional.

Delete the 1st sentence of § 4.2.3 in its entirety.

Add the following new language to the end of § 4.2.10

There will be no restriction on the owner having a Representative.

Delete § 4.2.11 in its entirety and replace with the following new § 4.2.11:

§ 4.2.11 The Architect will interpret and decide all matters concerning performance and/or failure to perform by either the Contractor or Owner under the Contract Documents either on written request of the Owner or the Contractor. The Architect's response to such requests will be made in writing within a time limit agreed upon by the Architect or otherwise with reasonable promptness.

ARTICLE 5 SUBCONTRACTORS

§ 5.2 AWARD OF SUBCONTRACTS AND OTHER CONTRACTS FOR PORTIONS OF THE WORK

Delete the 1st sentence of § 5.2.1 and replace with the following new language:

The Contractor, within fourteen (14) calendar days following the date of issuance of the Notice to Proceed or date of commencement of the Work, whichever occurs first, shall submit to the Owner through the Architect a complete list of the names of persons or entities (including those who are to furnish materials and equipment fabricated to a special design) proposed to fabricate, furnish or perform work on the Project as manufacturers, fabricators, suppliers, subcontractors, and sub-subcontractors. No Contractor payments shall be made until this information is received."

Delete § 5.2.2 and substitute the following:

§ 5.2.2 The Contractor shall be solely responsible for selection and performance of all subcontractors. The Contractor shall not be entitled to claims for additional time and/or an increase in the contract sum due to a problem with performance or nonperformance of a subcontractor.

Delete § 5.2.3 and 5.2.4 and add the following:

§ 5.2.3 The contractor shall notify the owner when a subcontractor is to be changed and substituted with another subcontractor.

§ 5.4 CONTINGENT ASSIGNMENT OF SUBCONTRACTS

Delete § 5.4.1 and § 5.4.2 in their entirety.

ARTICLE 6 CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS

§ 6.2 MUTUAL RESPONSIBILITY

Delete § 6.2.3 in its entirety and replace with the following new § 6.2.3:

§ 6.2.3 If a separate Contractor initiates legal or other proceedings against the Owner on account of damage alleged to have been caused by the Contractor, the Owner shall notify the Contractor, who shall defend such proceedings at its own expense, and if judgment or award against the Owner arises therefrom, the Contractor shall pay or satisfy it and shall reimburse the Owner for attorneys' fees and court or other costs which the Owner has incurred over and above those paid for directly by the Contractor.

In the 1st line of § 6.2.4, delete the word "wrongfully."

ARTICLE 7 CHANGES IN THE WORK

§ 7.1 GENERAL

Add the following new language to the end of § 7.1.1:

Requests for Information (RFIs), responses to an RFI and/or Architect's Supplemental Instructions (ASIs) are not recognized as a modification to the Contract Documents where such documents may be interpreted to have the effect of altering the Contract Sum or the Contract Time. Contractor stipulates and agrees that the Contract Documents may only be changed by a written document properly signed as required herein below. Contractor hereby states its solemn intent that any such asserted reliance is unresolvable.

Add the following new § 7.1.4, § 7.1.5, § 7.1.6 and § 7.1.7:

§ 7.1.5 The overhead and profit included in the total cost to the Owner of any change in the Work shall be based on the following schedule:

Cost of Change in Work	Total Profit and Overhead to be Added
$0-$50,000	15%
$50,000-$100,000	15%
$100,000-$200,000	12%
$200,000-$500,000	10%
$500,000-$1,000,000	10%
$1,000,000-$2,000,000	7%
Over $2,000,000	7%

§ 7.1.6 In order to facilitate checking of quotations for extras or credits, all proposals, except those so minor that their propriety can be seen by inspection as determined solely by the Architect, shall be accompanied by a complete itemization of Contractor's costs including labor, materials, and equipment, and Subcontractors costs including labor, materials and equipment at every level. Labor, materials and equipment shall be itemized in the manner prescribed above and shall be supported by proposals and/or invoices.

§ 7.1.7 As part of the pre-construction conference submittals, the contractor is to submit the following prior to the commencement of work.

.1 Fixed job site overhead cost itemized with documentation to support daily rates.

.2 Bond Premium Rate with supporting information from the General Contractor's carrier.

.3 Labor Burden by trade for both Subcontractors and General Contractor.

.4 Internal Rate Charges for all significant company owned equipment.

§ 7.2 CHANGE ORDERS

Delete **§** 7.2.1 and replace with the following new language:

A Change Order is a written order to the Contractor signed by the Owner and the Architect, issued after execution of the Contract, authorizing a change in the work or an adjustment in the Contract Sum or the Contract Time. The Contract Sum and the Contract Time may be changed only by Change Order. A Change Order signed by the Contractor indicates his agreement therewith, including the adjustment in the Contract Sum or the Contract Time.

Add the following new § 7.2.2, § 7.2.3 § 7.2.4, § 7.2.5, § 7.2.6, § 7.2.7, § 7.2.8, § 7.2.9, and § 7.2.10:

§ 7.2.2 By executing the Change Order, the Contractor acknowledges that the Change Order is for the full and final amount of the Contract Sum and the Contract Time adjustments due the Contractor for all additional or changed Work related to the Change Order. Contractor waives all claims for any additional Contract Time or any additional Contract Sum for whatever reason and of whatever kind, whether direct or indirect costs, profit, overhead or any other expense for the work enumerated in the Change Order. An executed Change Order shall have the full force and effect as a compromise and settlement.

§ 7.2.3 The "Cost of the Work", whether Contractor cost, Subcontractor cost or Supplier cost, for the purpose of Change Orders and Construction Change Directives shall be costs actually required to be incurred in performance of the Work and paid by the Contractor and/or Subcontractors. Such costs shall consist only of the following:

.1 Wages paid for direct labor personnel, delineating a labor burden mark-up to include only:
- .1 Applicable payroll taxes;
- .2 Worker's compensation;
- .3 Unemployment compensation – Federal and State;
- .4 Social Security taxes.

.2 Fringe Benefits for direct labor personnel, to include only Sick leave and Vacation, limited to a maximum of 120 hours per year;

.3 Costs of direct materials and supplies, including the identification of each item, its unit cost and quantity;

.4 Costs of necessary machinery and equipment required by the Change Order, including the identification of each and allocation of its cost, and the bases therefore, to the change in the Work,
- .1 For leased machinery and equipment already being utilized on site, the allocation of its cost shall be at the actual rate leased, supported by lease invoices;
- .2 Incidental use of machinery and equipment already being utilized on site shall not be allocated to the costs of a change;

.5 Cost of premiums for bonds directly related to the change in the Work;

.6 Costs of premiums for insurance directly related to the change in the Work.

§ 7.2.4 The "Cost of the Work", whether General Contractor cost, Subcontractor cost or Supplier cost for the purpose of Change Orders, shall not include the following:

.1 Salaries or other compensation of the Contractor's, Subcontractor's and/or Supplier's personnel at its principal offices and branch offices;

.2 Salaries or other compensation of the Contractor's, Subcontractor's and/or Suppliers project management, administrative or safety personnel, whether or not located on site;

.3 Any part of the Contractor's, Subcontractor's and/or Supplier's capital expenses, including interest on its capital employed for the Work;

.4 Overhead and general expenses of any kind or the cost of any item not specifically included in General Conditions § 7.3.7 Cost of the Work;

.5 Cost of supervision not specifically required by the Change Order or for full- or part-time supervisory personnel already required or intended to be on site supervising ongoing Work;

.6 Costs for clean-up, trash removal, and other similar costs that are incidental to the Work.

§ 7.2.5 The Contractor and Subcontractor shall be due job-site and home office fixed overhead and profits on the Cost of the Work as set forth in Section 7.1.5 above.

The credit to the Owner resulting from a change in the work shall be the sum of those items above, except credit will not be required for overhead and profit. Where a change results in both credits to the Owner and extras to the Contractor for related items, overhead and profit will only be computed on the net extra cost to the Contractor.

§ 7.2.6 The cost to the Owner resulting from a change in the work shall be the sum of "Cost of the Work" (as defined at 7.2.3) plus "Overhead and Profit" (as defined at 7.2.5).

§ 7.2.7 "Before a Change Order is prepared, the Contractor shall provide and deliver to the Architect the following information concerning the Cost of the Work, not subject to waiver, within a reasonable time after being notified to prepare said Change Order:

A detailed itemized list of labor, material and equipment costs for the General Contractor's work including quantities and unit costs for each item of labor, material and equipment.

An itemized list of labor, material and equipment costs for each Subcontractor's and/or Sub Subcontractor's work including quantities and unit costs for each item of labor, material, and equipment.

§ 7.2.8 After a Change Order has been approved, no future requests for extensions of time or additional cost shall be considered for that Change Order.

§ 7.2.9 The Contractor will be due extended fixed job-site overhead for time delays only when complete stoppage of work occurs causing a contract completion extension, and the Contractor is unable to mitigate financial damages through replacement work. The stoppage must be due to acts or omissions solely attributable to the Owner. In all cases the Contractor is to notify the Designer in writing as required by article 4.3.2. Reasonable proof may be required by the architect that alternate work could not be performed. Reasonable proof may be required by the architect that the stoppage affected the Completion Date.

§ 7.2.10 "Cost of the work" whether General Contract cost or Subcontract cost shall not apply to the following:

.1 Salaries or other compensation of the Contractor's personnel at the Contractor's principal office and branch offices.

.2 Any part of the Contractor's capital expenses, including interest on the Contractor's capital employed for the work.

.3 Overhead and general expenses of any kind or the cost of any item not specifically and expressly included above in cost of the work.

.4 Cost of supervision not specifically required by the Change Order.

§ 7.2.11 When applicable as provided by the Contract, the cost to Owner for Change Orders shall be determined by quantities and unit prices. The quantity of any item shall be as submitted by the Contractor and approved by the Architect. Unit prices shall cover cost of Material, Labor, Equipment, Overhead and Profit."

At the end of the first sentence of §7.3.3 add:

but not to exceed a specified amount.

Replace the five cost of work descriptions in § 7.3.4 with the following four:

.1 Wages paid direct labor personnel, with a labor burden markup for applicable payroll taxes, worker's compensation insurance, unemployment compensation, and social security taxes.

.2 Cost of all materials and supplies.

.3 Cost of necessary machinery and equipment.

.4 Other documented direct costs.

Delete the last sentence of § 7.3.8 in its entirety and substitute the following new language:

When both additions and deletions are involved in any one change, the allowance for overhead and profit shall be figured on the basis of net increase, if any.

Add the following sentence to § 7.3.7:

The Architect's determination, as specified in Section 7.3.4, shall not be less than the actual cost of the items set forth in Section 7.3.4.1-4 reasonably expended by the Contractor in performing the changed Work. If the Architect's determination is believed to be less than its actual cost in performing the Work, the Contractor may assert a Claim.

§ 7.4 MINOR CHANGES IN THE WORK

Add the following new § 7.4.1:

§ 7.4.1 The issuance of an Architect's Supplemental Instructions ("ASI") or the Architect's response to any Request for Information ("RFI") shall not be interpreted as authorization for the Contractor to perform Work which increases the Contract Sum or Contract Time. The Contractor hereby stipulates and agrees that the Architect does not have the authority to instruct the Contractor to perform any Work which increases the Contract Sum or Contract Time without the express written approval of the Owner as may be documented in a Change Order or Construction Change Directive.

ARTICLE 8 TIME

§ 8.1 DEFINITIONS

Delete § 8.1.2 in its entirety and replace with the following new § 8.1.2:

§ 8.1.2 The date of commencement of the Work is the effective date established in the Agreement or the date established in the Notice to Proceed given by the Owner.

Add the following new § 8.1.5:

§ 8.1.5 The Contract Time shall not be changed by the submission of a schedule that shows an early completion date unless specifically authorized by change order.

§ 8.2 PROGRESS AND COMPLETION

Delete § 8.2.1 in its entirety and replace with the following new § 8.2.1:

Time is of the essence and completion of the work must be within the Time for Completion stated in the Agreement, subject to such extensions as may be granted under Section 8.3. The Contractor agrees to commence work not later than fourteen (14) days after the transmittal date of Written Notice to Proceed from the Owner and to substantially complete the project within the time stated in the Contract, subject to adjustments as contemplated in the Contract Documents. The Owner will suffer financial loss if the project is not substantially complete in the time set forth in the Contract Documents. The Contractor and the Contractor's Surety shall be liable for and shall pay to the Owner the sum stated in the Contract Documents as fixed, agreed and liquidated damages for each consecutive calendar day (Saturdays, Sundays, and holidays included) of delay until the work is substantially complete. The owner shall be entitled to the sum stated in the Contract Documents. Such Liquidated Damages shall be withheld by the Owner from the amounts due the Contractor for progress payments.

Delete § 8.2.2 in its entirety and replace with the following new § 8.2.2:

§ 8.2.2 The Contractor shall not, except by prior written agreement of the Owner, commence operations of any kind or nature whatsoever on the site or elsewhere prior to the effective date of the insurance required by article 11, and the Contractor has delivered to the Owner documentation reasonably requested by the Owner to prove such insurance. The Owner shall have the right to require the Contractor to provide a complete and certified copy of all insurance policies required under the Contract Documents prior to commencement of the work, and any payment becoming due to the Contractor. The Date of Commencement of the work shall not be changed by the effective date of such insurance.

The Contractor shall not commence any portion of the work until the Contractor has properly, and in compliance with applicable law, recorded a notice of contract together with any bonds required by the contract documents and a description of the property where the work is to be performed, with the recorder of mortgages for the parish where the work is to be performed, and the contractor has delivered a copy of the recorded notice of contract and bond(s) to the owner bearing the recordation stamp of the public official. The Contractor hereby stipulates and agrees that the Contractor shall be liable unto the owner for any and all costs, expenses, fees and attorney's fees incurred by the owner arising from the failure of the contractor to perform this obligation. The date of commencement of the work shall not be changed by the effective date of such recordation.

Add the following new § 8.2.4 LIQUIDATED DAMAGES:

§ 8.2.4 LIQUIDATED DAMAGES

The Contractor acknowledges that delay caused by the Contractor will damage the Owner and that, in lieu of proof of actual damages, Contractor hereby stipulates and agrees to pay as stipulated damages, and not as a

penalty, the sum as stated in the Owner/Contractor Agreement, or if none stated there or elsewhere, of one thousand five hundred and no/100 dollars ($1500.00) for each consecutive calendar day, Saturdays, Sundays and holidays, which the work is not complete beginning with the first day beyond the completion time provided in the Notice to Proceed or Contract Documents and any proper extension thereof granted by the Owner.

§ 8.3 DELAYS AND EXTENSION OF TIME

Delete 8.3.1 in its entirety and replace with the following:

If the Contractor is delayed at any time in the commencement or progress of the Work by (1) an act or neglect of the Owner or Architect, of an employee of either, or of a Separate Contractor; (2) by changes ordered in the Work; (3) by labor disputes, fire, earthquakes, enemy action, act of god or similar catastrophe, concealed conditions, unusual delay in deliveries not the fault of Contractor or other unusual delays not due to the fault of Contractor or anyone else for whom Contractor is responsible, unavoidable casualties, adverse weather conditions documented in accordance with Section 15.1.6.2, government-ordered work condition restrictions, government-ordered shutdowns, or government-ordered travel restrictions related to COVID-19, or other causes beyond the Contractor's control and the control of anyone else for whom Contractor is responsible; (4) by delay authorized by the Owner pending mediation and binding dispute resolution; or (5) by other causes that the Contractor asserts, and the Architect determines, justify delay, then only to the extent the critical path of the schedule was delayed by the foregoing causes as determined by the Architect, the Contract Time and Contract Sum may be reasonably adjusted pursuant to a written Change Order issued pursuant to the terms of Article 7.2. Any and all claims by the Contractor arising from or connected with delay shall be submitted in strict accordance with this article and Article 15 of the General Conditions.

Delete § 8.3.2 in its entirety and replace with the following new § 8.3.2:

§ 8.3.2 If the progress or completion of the Work is delayed by any fault, neglect, act or failure to act on the part of the Contractor or any one acting for or on behalf of the Contractor, then the Contractor shall, if permitted by applicable laws and Owner's grant or loan programs, in addition to all of the other obligations imposed by this contract and by law upon the contractor, and at no cost or expense to the Owner, work such overtime or require the appropriate sub-contractor(s) to work such overtime as may be necessary to make up for all time lost and to avoid delay in the progress and completion of the work. The "premium" cost of all such overtime work shall be paid by the Contractor.

Add the following new § 8.3.4 and its Subparagraphs:

§ 8.3.4 If adverse weather conditions are the basis for a claim for additional Contract Time, the Contractor shall document that weather conditions had an adverse effect on the scheduled critical path construction activities only. Rain days shall be those of at least .1" of rain over a 24-hour period and shall only be considered for rain events that impact the portion of the day normally or scheduled for work to be performed. Wet days will not be considered, unless the site conditions due solely to a weather event preclude the performance of critical path work. An increase in the Contract Time due to weather, unavailability or delay in delivery of material or equipment, or any force majeure event, shall not be cause for an increase in the Contract Sum.

.1 Adverse weather conditions shall not be considered as a basis of claim for additional Contract Time involving interior work and may not be claimed for normally scheduled holidays or for days or times not normally scheduled for work to be performed.

.2 The following are considered reasonably anticipated days of adverse weather on a monthly basis:

January	11	days	May	5	days	September	11	days
February	10	days	June	6	days	October	11	days
March	8	days	July	11	days	November	11	days
April	7	days	August	11	days	December	11	days

.3 Contract Time is on a consecutive calendar day basis.

.4 The Contractor shall submit to the Architect a written request for total adverse weather days with each application for payment. Failure to submit such request, with supporting documentation, with the Contractor's application for payment shall serve as a knowing and voluntary waiver of any claim for weather related delays for the period of time covered by such application for payment. The Contractor's request for extension of Contract Time due to weather related delays shall only be considered for the number of properly documented and accepted days

over the allowable number of adverse weather days stated above for the total of all months encompassed in the Project duration, including any adjustments to the Contract Time by Change Order. The Contractor stipulates and agrees that it shall not be allowed to make a Claim for additional Contract Time due to weather delays until the date established for Substantial Completion. The Contractor stipulates and agrees that delays caused by any adverse weather conditions shall not entitle the Contractor to claims for cost due to extended project general conditions or overhead.

Add the following new § 8.3.5 and its Subparagraphs:

§ 8.3.5 If COVID-19 is the basis for a claim for additional Contract Time, the Contractor shall document that government orders related to COVID-19 had an adverse effect on the scheduled critical path construction activities. COVID-19 delays shall only be allowed to the extent that government orders directly restrict Contractor's ability to perform critical path work by limiting workers' ability to access or perform work on the site. The provisions of 8.3.4.4 shall apply to applications for COVID-19 delays.

Re-number existing § 8.3.2 as § 8.3.5.

Add the following new § 8.4 after § 8.3:

§ 8.4 CONTRACT TIME

§ 8.4.1 The Contractor shall commence the Work and achieve Substantial Completion as set forth in Article 3 of the Agreement, such period of time constituting the Contract Time.

.2 The Contractor shall achieve Final Completion of the Work within thirty-five (35) days of the date of Substantial Completion. Contractor shall pay as stipulated damages the amount of $1,500.00 (one thousand five hundred dollars) for each consecutive calendar day, including Saturdays, Sundays and holidays, for which the Work is not Finally Complete after such date.

ARTICLE 9 PAYMENTS AND COMPLETION

§ 9.2 SCHEDULE OF VALUES

Delete § 9.2 and substitute the following:

§ 9.2 At the Pre Construction Conference, the Contractor shall submit to the Owner and the Architect a Schedule of Values prepared as follows:

.1 The attached Schedule of Values Format shall be used. If applicable, the cost of work for each section listed under each division, shall be given. The cost for each section shall include labor, materials, overhead and profit.

.2 The Total of all items shall equal the Total Contract Sum. This schedule, when approved by the Architect, shall be used only as a basis for the Contractor's Applications for Payment.

§ 9.3 APPLICATIONS FOR PAYMENT

Delete Subparagraph 9.3.1 and clause 9.3.1.1 and 9.3.1.2 and substitute the following:

§ 9.3.1 Monthly, the Contractor shall submit to the Architect an Application & Certificate for Payment on the AIA Document G702-1992, accompanied by AIA Document G703-1992, and supported by any additional data substantiating the Contractor's right to payment as the Owner or the Architect may require. Application for Payment shall be submitted on or about the first of each month for the value of labor and materials incorporated into the work and of materials, suitably stored, at the site as of the twenty-fifth day of the preceding month, less normal retainage as follows, per R.S.38:2248:

The normal retainage shall not be due the Contractor until after substantial completion and expiration of the forty five day lien period and submission to the Architect of a clear lien certificate and invoice for retainage.

Add the following new Subparagraph 9.3.1.3 to § 9.3.1:

§ 9.3.1.3 Retainage in the amount of ten (10) percent of the total amount earned to date shall be held by the Owner as retainage from each progress payment. Per R.S. § 38:2248, Normal retainage for Projects with a Contract Sum of less than $500,000.00 shall be 10% of the total Contract Sum. Per R.S. § 38:2248 Normal Retainage for Projects with a Contract Sum of $500,000.00 or more shall be 5% of the total Contract Sum.

Delete Subparagraph 9.3.2 and substitute the following:

§ 9.3.2 Unless otherwise provided in the Contract Documents, payments shall be made on account of materials and equipment delivered and suitably stored at the site for subsequent incorporation in the Work. Payments for materials or equipment stored on the site shall be conditioned upon submission by the Contractor of bills of sale or such other procedures satisfactory to the Owner to establish the Owner's title to such materials and equipment or otherwise protect the Owner's interest, including applicable insurance."

Add the following new Subparagraphs 9.3.2.1 through 9.3.2.5 to § 9.3.2:

§ 9.3.2.1 In requesting payment for materials stored on or off the site, the Contractor shall submit with his Application for Payment the following:

.1 an itemized list of the stored material prepared in sufficient detail to identify the materials and their value. Include an accounting for new items stored, paid items that continue in storage, and items previously stored and since incorporated in the Work.

.2 evidence such as bills of sale or such other proof as may be requested by the Architect to substantiate that the materials listed have been paid for by the Contractor, or, for materials stored at the site only, a notarized statement from the materials supplier stating that the materials will become the property of the Owner upon payment by the Owner to the Contractor.

§ 9.3.2.2 For material stored off the site, the Contractor shall additionally submit with his Application for Payment the following:

.1 evidence that the materials are stored at the location previously agreed to in writing as provided by Subparagraph 9.3.2 of the General Conditions. No payment will be made for material stored off the site until the storage location has been agreed upon in writing.

.2 evidence that the storage location and the subject materials are secured in a manner satisfactory to the Architect.

.3 evidence that the materials are insured while in storage and while in transit to the site.

.4 evidence that transportation to the site will be provided by the Contractor.

§ 9.3.2.3 Stored materials may be reviewed in their storage location by the Architect.

§ 9.3.2.4 Contractor shall reimburse the Owner for the Architect's cost for inspections of off-site stored materials, to include his Time (travel, site observation, and office-related duties) per the hourly rate established by the fee/rate schedule attachment to Owner-Architect Agreement), the cost for Engineering Consultants if their services are needed, and will also include travel expenses at IRS approved travel expense rate for travel to/from the off-site storage location. In no case will the charges be less than the minimum set at $500.00 per inspection.

Add the following new § 9.3.4:

§ 9.3.4 The Owner reserves the right to require the Contractor, all subcontractors, laborers and material suppliers to provide lien releases at any time. The Owner reserves the right to withhold progress payments until such lien releases are received for all work for which prior progress payments have been made. Upon the Owner's Demand for lien releases (either verbally or written), the Contractor, all subcontractors and material or equipment suppliers shall provide such releases with every payment request until Final Acceptance of the Project.

§ 9.5 DECISIONS TO WITHHOLD CERTIFICATION

Add the following after the 2md sentence in 9.5.1:

To the extent the Architect fails to certify the entire amount of the pay application, the Architect shall provide the Contractor with written notification, within seven (7) days, detailing all reasons why the Architect is not certifying the Contractor's pay application.

Delete Subparagraphs 9.5.1.1 through 9.5.1.7 in their entirety and replace with following Subparagraphs 9.5.1.1 through 9.5.1.9:

.1 defective Work not remedied;
.2 third party claims filed in the amount of 125% of the claim or reasonable evidence indicating probable filing of such claims unless security acceptable to the Owner is provided by the Contractor;
.3 failure of the Contractor to make timely payments properly to Subcontractors or for labor, materials or equipment;
.4 reasonable evidence that the Work cannot be completed for the unpaid balance of the Contract Sum;
.5 damage to the Owner or a separate contractor;
.6 reasonable evidence that the Work will not be completed within the Contract Time, and that the unpaid balance would not be adequate to cover actual or liquidated damages for the anticipated delay;
.7 repeated failure(s) to carry out the Work in accordance with the Contract Documents;
.8 the value of the Punch List; and/or
.9 rejection(s) of any part of the Work by any governmental authority having jurisdiction over the Project.

§ 9.6 PROGRESS PAYMENTS

Delete Subparagraph 9.6.1 and substitute the following:

§ 9.6.1 After the Architect has issued a Certificate for Payment, the Owner shall make payment within twenty days except for projects funded fully or in part by a Federal reimbursement program. For such projects the Owner will make payment in a timely manner consistent with reimbursement.

Add the following new language to the end of **§** 9.6.4:

Pursuant to La. R.S. 38:2242, when the Owner receives any claim of nonpayment arising out of the Contract, the owner shall deduct 125% of such claim from the Contract Sum. The Contractor, or any interested party, may deposit security, in accordance with La. R.S. 38:2242.2, guaranteeing payment of the claim with the re-corder of mortgages of the parish where the Work has been done. When the Owner receives original proof of such guarantee from the recorder of mortgages, the claim deduction will be added back to the Contract Sum.

The Owner shall have the right to issue payments on the Contract Sum in the form of a joint check made payable to the Contractor and other persons or entities performing portions of the Work on behalf of the Contractor.

§ 9.7 FAILURE OF PAYMENT

Delete Paragraph 9.7.

9.8 SUBSTANTIAL COMPLETION

Delete § 9.8.1 through 9.8.5 and substitute the following new sections § 9.8.1 through 9.8.7:

§ 9.8.1 Substantial Completion is the stage in the progress of the Work when the Work is sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work for its intended use. The Architect shall determine if the project is substantially complete in accordance with this Subparagraph.

§ 9.8.2 When the Contractor considers that the Work is Substantially Complete, the Contractor shall prepare and submit to the Architect a comprehensive list of items to be completed or corrected prior to final payment. Failure to include an item on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents.

§ 9.8.3 Upon receipt of the Contractor's list, the Architect will make an inspection to determine whether the Work is substantially complete. A prerequisite to the work being accepted as substantially complete, is the Owner's receipt of the executed Roofing Contractor's and Roofing Manufacturer's guarantees, where roofing work is part of the Contract. Prior to inspection by the Architect, the Contractor shall notify the Architect that the project is ready for inspection by the State Fire Marshal's office or other Authority Having Jurisdiction. If the Architect's inspection discloses any item, whether or not included on the Contractor's list, which is not sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work for its intended use,

the Contractor shall, before acceptance of the work as Substantially Complete, complete or correct such item upon notification by the Architect. In such case, the Contractor shall then submit a request for another inspection by the Architect to determine Substantial Completion.

§ 9.8.4 When the Architect determines that the project is Substantially Complete, he shall prepare a "punch list" of exceptions and the dollar value related thereto. The monetary value assigned to this list will be the sum of the cost estimate for each particular item of work the Architect develops based on the mobilization, labor, material and equipment costs of correcting the item and shall be retained from the monies owed the contractor, above and beyond the standard lien retainage. The cost of these items shall be prepared in the same format as the schedule of values. At the end of the 45 day lien period payment shall be approved for all punch list items completed up to that time. After that payment, none of the remaining funds shall be due the contractor until all punch list items are completed and are accepted by the Architect. If the dollar value of the punch list exceeds the amount of funds, less the retainage amount, in the remaining balance of the Contract, then the Project shall not be accepted as substantially complete. If funds remaining are less that that required to complete the work, the Contractor shall pay the difference.

§ 9.8.5 When the "punch list" is complete the Architect shall prepare a Recommendation of Acceptance" incorporating the punch list and submit it to the Owner. Upon approval of the Recommendation the Recommendation of Acceptance, the Owner may issue a Notice of Acceptance of Building Contract which shall establish the Date of Substantial Completion. The Contractor will record the Notice of Acceptance with the Clerk of Court in the Parish or County in which the work has been performed. If the Notice of Acceptance has not been recorded seven (7) days after issuance, the owner may record the acceptance at the Contractor's expense.

§ 9.8.6 Warranties required by the Contract Documents shall commence on the date of Substantial Completion of the Work unless otherwise agreed to in writing by the Owner and Contractor. Unless otherwise agreed to in writing by the Owner and Contractor, security, maintenance, heat, utilities, damage to the Work not covered by the punch list and insurance shall become the Owner's responsibility on the Date of Substantial Completion.

§ 9.8.7 If all punch list items have not been completed by the end of the forty-five (45) day lien period, through no fault of the Architect or Owner, the Owner may hold the Contractor in default. If the Owner finds the Contractor is in default, the Surety shall be notified. If within forty-five (45) days after notification, the Surety has not completed the punch list, through no fault of the Architect or Owner, the Owner may, at his option, contract to have the balance of the work completed and pay for such work with the unpaid funds remaining in the Contract sum. Finding the Contractor in default shall constitute a reason for disqualification of the Contractor from bidding on future state contracts. If the surety fails to complete the punch list within the stipulated time period, the Owner may not accept bonds submitted, in the future, by the surety.

§ 9.9 PARTIAL OCCUPANCY OR USE

Delete § 9.9.1 in its entirety and replace with the following new § 9.9.1:

§ 9.9.1 The Owner may occupy or use any completed or partially completed portion of the Work at any stage when such portion is designated by the Architect, provided such occupancy or use is authorized by public authorities having jurisdiction over the Work, and the Contractor has been provided ten (10) days prior written notice to enable the Contractor to fully document conditions prior to occupancy or use of the completed or partially completed portion of the Work. Such partial occupancy or use may commence whether or not the portion is substantially complete. Any partial occupancy or use of the Work by the Owner shall not relieve the Contractor of any obligation under the Contract Documents except an obligation to provide property casualty insurance for the specific portion of the Work upon the occupancy or use of that portion of the Work by the Owner. The stage of the progress of the Work for any portion to be occupied or used by the Owner shall be determined by decision of the Architect, but Contractor may assert a Claim if it disagrees.

§ 9.10 FINAL COMPLETION AND FINAL PAYMENT

Add the following new language after the second sentence of § 9.10.1:

If the Architect does not find the work acceptable under the Contract Documents, the Architect shall make two additional inspection; if the work is still not acceptable, the Architect, and each of the Architect's principal consultants, shall be paid $150.00/hour for their time at the project site, for each additional inspection, to be withheld from the unpaid funds remaining in the Contract sum. The payment shall be made by the owner and deducted

from the construction contract funds. Contractor shall not be responsible for additional inspections occasioned by the negligence or omission of any party other than Contractor.

Add the following new Subparagraph 9.10.2.1 to § 9.10.2:

9.10.2.1 Except with the consent of the Owner, the Architect will perform no more than two (2) inspection to determine whether the Work or a designated portion thereof has attained Final Completion in accordance with the Contract Documents. The Owner shall be entitled to deduct from the Contract Sum amount paid to the Architect for all additional inspections, including normally reimbursable expenses, and all other costs, expenses and fees incurred by the Owner. Contractor shall not be responsible for additional inspections occasioned by the negligence or omission of any party other than Contractor.

Add the following new Subparagraph 9.10.3.1 to § 9.10.3:

9.10.3.1 Owner's Option Final Payment: If at the time final completion is scheduled there are remaining uncompleted items, the contract may be closed and contract closeout completed, an amount equal to 200 percent of the value of each items as determined by the Architect shall be withheld for these items, as value to the Owner to provide for the Owner's completion of the work and related costs for Owner's and Architect's additional services.

Add the following new Subparagraphs .4, .5, and .6 to § 9.10.4:

.4 Claims for Indemnification;
.5 Claims about which the Owner has given the Contractor written notice;
.6 Claims arising after final payment.

Add the following to § 9.10.4:

The failure of the Architect to identify any failure to perform by the Contractor in accordance with the Contract Documents, shall not serve as a waiver of any Owner rights nor relieve the Contractor of any responsibility to perform the Work in strict accordance with the Contract Documents, despite the Architect's signature on a Final Application or Certification for Payment, or on any recommendation of final acceptance.

Delete § 9.10.5 in its entirety and replace with the following new § 9.10.5:

§ 9.10.5 Acceptance of Final Payment by the Contractor, a subcontractor or material supplier shall constitute a knowing and voluntary forfeiture of any and all claims by that payee except those claims which are specifically identified in writing by that payee on the Final Application for Payment document.

Add the following new § 9.10.6:

9.10.6 In response to Federal Arbitrage regulations: If such compliance has not been effected within 90 days of the date of acceptance, the contract shall be terminated and no further opportunity will be granted the Contractor and no further payments will be made on this contract.

Add the following new § 9.11:

§ 9.11 COSTS FOR ADDITIONAL INSPECTIONS

The Architect's costs for additional inspections will include his Time (Travel, Site Visitation and Office) at the rate established in the fee/rate schedule attachment to the Owner-Architect Agreement, the cost for Engineering Consultants if their services are needed, including their travel expenses at IRS approved Travel Expense Rate to/from the Project site. In no case will the charges be less than the minimum set at $500.00 per inspection. Contractor shall not be responsible for additional inspections occasioned by the negligence or omission of any party other than Contractor.

ARTICLE 10 PROTECTION OF PERSONS AND PROPERTY

§ 10.2 SAFETY OF PERSONS AND PROPERTY

10.2.2, In the first sentence, between the words "bearing on" and "safety", add the words "the health and".

Add the following new Subparagraph 10.2.2.1 after § 10.2.2:

10.2.2.1 In the event that review, inspection or other action by regulatory agencies or other parties results in the imposition of fines, fees, or other costs due to the failure of the Contractor to comply with said applicable laws, ordinances, rules, regulations and lawful orders, the Contractor shall hold harmless the Owner, the Architect, Architect's consultants and Owner's separate consultants and contractors, if any, from all consequences arising from the Contractor's noncompliance.

10.3 HAZARDOUS MATERIALS

In the first sentence of §10.3.1 add the following:

after "(PCB)" add "or lead"

Delete Subparagraph 10.3.3.

§ 10.4 EMERGENCIES

Delete Subparagraph 10.4 and substitute the following:

10.6.14 In an emergency affecting the safety of persons or property, the Contractor shall notify the Owner and Architect immediately of the emergency, simultaneously acting at his discretion to prevent damage, injury, or loss. Any additional compensation or extension of time claimed by the Contractor on account of emergency work shall be determined as provided in Article 4.3 15 and Article 7.

Add the following language to the end of § 10.4:

Nothing in this paragraph shall be construed as relieving the Contractor from sole responsibility for the costs, effect on the Project schedule and responsibility for emergencies covered hereby, which arise from any matter within the contractual responsibility of the Contractor and its control of the property.

Add the following new § 11.3.3:

§ 11.3.11 STATUTORY EMPLOYER STATUS: Pursuant to the directive of Act 315 of the 1997 Louisiana Regular Session regarding guidelines for determining statutory employer status under La R.S. 23:1061, effective June 17, 1997, and in consideration thereof:

.1 Owner and Contractor jointly agree, stipulate and recognize that Owner shall be the Statutory Employer pursuant to R.S. 23:1061 of any and all of the Contractor's employees and/or employees of any subcontractor hired or retained in any manner by Contractor while Contractor's employees and/or subcontractor's employees are performing any work and all work and/or any services under the contract between Owner and Contractor.

.2 Owner and Contractor further stipulate, agree and recognize that all work performed under the contract between Owner and Contractor shall be considered part of Owner's trade, business or occupation and shall be specifically considered an integral part of and essential to the ability of Owner to generate goods, products or services as a private business entity.

.3 Owner and Contractor further stipulate, agree and recognize that the services or work provided by any subcontractor hired or retained by Contractor for the performance of any work and/or services under this contract shall be contemplated by and included in this contract.

Add the following new § 11.6 and subparagraphs:

§11.4.10 RECORDATION OF CONTRACT AND BOND (LA. R.S. 38:2241A (2))

The Contractor shall record. within thirty (30) days of Commencement of the Work, the Contract Between Owner and Contractor and the Performance and Payment Bonds with the Clerk of Court in the Parish in which the work is to be performed. The Contractor shall provide written evidence of such recordation to the Owner. Should the Contractor fail to do so, the Owner may do so at the Contractor's expense.

§11.4.11 RECORDATION OF CERTAIN CHANGE ORDERS (LA. R.S. 38:22221)

The Contractor SHALL record EACH change order to the Contract Between Owner and Contractor or to a contract for materials and supplies that meets the following criteria. The change order:

(1) adds an amount of ten percent or more of the original contract amount, AND

(2) the additional amount is at least ten thousand dollars.

Additionally. the Contractor SHALL record ALL change orders to the Contract Between Owner and Contractor or to a contract for material and supplies that meet the following criteria. ALL change orders which:

(1) aggregate to an amount of twenty percent or more of the original contract amount, AND
(2) the additional amount is at least ten thousand dollars.

IF NOT PREVIOUSLY RECORDED. THE ORIGINAL CONTRACT BETWEEN OWNER AND CONTRACTOR SHALL BE RECORDED TOGETHER WITH THE CHANGE ORDERS. THE CHANGE ORDER OR ORDERS SHALL BE RECORDED IN THE OFFICE OF THE RECORDER OF MORTGAGES IN THE PARISH WHERE THE WORK IS TO BE DONE OR, IF NOT A PUBLIC WORK, IN THE OFFICE OF THE RECORDER OF MORTGAGES WHERE THE ENTITY IS DOMICILED. THE CHANGE ORDER MUST BE RECORDED NOT LATER THAN THIRTY (30) DAYS AFTER THE DATE OF THE CHANGE ORDER WHICH REQUIRES THAT THE RECORDATION TAKE PLACE.ARTICLE 12 UNCOVERING AND CORRECTION OF WORK

§ 12.2 CORRECTION OF WORK

Delete the language “one-year” from Subparagraph 12.2.2.2.

Delete Subparagraph 12.2.2.3 in its entirety and replace with the following Subparagraph 12.2.2.3:

12.2.2.3 The period for correction of Work shall be extended for any portion of the Work corrected or performed by the Contractor for an additional one (1) year from the date that the corrective Work was completed in accordance with the Contract Documents as determined by the Architect.

Add new Subparagraph 12.2.2.4 to § 12.2.2:

12.2.2.4 Upon request by the Owner and prior to the expiration of one year from the date of Substantial Completion, the Architect will conduct, and the Contractor shall attend a meeting with the Owner to review the facility operations and performance of the Work of the Contractor. Subsequent to the meeting, the Owner shall provide the Contractor, with a copy to the Architect, a list of items found not to be not in accordance with the Contract, including latent defects. The Contractor shall correct all items within thirty (30) consecutive calendar days from the date of receipt of the Owner’s list. If certain corrective work requires additional time to complete, the Contractor shall provide the Owner with a schedule to complete the work within a reasonable duration thereafter.

§ 12.3 ACCEPTANCE OF NONCONFORMING WORK

Add the following new language to the end of § 12.3:

The acceptance of nonconforming Work by the Owner shall be by written Change Order or Construction Change Directive, signed by the Owner's authorized representative. No person has authority to accept nonconforming work except the Owner.

ARTICLE 13 MISCELLANEOUS PROVISIONS

13.2 SUCCESSORS AND ASSIGNS

In the second sentence of Subparagraph 13.2.1, delete "Except as.....13.2.2"

Add the following clause 13.3.3

13.3.3 The Judicial Court in and for the Parish of Orleans, State of Louisiana shall have sole jurisdiction and venue in any action brought under this contract.

13.5 TESTS AND INSPECTIONS

In Subparagraph 13.5.1 delete the second sentence and substitute the following:

The Contractor shall make arrangements for such tests, inspections and approvals with the Testing Laboratory provided by the Owner, and the Owner shall bear all related costs of tests, inspections and approvals."

Delete the last sentence of Subparagraph 13.5.1.

13.6 INTEREST

Delete Paragraph 13.6.

Add the following new § 13.6 through § 13.9:

§ 13.6 PROJECT RECORDS
For a negotiated or cost of the work plus fee contract, upon written request from the Owner, the Contractor shall, within ten (10) calendar days, provide access to the Owner of all of the Contractor's Work related papers including, but not limited to, all financial records reflecting payments made for any labor, materials, equipment or supplies.

§ 13.8 WRITING REQUIRED TO WAIVE RIGHTS
Contractor stipulates and agrees that actions, inactions or conduct alone, which may be deemed or interpreted as inconsistent with rights afforded the Owner, shall not be interpreted as a waiver of such rights absent an express writing signed by the Owner to that effect.

§ 13.89 NO THIRD PARTY BENEFICIARIES
There are no third party beneficiaries to this Contract. The Owner and Contractor stipulate and agree that they, as the contracting parties, do not intend to bestow any benefit, direct or indirect, upon any other person or entity.

ARTICLE 14 TERMINATION OR SUSPENSION OF THE CONTRACT

§ 14.1 TERMINATION BY THE CONTRACTOR

Delete clause 14.1.1.4.

§ 14.2 TERMINATION BY THE OWNER FOR CAUSE

Add the following at the beginning of 14.2.1: "After providing the Contractor a fourteen (14) day written notice and an opportunity to cure, and the in the event the Contractor fails to cure or commence a cure"

In 14.2.2: delete the phrase "seven day's notice" and replace with fourteen (14) days' notice and providing Contractor with an opportunity to cure"

In Subparagraph 14.2.1.3, after the semicolon, delete the word "or", delete subparagraph 14.2.1.4 in its entirety and replace with the following new Subparagraphs 14.2.1.4 and 14.2.1.5:

.4 otherwise is guilty of substantial breach of a provision of the Contract Documents; or

.5 failure to complete the punch list or list of deficiencies as developed by either the Contractor or the Architect in connection with Substantial Completion within thirty days following the date designated by the Architect as the date of Substantial Completion.

In the first sentence of § 14.2.2, delete the language: ", upon certification by the initial decision maker that sufficient cause exists to justify such action,"

Add the following new language to the end of § 14.2.3:

The Contractor shall be liable to, and shall pay, the Owner all costs, expenses, fees and attorney's fees and expenses arising from the Owner's termination of the Contractor for cause upon a final determination through the binding resolution procedure that the Owner was entitled to terminate the Contractor for cause as provided under the Contract Documents.

Add the following new § 14.2.5:

§ 14.2.5 Termination by the Owner for cause will not relieve the Contractor or the Surety of any obligation under any liquidated damages or stipulated damages provision of the Contract Documents.

Delete § 14.4.3 in its entirety and replace with the following new § 14.4.3:

§ 14.4.3 Notwithstanding any other provisions in any of the Contract Documents, in case of such termination for the Owner's convenience, the Contractor shall only be entitled to receive payment for Work executed.

ARTICLE 15 CLAIMS AND DISPUTES

§ 15.1. CLAIMS

Add the following to the end of § 15.1.1:

A "Reservation of Rights" and similar stipulations shall not be recognized under this contract as having any effect. A party must make a claim as defined herein within the time limits provided.

§ 15.1.2.1 NOTICE OF CLAIMS

Add the following new language to the end of § 15.1.2.1:

Contractor stipulates and agrees that any such failure to provide timely notification will prejudice the Owner by depriving the Owner of an opportunity to make adjustments to the project budget or schedule. Failure to provide such notice shall serve as a knowing and voluntary forfeiture of any claim by the Contractor, and the Contractor shall be liable for and pay all costs, damages and attorney's fees incurred by the Owner arising from the Contractor's failure to provide timely notice.

§ 15.1.5 CLAIMS FOR ADDITIONAL TIME

Delete paragraph 15.1.5.2 and replace with the following new paragraph 15.1.5.2

15.1.6.2 Claims for increases in the Contract Time shall set forth in detail the circumstances that form the basis for the Claim, the date upon which each cause of delay began to affect the progress of the Work, the date upon which each cause of delay ceased to affect the progress of the Work, and the number of days' increase in the Contract Time claimed as a consequence of each such cause of delay. The Contractor shall provide such supporting documentation as the Owner may require including, when appropriate or upon request of the Owner or Architect, a revised construction scheduled indicating all the activities affected by the circumstances forming the basis of the Claim.

Add the following new Subparagraphs 15.1.6.3 and 15.1.6.4 after Subparagraph 15.1.6.2:

15.1.6.3 The Contractor shall not be entitled to a separate increase in the Contract Time for each one of the number of causes of delay which may have concurrent or interrelated effects on the progress of the Work, or for concurrent delays due to the fault of the Contractor, or for delays not affecting tasks not identified to be on the critical path affecting the date of completion of the Work on the initial project schedule.

15.1.6.4 The Contractor has the option to purchase such insurance and riders to his insurance (Inland Marine Floater policies to Builders Risk Insurance to cover the following potential losses: Theft, Business Interruption, Extra Expense, Installation, Contractors Equipment) as he deems prudent to cover possible losses due to acts of God (force majeure) including loss of income and financial damages due to loss of income caused by delays in construction from a covered peril. This option shall be the Contractor's sole remedy for damages not a result of Owner, Architect, Contractor or their agents' actions, omissions, or failures to take action.

§ 15.1.6 WAIVER OF CLAIMS FOR CONSEQUENTIAL DAMAGE

Delete § 15.1.6 in its entirety.

§ 15.2 INITIAL DECISION

In section § 15.2.2, in the 1st line, add the word "business" between the words "ten" and "days".

In section § 15.2.4, in the 2nd line, add the word "business" between the words "ten" and "days".

Add § 15.2.9 and its Subparagraphs as follows:

§ 15.2.9 Alternative Dispute Resolution: If a dispute occurs between the Owner and Contractor arising out of or relating to the contract or an alleged breach thereof, the Owner and Contractor agree to attempt to resolve the dispute by engaging in good faith negotiations. If the dispute cannot be resolved by negotiation, the Owner and the Contractor agree as a condition precedent to commencing a lawsuit to submit the dispute to the following methods of alternative dispute resolution:

.1 Mediation: pursuant to Constructions Rules of the American Arbitration Association, prior to pursing arbitration.

.2 Arbitration: pursuant to the Arbitration Rules of the American Arbitration Association.

.3 The award rendered by the arbitrator or arbitrators shall be final unless a party thereto gives written notice of its objection to the final award by arbitration within twenty (20) days from receipt of said decision. Upon giving of said notice the party objecting thereto may file suit concerning the dispute as if no arbitration had ever occurred.

§ 15.3 MEDIATION

Delete § 15.3.1 in its entirety and replace with the following § 15.3.1:

§ 15.3.1 Claims, disputes, or other matters in controversy arising out of, or related to the Contract Documents or the Work, except those previously waived, shall be subject to mediation as a condition precedent to binding dispute resolution.

§ 15.4 ARBITRATION

Delete § 15.4 in its entirety and strike any and all references to arbitration wherever they may appear anywhere in the Contract Documents and replace with the following § 15.4:

Add the following as Article 16:

ARTICLE 16 EQUAL OPPORTUNITY

§ 16.1 The Contractor and all Subcontractors shall not discriminate against any employee or applicant for employment because of race, religion, color, sex or national origin. The Contractor shall take affirmative action to ensure that applicants are employed, and that employees are treated during employment without regard to their race, religion, color, sex, or national origin. Such action shall include, but not be limited to the following: employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. The Contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices setting forth the policies of nondiscrimination.

§ 16.2 The Contractor and all Subcontractors shall, in all solicitations or advertisement for employees placed by them or on their behalf, state that all qualified applicants will receive consideration for employment without regard to race, religion, color, sex or national origin.

Add the following as Article 17:

ARTICLE 17 OTHER COMPLIANCE

§ 17.1 Contractor shall comply with 24 CFR Section 570.603, and the requirements of the Secretary of Labor in accordance with the Davis-Bacon Act (40 U.S.C. §3141 et. seq.) and maintain documentation and records which demonstrate compliance with hour and wage requirements, including contract provisions and payroll records and will further provide a certificate of compliance with the foregoing upon request. Contractor shall comply with the requirements set forth in 24 CFR Section 570.613 regarding eligibility restrictions for certain resident aliens and the Fair Housing Act (42 U.S.C. §§3601-3620) and Executive Order 11063, as amended by Executive Order 12259 (Equal Opportunity in Housing) and implementing regulations in 24 CFR Part 107 and keep all records demonstrating compliance with the foregoing for at least five (5) years. Contractor shall comply with the Historic

Preservation requirements set forth in the National Historic Preservation Act of 1966, as amended (16 U.S.C. §470) and the procedures set forth in 36 CFR Part 800, Advisory Council on Historic Preservation Procedures for Protection of Historic Properties, insofar as they apply to the Project and the Property. Contractor shall comply with the conflict of interest provisions contained in 24 CFR Section 570.611, Section 84.42 and Section 85.36, as applicable. Contractor agrees to comply with all CBDG Program requirements, HUD regulations and the provisions of 24 CFR Part 570 and Chapter 15 of Title 42 of the Louisiana Revised Statutes (R.S. 42:1101 et seq., Code of Governmental Ethics) as well as all federal, state, and local regulations, policies, guidelines and requirements, as they relate to the application, acceptance and use of state and federal funds. Contractor shall comply with the Drug-Free Workplace Act of 1988, as amended and with 24 CFR part 21. Contractor shall insure recognition of the role of the Office of Community Development, the Louisiana Recovery Authority, and the U.S. Department of Housing and Urban Development in providing services through this Agreement and in all publications made possible with federal funds. The Contractor shall provide the Owner and Architect and Owner's lender's representatives with access to the Work in preparation and progress wherever located. Contractor shall execute Exhibit D, Contractor Limited Statement of Assurances.

END OF DOCUMENT 00 73 00

PERFORMANCE AND PAYMENT BOND

This agreement entered into this _____day of _____ , 20____, by _____, hereinafter called the "Contractor", whose business address is _____, and YWCA Greater New Orleans., herein represented by the contracting officer executing this contract, hereinafter called the "Owner".

Witnesseth that the Contractor and the Owner, in consideration of premises and the mutual covenants; consideration and agreement herein contained, agree as follows:

Statement of Work: The contractor shall furnish all labor and materials and perform all of the work required to build, construct and complete in a thorough and workmanlike manner:

in strict accordance with Contract Documents prepared by: Trapolin Peer Architects & _____

It is recognized by the parties herein that said Contract Documents including by way of example and not of limitation, the Drawings and Specifications dated _____ , Addenda number(s) _____, the Instruction to Bidders, Bid Form, General Conditions, Supplementary Conditions, any Addenda thereto, impose duties and obligations upon the parties herein, and said parties thereby agree that they shall be bound by said duties and obligations. For these purposes, all of the provisions contained in the aforementioned Construction Documents are incorporated herein by reference with the same force and effect as though said Construction Documents were herein set out in full.

Time for Completion: The work shall be commenced on a date to be specified in a written order of the Owner and shall be substantially completed by _____.

Liquidated Damages: Contractor shall be assessed Liquidated Damages in the amount of $1,500.00 per day for each consecutive calendar day which work is not complete beginning with the first day beyond the completion time.

Compensation to be paid to the Contractor: The Owner will pay and the Contractor will accept in full consideration for the performance of the contract the sum of _____Dollars, ($ _____) which sum represents the Base Bid.

Performance and Payment Bond: To these presents personally came and intervened _____, herein acting for _____, a corporation organized and existing under the laws of the State of _____, and duly authorized to transact business in the State of Louisiana, as Surety, who declared that having taken cognizance of this contract and of the Construction Documents mentioned herein, he hereby in his capacity as its Attorney in Fact obligates his said company, as Surety for the said Contractor, unto the said Owner, up to the sum of _____. By issuance of this bond, the Surety acknowledges they are in compliance with R.S. 38:2219 and Article 8 of the Instructions to Bidders.

The condition of this performance and payment bond shall be that should the Contractor herein not perform the contract in accordance with the terms and conditions hereof, or should said Contractor not fully indemnify and save harmless the Owner, from all cost and damages which he may suffer by said Contractor's non-performance or should said Contractor not pay all persons who have and fulfill obligations to perform labor and/or furnish materials in the prosecution of the work provided for herein, including by way of example workmen, laborers, mechanics, and furnishers of materials, machinery, equipment and fixtures, then said Surety agrees and is bound to so perform the contract and make said payment(s).

Provided, that any alterations which may be made in the terms of the contract or in the work to be done under it, or the giving by the Owner of any extensions of time for the performance of the contract, or any other forbearance on the part of either the Owner or the Contractor to the other shall not in any way release the Contractor or the Surety from their liability hereunder, notice to the Surety of any such alterations, extensions or other forbearance being hereby waived.

The Contractor agrees to abide by the requirements of the following as applicable: Title VI and VII of the Civil Rights Act of 1964, as amended by the Equal Opportunity Act of 1972, Federal Executive Order 11246, the Federal Rehabilitation Act of 1973, as amended, the Vietnam Era Veteran's Readjustment Assistance Act of 1974, Title IX of the Education Amendments of 1972, the Age Act of 1972, and contractor agrees to abide by the requirements of the Americans with Disabilities Act of [2010?].

Contractor agrees not to discriminate in its employment practices, and will render services under this contract without regard to race, color, religion, sex, national origin, veteran status, political affiliation, disabilities, or in accordance with EWE 92-7 because of an individual's sexual orientation.

Any act of discrimination committed by Contractor, or failure to comply with these statutory obligations when applicable shall be grounds for termination of this contract.

In Witness whereof, the parties hereto on the day and year first above written have executed this agreement in seven (7) counterparts, each of which shall, without proof or accountancy for the other counterparts, be deemed an original thereof.

WITNESSES:

_____

_____

_____

_____

_____

_____

YWCA GREATER NEW ORLEANS.
PRESIDENT
BY: _____
Loyce Pierce Wright

BY: _____
SURETY:

_____

BY: _____
ATTORNEY IN FACT

_____

_____
ADDRESS

_____

STATE OF LOUISIANA
PARISH OF ORLEANS

PROJECT: **YWCA Greater New Orleans**
LOCATION: **(aka601 S. Jefferson Davis Parkway)**
601 Norman C. Francis Parkway
New Orleans, LA 70119

NON-COLLUSION AFFIDAVIT

Before me, the undersigned authority, duly commissioned and qualified within and for the State and Parish aforesaid, personally came and appeared _____ representing _____ who, being by me first duly sworn deposed and said that he has read this affidavit and does hereby agree under oath to comply with all provisions herein as follows:

PART I.

Section 2224 of Part II of Chapter 10 of Title 38 of the Louisiana Revised Statutes, as amended.

(1) That affiant employed no person, corporation, firm, association, or other organization, either directly or indirectly, to secure the public contract under which he received payment, other than persons regularly employed by the affiant whose services in connection with the construction, alteration or demolition of the public building or project or in securing the public contract were in the regular course of their duties for affiant; and

(2) That no part of the Contract price received by affiant was paid or will be paid to any person, corporation, firm, association, or other organization for soliciting the Contract, other than the payment of their normal compensation to persons regularly employed by the affiant whose services in connection with the construction, alteration or demolition of the public building or project were in the regular course of their duties for affiant.

PART II.

Section 2190 of Part I of Chapter 10 of Title 38 of the Louisiana Revised Statutes, as amended.

That affiant, if an architect or engineer, or representative thereof, does not own a substantial financial interest, either directly or indirectly, in any corporation, firm, partnership, or other organization which supplies materials for the construction of a public work when the architect or engineer has performed architectural or engineering services, either directly or indirectly, in connection with the public work for which the materials are being supplied.

For the purposes of this Section, a "substantial financial interest" shall exclude any interest in stock being traded on the American Stock Exchange or the New York Stock Exchange.

That affiant, if subject to the provisions of this section, does hereby agree to be subject to the penalties involved for the violation of this section.

_____
AFFIANT

SWORN TO AND SUBSCRIBED BEFORE ME THIS _____ DAY OF _____, 20____

_____
NOTARY

YWCA Greater New Orleans

STATE OF LOUISIANA
PARISH OF ORLEANS

ATTESTATIONS AFFIDAVIT

Before me, the undersigned notary public, duly commissioned and qualified in and for the parish and state aforesaid, personally came and appeared Affiant, who after being duly sworn, attested as follows:

LA. R.S. 38:2227 PAST CRIMINAL CONVICTIONS OF BIDDERS

A. No sole proprietor or individual partner, incorporator, director, manager, officer, organizer, or member who has a minimum of a ten percent (10%) ownership in the bidding entity named below has been convicted of, or has entered a plea of guilty or nolo contendere to any of the following state crimes or equivalent federal crimes:

(a) Public bribery (R.S. 14:118)
(b) Corrupt influencing (R.S. 14:120)
(c) Extortion (R.S. 14:66)
(d) Money laundering (R.S. 14:23)

B. Within the past five years from the project bid date, no sole proprietor or individual partner, incorporator, director, manager, officer, organizer, or member who has a minimum of a ten percent (10%) ownership in the bidding entity named below has been convicted of, or has entered a plea of guilty or nolo contendere to any of the following state crimes or equivalent federal crimes, during the solicitation or execution of a contract or bid awarded pursuant to the provisions of Chapter 10 of Title 38 of the Louisiana Revised Statutes:

(a) Theft (R.S. 14:67)
(b) Identity Theft (R.S. 14:67.16)
(c) Theft of a business record (R.S.14:67.20)
(d) False accounting (R.S. 14:70)
(e) Issuing worthless checks
(f) Bank fraud (R.S. 14:71.1)
(g) Forgery (R.S. 14:72)
(h) Contractors; misapplication of payments (R.S. 14:202)
(i) Malfeasance in office (R.S. 14:134)

LA. R.S. 38:2212.10 Verification of Employees

A. At the time of bidding, Appearer is registered and participates in a status verification system to verify that all new hires in the state of Louisiana are legal citizens of the United States or are legal aliens.

B. If awarded the contract, Appearer shall continue, during the term of the contract, to utilize a status verification system to verify the legal status of all new employees in the state of Louisiana.

C. If awarded the contract, Appearer shall require all subcontractors to submit to it a sworn affidavit verifying compliance with Paragraphs (A) and (B) of this Subsection.

LA. R.S. 23:1726(B) Certification Regarding Unpaid Workers Compensation Insurance

A. R.S. 23:1726 prohibits any entity against whom an assessment under Part X of Chapter 11 of Title 23 of the Louisiana Revised Statutes of 1950 (Alternative Collection Procedures & Assessments) is in effect, and whose right to appeal that assessment is exhausted, from submitting a bid or proposal for or obtaining any contract pursuant to Chapter 10 of Title 38 of the Louisiana Revised Statutes of 1950 and Chapters 16 and 17 of Title 39 of the Louisiana Revised Statutes of 1950.

B. By signing this bid /proposal, Affiant certifies that no such assessment is in effect against the bidding / proposing entity.

DATE: _____, 2023

NAME OF BIDDER: _____

NAME OF AUTHORIZED SIGNATORY OF BIDDER: _____

TITLE OF AUTHORIZED SIGNATORY OF BIDDER: _____

SIGNATURE OF AUTHORIZED SIGNATORY OF BIDDER/AFFIANT: _____

Sworn to and subscribed before me by Affiant on the _____day of _____, 2023 .

_____
Notary Public

NOTICE OF CONSTRUCTION CONTRACT

THIS NOTICE OF CONSTRUCTION CONTRACT is by and between **YWCA Greater New Orleans** ("Owner"), and _____ _____ ("Contractor").

1. Pursuant to the provisions of La. R.S. § 9:4801 *et. seq.*, including but not limited to La. R.S. § 9:4811, Owner and Contractor hereby execute this Notice of Construction Contract and shall cause it to be filed in the mortgage office of Orleans Parish, Louisiana.

2. Owner and Contractor have entered into a written contract dated as of this _____ day of _____, 20___, for the project known as **YWCA Greater New Orleans** (the "Project"), pursuant to the terms and conditions of which Contractor shall perform the work described therein on the real property with the municipal address of **601-605 Norman C. Francis Parkway** (**aka 601 S. Jefferson Davis Parkway), New Orleans, LA 70119**, and as more fully described in Exhibit "A" attached hereto.

3. The work to be done by Contractor consists generally of providing all of the materials and products and all of the labor and services necessary for the design and construction of the improvements of the Project.

4. The price of the services and work to be performed by Contractor is _____ ($_____).

5. Payment of the price of the work by Owner to Contractor shall be made in progress payments during the term of the contract with final payment to be made upon completion and acceptance of the work.

6. The mailing addresses of Owner and Contractor, respectively, are as follows:

Owner: **YWCA Greater New Orleans**

601-605 Norman C. Francis Parkway
(Aka 601-605 S. Jefferson Davis Parkway)
New Orleans, LA 70119

Contractor: _____
_____
_____

7. Payment and Performance Bonds are attached as Exhibit "B" and made a part hereof.

Executed as of the _____ day of _____, 20___.

OWNER:

_____

BY: _____
(Printed Name of Owner)

TITLE: _____

CONTRACTOR:

_____

BY: _____
(Printed Name of Contractor)

TITLE: _____

❖ **FOR RECORDATION** ❖

STATE OF LOUISIANA
PARISH OF ORLEANS

NOTICE OF TERMINATION OF WORK

BEFORE ME, the undersigned Notary Public, duly commissioned and qualified in the State and Parish aforesaid, this _____ day of _____, 20____ personally came and appeared _____ as Owner of **YWCA Greater New Orleans**
(Authorized Signatory of Owner)
, whose mailing address is aka **601- 605 Norman C. Francis Parkway (aka 601-605 S. Jefferson Davis Parkway), New Orleans, LA 70119**, appearing herein by and through the undersigned duly authorized representative ("Owner"); and

BEFORE ME, the undersigned Notary Public, duly commissioned and qualified in the State and Parish aforesaid, this _____ day of _____, 20____ personally came and appeared _____ as _____ of
(Authorized Signatory of Contractor) *(Title)*
_____, [a Louisiana limited liability company]
(Name of Construction Company)
whose mailing address is_____,
appearing herein by and through the undersigned duly authorized representative ("Contractor"); who, after being duly sworn, did depose and state the following, to-wit:

1. That Owner is the record owner of the immovable property more particularly described on Exhibit "A" attached hereto (the "Property").

2. Owner and Contractor entered into a construction contract dated _____ _____, 20____, for **YWCA Greater New Orleans** on the Property (the "Work").

3. A Notice of Contract was recorded on _____, 20____, in the Notarial Archives at #_____ and MIN #_____ in the mortgage records of the Orleans Parish Clerk of Court, State of Louisiana. Partial Acceptances were recorded periodically throughout the Project.

4. Owner and Contractor do hereby certify in good faith that the Work being performed on the Property is substantially complete; and in accordance with the provisions of La. R.S. 9:4822 Owner and Contractor do hereby execute this Notice of Termination of Work.

5. All work has been completed.

6. This Notice of Termination of Work may be executed in multiple counterparts; each counterpart shall be deemed an original, but all of which together shall constitute one and the same instrument.

[SIGNATURES ON FOLLOWING PAGE(S)]

❖ **FOR RECORDATION** ❖

Thus done and signed by the Owner effective as of the day and date first set forth hereinabove.

OWNER:

By: _____ its _____
(Title of Owner)

_____
(Printed Name of Owner)

Sworn to and subscribed before me on this _____ day of_____, 20____.

_____
NOTARY PUBLIC

_____
(Printed Name of Notary Public)

Bar Number: _____
Commission: _____

Thus done and signed by the Contractor effective as of the day and date first set forth hereinabove.

CONTRACTOR:

By: _____ its _____
(Title of Owner)

_____
(Printed Name of Contractor)

Sworn to and subscribed before me on this _____ day of_____, 20____.

_____
NOTARY PUBLIC

_____
(Printed Name of Notary Public)

Bar Number: _____
Commission: _____

CONTRACTOR'S CONDITIONAL WAIVER OF LIEN FOR CURRENT PROGRESS PAYMENT and UNCONDITIONAL WAIVER OF LIEN FOR PRIOR PROGRESS PAYMENTS

STATE OF LOUISIANA DATE: _____, 20____
PARISH OF ORLEANS

The Undersigned is a General Contractor, Subcontractor, materialman, or other person furnishing labor, services or materials pursuant to that Contract dated **_____, 20____**, between the **YWCA GreatervNew Orleans** (the "Owner") and _____ (the "Contractor"), for Work performed on the **YWCA Greater New Orleans** in Orleans Parish, Louisiana. Said Contract is for the total amount of

_____ Dollars and no/100 ($.)
(Insert Current Contract Amount in words and figures.)

for Work on the following described Property:

601-605 Norman C. Francis Parkway
(aka 601-605 S. Jefferson Davis Parkway),
Orleans Parish, LA

Contractor submits this Conditional Waiver of Lien Upon Current Progress Payment and Unconditional Waiver of Lien Upon Prior Progress Payments in connection with that Application for Payment dated

_____, 20____ for period ending **_____, 20____**
(Insert Application for Payment date.) *(Insert End date of Payment Period.)*

submitted by Contractor to Owner in the amount of

_____ Dollars and no/100 ($.)
(Insert Application for Payment amount in words and figures.)

In consideration of receipt of the sum of the current Application for Payment,

_____ Dollars and no/100 ($.)
(Insert Application for Payment amount in words and figures.)

the Contractor hereby waives, releases, relinquishes and quitclaims, in favor of Owner and its successors and assigns, and all persons or entities with any legal or equitable interest in the above-referenced Property, any and all right that Contractor has or may have to lien and claim a lien for all work performed and all costs or expenses incurred, including all labor, services and materials furnished, on the above-referenced Property, up to and including the date of this Waiver of Lien, except for the payment of retainage. This Conditional Waiver of Lien for Current Progress Payment is conditioned upon the Owner's payment to the Contractor being paid in good and sufficient funds by the Bank upon which it is drawn to the account of the Contractor. Once said Bank has made such payment, this Waiver of Lien for Current Progress Payment shall become Unconditional.

Contractor hereby attests that all amounts on prior Applications for Payment have been received from the Owner, and are deemed paid in full, such payments totaling

_____ Dollars and no/100 ($.)
(Insert Sum Total of Prior Payments in words and figures.)

as of the date of this Waiver of Lien. In consideration of receipt of these sums, the Contractor hereby

unconditionally waives, releases, relinquishes and quitclaims, in favor of Owner and its successors and assigns, and all persons or entities with any legal or equitable interest in the above-referenced Property, any and all right that Contractor has or may have to lien and claim a lien for all work performed and all costs or expenses incurred, including all labor, services and materials furnished, on the above-referenced Property, up to and including the date of this Waiver of Lien, except for the payment of retainage.

Undersigned does hereby attest that he/she is duly authorized to act on behalf of the Contractor, and further does hereby certify that every performance of labor and/or items of material for which the Contractor is requesting payment has been performed in strict accordance with the terms and conditions of the hereinabove referenced Contract, and that all labor and/or materials for which this payment is requested has been performed and/or delivered as of the date hereinabove mentioned. Further, any and all contractors, subcontractors, laborers, suppliers and materialmen that have provided labor, material or services to the undersigned for use or incorporation into the construction of the improvements to the Property have been paid and satisfied in full, including payments made on equipment in use on the Project, including that on rental and lease purchase agreements, excepting only amounts in the current Application for Payment dated

_____**, 20___** for period ending _____**, 20___,**
(Insert Application for Payment date.) *(Insert End Date of Payment Period.)*

and retainage, if any, thereon. Contractor further attests that there are no outstanding claims of any character arising out of, or related to, the Contractor's activities on, or improvements to, the Property.

This Waiver constitutes a representation by the undersigned, for and on behalf of the firm or company listed below, that the payments referenced above, once received, constitute full and complete payment for all work performed, and all costs or expenses incurred (including, but not limited to, costs for supervision, field office overhead, home office overhead, interest on capital, profit, and general conditions costs) relative to the work or improvements at the Property as of the date of this Waiver, except for the payment of retainage. The undersigned hereby specifically waives, quitclaims and releases any Claim, as that term is defined in the Contract Documents, for damages due to delay, hindrance, interference, acceleration, inefficiencies or extra work, or any other claim of any kind it may have against the Owner, or any other person or entity with a legal or equitable interest in the Property, as of the date of this Waiver, except as follows:

_____

(*Insert exceptions, if any*)

This Waiver is specifically made for the benefit of the Owner, and may be relied upon unconditionally by the Owner.

In Witness hereof, the undersigned signatory, acting for and on behalf of the firm or company listed below, and all of its laborers, subcontractors and suppliers, has placed his hand and seal.

CONTRACTOR: _____

(General Contractor, Subcontractor, materialman, or other person furnishing labor, services or materials.)

By (Signature): _____

Print Name: _____

Title: _____

☐ *(For Corporations, check box and attach notarized Resolution authorizing the signatory.)*

Sworn to and subscribed before me, this_____day of_____, 20____.

_____

NOTARY PUBLIC in and for the
PARISH OF ORLEANS
STATE OF LOUISIANA

CONTRACTOR'S UNCONDITIONAL WAIVER OF LIEN UPON FINAL PAYMENT

STATE OF LOUISIANA DATE: _____, 20___
PARISH OF ORLEANS

The Undersigned is a General Contractor, Subcontractor, materialman, or other person furnishing labor, services or materials pursuant to that Contract dated **_____, 20___**, between **YWCA Greater New Orleans** (the "Owner") and _____ (the "Contractor"), for Work performed on the **YWCA Greater New Orleans 601-605 Norman C. Francis (aka 601-605 S. Jefferson Davis Parkway)** in Orleans Parish, Louisiana. Said Contract is for the total amount of

Dollars and no/100 ($.)

(Insert Current Contract Amount in words and figures.)

for Work on the following described Property:

601-605 Norman C. Francis
(aka 601 S. Jefferson Davis Parkway),
Orleans Parish, LA

Contractor submits this Unconditional Waiver of Lien Upon Final Payment and in connection with its Final Application for Payment dated

_____, 20___ for period ending **_____, 20___**

(Insert Application for Payment date.) *(Insert End Date of Payment Period.)*

submitted by Contractor to Owner in the amount of

Dollars and no/100 ($.)

(Insert Application for Payment amount in words and figures.)

In consideration of receipt of the sum of the current Application for Payment,

Dollars and no/100 ($.)

(Insert Application for Payment amount in words and figures.)

the Contractor hereby unconditionally waives, releases, relinquishes and quitclaims, in favor of Owner and its successors and assigns, and all persons or entities with any legal or equitable interest in the above-referenced Property, any and all right that Contractor has or may have to lien and claim a lien for all work performed and all costs or expenses incurred, including all labor, services and materials furnished, on the above-referenced Property, up to and including the date of this Waiver of Lien.

Contractor hereby attests that all amounts on prior Applications for Payment have been received from the Owner, and are deemed paid in full, such payments totaling

Dollars and no/100 ($.)

(Insert Sum Total of Prior Payments in words and figures.)

as of the date of this Unconditional Waiver of Lien Upon Final Payment. In consideration of receipt of these sums, the Contractor hereby unconditionally waives, releases, relinquishes and quitclaims, in favor of Owner and its successors and assigns, and all persons or entities with any legal or equitable interest in the above-referenced Property, any and all right that Contractor has or may have to lien and claim a lien for all work performed and all costs or expenses incurred, including all labor, services and materials furnished, on the above-referenced Property.

Undersigned does hereby attest that he/she is duly authorized to act on behalf of Contractor, and further does hereby certify that every performance of labor and/or items of material for which the Contractor is requesting payment has been performed in strict accordance with the terms and conditions of the hereinabove referenced Contract, and that all labor and/or materials for which this payment is requested has been performed and/or delivered. Further, any and all contractors, subcontractors, laborers, suppliers and materialmen that have provided labor, material or services to the undersigned for use or incorporation into the construction of the improvements to the Property have been paid and satisfied in full, including payments made on equipment in use on the Project, including that on rental and lease purchase agreements. Contractor further attests that there are no outstanding claims of any character arising out of, or related to, the Contractor's activities on, or improvements to, the Property.

This Waiver constitutes a representation by the undersigned, for and on behalf of the firm or company listed below, that the payments referenced above, once received, constitute full and complete payment for all work performed, and all costs or expenses incurred (including, but not limited to, costs for supervision, field office overhead, home office overhead, interest on capital, profit, and general conditions costs) relative to the work or improvements at the Property. The undersigned hereby specifically waives, quitclaims and releases any Claim, as that term is defined in the Contract Documents, for damages due to delay, hindrance, interference, acceleration, inefficiencies or extra work, or any other claim of any kind it may have against the Owner, or any other person or entity with a legal or equitable interest in the Property, relative to the Work or improvements at the Property.

This Waiver is specifically made for the benefit of the Owner, and may be relied upon unconditionally by the Owner.

In Witness hereof, the undersigned signatory, acting for and on behalf of the firm or company listed below, and all of its laborers, subcontractors and suppliers, has placed his hand and seal.

CONTRACTOR: _____

(General Contractor, Subcontractor, materialman, or other person furnishing labor, services or materials.)

By (Signature): _____
Print Name: _____
Title: _____

☐ *(For Corporations, check box and attach notarized Resolution authorizing the signatory.)*

Sworn to and subscribed before me, this_____day of_____, 20____.

_____
NOTARY PUBLIC in and for the
PARISH OF _____
STATE OF LOUISIANA

ROOFING GUARANTEE R-1

OWNER: YWCA Greater New Orleans

ADDRESS: 601-605 Norman C. Francis (aka 601-605 S. Jefferson Davis Pkwy.) New Orleans, LA 70119

WHEREAS _____

Address: _____

Telephone: (_____)_____,

herein called the "Roofing Contractor", has performed roofing and flashing in accordance with the Contract Documents for [NAME OF PROJECT] (hereinafter called the "Work") under a Subcontract with General Contractor on the Following Project:

Name of Project: **YWCA of New Orleans New Daycare, Education and Counseling Building**

User Agency: YWCA Greater New Orleans

Location/Address: 601-605 Norman C. Francis Parkway (aka 601-605 S. Jefferson Davis Pkwy.) New Orleans, LA 70119

Name and Type of Building(s): _____

Type(s) of Roof Deck(s): _____

_____

Total Roof Area: _____ SF; Flashing, Edge: _____ LF; Base: _____ LF

Date of Acceptance: _____, 20____ Guarantee Period: Two (2) Years

Date of Expiration: _____, 20____

AND WHEREAS the Roofing Contractor has contracted (as a Subcontractor) to guarantee said work against water entry from faulty or defective materials and workmanship for the designated Guarantee period;

AND WHEREAS the General Contractor, by its acceptance of the Contract for the above described project, has jointly assumed with the Roofing Contractor the obligations to the Owner of said guarantee against leaks and faulty or defective materials and workmanship;

NOW THEREFORE the Roofing Contractor and the General Contractor jointly and severally guarantee, subject to the terms and conditions herein set forth, that during the Guarantee Period they will at their own cost and expense, make or cause to be made with approved procedures and materials such repairs to or replacements of said work resulting from water entry or faults or defects of said Work as are necessary to correct faulty and defective work and as are necessary to maintain said Work in watertight conditions and further to respond on or within two (2) working days upon written notification of leaks or defects by the Owner/User Agency. Furthermore, they will at their own cost and expense maintain the roof for (2) years after acceptance, in accordance with the current edition of the Roof Maintenance Manual published by the Roofing Industry Educational Institute. The roof shall be inspected a minimum of twice each year, and a report prepared documenting the conditions observed at each inspection. These inspections shall be made once during the months of April or May and once during the months of September and October. Two copies of each report shall be forwarded to the Owner and User Agency.

This Guarantee is made subject to the following terms and conditions:

1. Specifically excluded from this guarantee are damages to the Work, other parts of the building and building contents caused by: A) lightning, and storm (includes hurricanes and tornadoes), hailstorm, earthquakes and other unusual phenomena of the elements; B) fire; and C) structural failures causing excessive roof deck, edgings and related roof components movement. When the Work has been damaged by any of the foregoing causes, the Guarantee will be null and void until such damage has been repaired by the Roofing Contractor, and until the cost and expense thereof has been paid by the Owner or another responsible party so designated.

2. During the Guarantee Period, if the Owner/User Agency allows alteration of the Work by anyone other than a Contractor approved in writing by the Roofing Subcontractor, General Contractor, and Roofing Material Manufacturer prior to the work being performed, including cutting, patching and maintenance in connection with penetrations, attachment of other work, and positioning of anything on the roof, this Guarantee shall become null and void upon the date of said alterations. If the Owner/User Agency engages the Roofing Contractor to perform said alterations, the Guarantee shall not become null and void, unless the Roofing Contractor, prior to proceeding with said work, shall have notified the Owner/User Agency in writing, showing reasonable cause for claim that said alterations would likely damage or deteriorate the Work, thereby reasonably justifying a termination of this Guarantee.

3. During the Guarantee Period, if the original use of the roof is changed and it becomes used for, but for which it was not originally designed or specified, as a promenade, work deck, spray-cooled surface, flooded basin, or other use of service more severe than originally specified, this Guarantee shall become null and void upon the date of said change.

4. During the Guarantee Period, if any building or area of a building is changed to uses creating extremes of interior temperature and/or humidity, but for which it was not originally designed and specified, without provisions and alterations made to the building which effectively contain or control these conditions, this guarantee shall become null and void upon the date of said change.

5. The Owner/User Agency shall promptly notify the Roofing Contractor in writing of observed, known or suspected leaks, defects or deterioration, and shall afford reasonable opportunity for the Roofing Contractor to inspect the Work, and to examine the evidence of such leaks, defects or deterioration.

6. This Guarantee is recognized to be the only guarantee of the General and Roofing Contractor on said work, and shall not operate to restrict or cut off the Owner from other remedies and recourses lawfully available to him in case of roofing failure. Specifically, this Guarantee shall not operate to relieve the Roofing Contractor of his responsibility for performance of the original work, regardless of whether the Contract was a Contract directly with the Owner or a Subcontract with the Owner's General Contractor.

IN WITNESS THEREOF, this instrument has been duly executed this _____ day of _____, 20___.

Roofing Contractor's Signature: _____

Typed Name: _____

Representing: _____

Telephone Number: (_____)_____

And has been countersigned by the General Contractor issuing the Roofing Contractor's Subcontract for said work:

Name of General Contractor: _____

Date: _____, 20____ Authorized Signature: _____

Representing: _____

Typed Name: _____

Telephone Number: (_____)_____

WITNESS: _____

_____

Telephone Number: (_____)_____

Witness: _____

ROOFING GUARANTEE R-2

OWNER: YWCA Greater New Orleans

ADDRESS: 601-603 Norman C. Francis (aka 601-603 S Jefferson Davis Pkway.) New Orleans, LA 70119

WHEREAS _____

Address: _____

Telephone: (_____)_____,

herein called the "Roofing Contractor", has performed roofing and flashing in accordance with the Contract Documents for [*name of project*] (hereinafter called the "Work") under a Contract with the Owner.

Name of Project: **YWCA of New Orleans**

Location/Address: 601-603 Norman C. Francis Parkway (aka 601-603 S Jefferson Davis Parkway), New Orleans, LA 70119

User Agency:

Name and Type of Building(s): **YWCA Greater New Orleans**

Type(s) of Roof Deck(s): _____

_____

Total Roof Area: _____ SF; Flashing, Edge: _____ LF; Base: _____ LF

Date of Acceptance: _____, 20___ Guarantee Period: Two (2) Years

Date of Expiration: _____, 20___

AND WHEREAS the Roofing Contractor has contracted to guarantee said work against water entry from faulty or defective materials and workmanship for the designated Guarantee period;

NOW THEREFORE the Roofing Contractor as the General Contractor guarantees, subject to the terms and conditions herein set forth, that during the Guarantee Period he will at his own cost and expense, make or cause to be made with approved procedures and materials such repairs to or replacements of said work resulting from water entry or faults or defects of said Work as are necessary to correct faulty and defective work and as are necessary to maintain said Work in watertight conditions and further to respond on or within two (2) working days upon written notification of leaks or defects by the Owner/User Agency. Furthermore, he will at his own cost and expense maintain the roof for (2) years after acceptance, in accordance with the current edition of the Roof Maintenance Manual published by the Roofing Industry Educational Institute. The roof shall be inspected a minimum of twice each year, and a report prepared documenting the conditions observed at each inspection. These inspections shall be made once during the months of April or May and once during the months of September and October. Two copies of each report shall be forwarded to the Owner and User Agency.

This Guarantee is made subject to the following terms and conditions:

1. Specifically excluded from this guarantee are damages to the Work, other parts of the building and building contents caused by: A) lightning, windstorm (includes hurricanes and tornados), hailstorm, earthquakes and other unusual phenomena of the elements; B) fire; and C) structural failures causing excessive roof deck, edgings and related roof components movement. When the Work has been damaged

by any of the foregoing causes, the Guarantee will be null and void until such damage has been repaired by the Roofing Contractor, and until the cost and expense thereof has been paid by the Owner or another responsible party so designated.

2. During the Guarantee Period, if the Owner/User Agency allows alteration of the Work by anyone other than a Contractor approved in writing by the Roofing Subcontractor, General Contractor, and Roofing Material Manufacturer prior to the work being performed, including cutting, patching and maintenance in connection with penetrations, attachment of other work, and positioning of anything on the roof, this Guarantee shall become null and void upon the date of said alterations. If the Owner/User Agency engages the Roofing Contractor to perform said alterations, the Guarantee shall not become null and void, unless the Roofing Contractor, prior to proceeding with said work, shall have notified the Owner/User Agency in writing, showing reasonable cause for claim that said alterations would likely damage or deteriorate the Work, thereby reasonably justifying a termination of this Guarantee.

3. During the Guarantee Period, if the original use of the roof is changed and it becomes used for, but for which it was not originally designed or specified, as a promenade, work deck, spray-cooled surface, flooded basin, or other use of service more severe than originally specified, this Guarantee shall become null and void upon the date of said change.

4. During the Guarantee Period, if any building or area of a building is changed to uses creating extremes of interior temperature and/or humidity, but for which it was not originally designed and specified, without provisions and alterations made to the building which effectively contain or control these conditions, this Guarantee shall become null and void upon the date of said change.

5. The Owner/User Agency shall promptly notify the Roofing Contractor in writing of observed, known or suspected leaks, defects or deterioration and shall afford reasonable opportunity for the Roofing Contractor to inspect the Work, and to examine the evidence of such leaks, defects or deterioration.

6. This Guarantee is recognized to be the only guarantee of the General and Roofing Contractor on said work, and shall not operate to restrict or cut off the Owner from other remedies and recourses lawfully available to him in case of roofing failure. Specifically, this Guarantee shall not operate to relieve the Roofing Contractor of his responsibility for performance of the original work, regardless of whether the Contract was a Contract directly with the Owner or a Subcontract with the Owner's General Contractor.

IN WITNESS THEREOF, this instrument has been duly executed this _____ day of _____, 20___.

Roofing Contractor's Signature: _____

Typed Name: _____

Representing: _____

Telephone Number: (_____)_____

WITNESS: _____

_____

Telephone Number: (_____)_____

Witness: _____

ROOFING GUARANTEE R3 (METAL)

OWNER: YWCA Greater New Orleans

ADDRESS: 601-605 Norman C. Francis Parkway (aka 601-605 S Jefferson Davis Pkwy.) New Orleans, LA 70119

WHEREAS _____

Address: _____

Telephone: (_____)_____,

herein called the Contractor, has provided pre-formed, pre-finished metal roofing, flashing, accessories and miscellaneous items required for a complete roof system installation in accordance with the Contract Documents for the PROJECT:

Name of Project: **YWCA of New Orleans New Daycare, Education and Counseling Building**

User Agency: YWCA Greater New Orleans

Location/Address: 601-605 Norman C. Francis Parkway (aka 601 S. Jefferson Davis Pkwy.) New Orleans, LA 70119

Name and Type of Building(s): _____

Type of System: (Standing Seam, SR, Flat Seam, etc. _____

Total Roof Area: _____ SF; Total Length of Ridge _____ LF;

Total Length of Valley: _____ LF; Total Length of gutter/fascia trim: _____

Date of Acceptance: _____, 20____ Guarantee Period: Two (2) Years

Date of Expiration: _____, 20____

AND WHEREAS the Contractor has contracted to guarantee said work against water entry from faulty or defective materials and workmanship for the designated Guarantee period of TWO (2) YEARS from the date of the Final acceptance of the Project;

NOW THEREFORE the Contractor guarantees, subject to the terms and conditions herein set forth, that during the Guarantee Period the Contractor will at his own cost and expense, make or cause to be made with approved procedures and materials such repairs to or replacements of said work (including any wetted thermal insulation) resulting from water entry or faults or defects of said Work as are necessary to maintain said Work in watertight conditions and further, respond on or within TWO (2) working days upon written notification of leaks or defects by the Owner/User Agency.

This Guarantee is made subject the following terms and conditions

1. Specifically excluded from this guarantee are damages to the Work, other parts of the building(s) and building contents caused by: A) lighting; windstorm (including hurricanes and tornadoes), hailstorm, earthquake and other unusual phenomena of the elements; B) fire; and C) structural failures causing excessive roof deck, edges and related roof component movement. When the Work has been damaged by any of the foregoing causes, the Guarantee will be suspended until such time as the damage has been repaired, and until the cost and expense thereof has been assigned or paid by the Owner or the responsible party. The

guarantee shall be reinstated upon Final Acceptance of the damage repair Work by both the Owner & Contractor.

2. During the Guarantee Period, if the Owner/ User Agency allows alteration of the Work by anyone other than a Contractor approved in writing by the original Contractor and/or Roofing Material Supplier prior to the work being performed, including cutting, patching and maintenance in connection with penetrations, attachment of other work, and positioning of anything (i.e. signs) onto the roof, this Guarantee shall become null and void as of the date of said alterations. If the Owner/ User Agency engages the original Contractor for said alterations, the Guarantee shall be maintained in force unless the Contractor presents written notification to the Owner that the intended work will likely damage or cause deterioration of the base work, thereby justifying a termination of the original Guarantee.

3. The Owner/User Agency shall promptly notify the Contractor in writing of observed, known or suspected leaks, defects, or condition deterioration and shall afford a reasonable opportunity for the Contractor to inspect the work and examine evidence of such leaks, defects or deterioration.

4. This Guarantee is recognized to be the only guarantee of the Contractor of said work, and shall not operate to restrict or cut-off the Owner from any other remedies and recourse lawfully available to him in case of roofing failure to any cause or degree. Specifically, this Guarantee shall not operate to relieve the Contractor of his responsibility for the performance of the original work.

IN WITNESS THEREOF, this instrument has been duly executed this _____ day of _____, 20___.

Contractor's Signature: _____

Typed Name: _____

Representing: _____

Telephone Number: (_____)_____

WITNESS: _____

_____

And if applicable, is countersigned by the following Sub Contractor, Installer, or other party (as indicated) who acted as agent or represented the Contractor during the performance of the work:

Countersignee Name: _____
(*Type or Print)*

Date: _____, 20____ Signature: _____

Representing: _____

Address: _____

_____

Telephone Number: (_____)_____

Witness: _____

_____

Construction Contract Change Order
BREAKDOWN

YWCA Greater New Orleans

Breakdown No. _____
Item No. _____
RFI No. (or COR, CPR, etc.) _____
Date: _____

Project Name: _____

Contractor/Subcontractor Name: _____

Direct Cost of Work :

A. Labor	Check here if explained on the Comment Sheet ➘	Hourly Wage Rate	Hours	Total Cost
1 _____	☐			
2 _____	☐			
3 _____	☐			
4 _____	☐			
5 _____	☐			
6 _____	☐			
7 _____	☐			
		Add Labor Burden @	____ %	
		LABOR TOTAL		

B. Material		Unit Price	Unit	Units	Total Cost
1 _____	☐				
2 _____	☐				
3 _____	☐				
4 _____	☐				
5 _____	☐				
6 _____	☐				
7 _____	☐				
(Copies of invoices may be required.)		Add Tax @		____ %	
		MATERIAL TOTAL			

C. Equipment		Unit Rate	Unit	Units	Total Cost
1 _____	☐				
2 _____	☐				
3 _____	☐				
4 _____	☐				
5 _____	☐				
6 _____	☐				
7 _____	☐				
(Copies of invoices may be required.)		Add Tax @		____ %	
		EQUIPMENT TOTAL			

TOTAL DIRECT COST FOR THIS BREAKDOWN:
(Sum A, B & C)

Construction Contract Change Order
BREAKDOWN COMMENT SHEET

YWCA Greater New Orleans

Breakdown No. _____
Item No. _____
RFI No. (or COR, CPR, etc.) _____
Date: _____

Project Name: _____

Contractor/Subcontractor Name: _____

A. Labor

No. (From BREAKDOWN Sheet)

B. Material

C. Equipment

Construction Contract Change Order

UNIT PRICE BREAKDOWN

YWCA Greater New Orleans

Breakdown No. _____
Item No. _____
RFI No. (or COR, CPR, etc.) _____
Date: _____

Project Name: _____

Contractor/Subcontractor Name: _____

Unit Price Tabulation

(Unit prices must be included in the bid or clearly defined in a standard, industry recognized pricing reference. The pricing reference shall be identified herein.)

Unit Price Description	Reference*	Unit Price	Units	Total

* Reference Legend: _____

Unit Price Total:
(Sum Total column)

Instructions for Change Order Back Up Forms

The General Conditions of the Contract for Construction, AIA Document A201, 2017 Edition, and the Supplementary Conditions provide for changes in the contract in the form of change orders. The costs of such changes must be carefully, clearly and accurately documented. Advocates for Academic Excellence in Education, Inc. has prepared a set of forms to be used to provide this documentation in a consistent format that is in accordance with the Contract Documents.

Change orders will typically contain one or more items of work. Each item of work will typically include work by the general contractor and/or one or more subcontractors. The documentation begins with a breakdown of the work of the contractor and each subcontractor. This is prepared using the form entitled "BREAKDOWN." One form for the General Contractor and one for each subcontractor. Each breakdown will be summarized on the form entitled "SUMMARY." Each item of work will, in turn, be summarized on the change order itself. This should be on the face of the change order.

The forms are available as a Microsoft Excel worksheet for ease of preparation, with formulas established for mark-ups and other basic mathematical operations.

These forms are to be used as provided. Any alteration to the forms may cause the change order to be rejected.

GENERAL: (Refer to Article 7 of the Supplementary and General Conditions)

Forms - There are five forms to be used for all Advocates for Academic Excellence in Education, Inc. change orders: CHANGE ORDER form, SUMMARY, BREAKDOWN, BREAKDOWN COMMENT SHEET and UNIT PRICE BREAKDOWN. The CHANGE ORDER form is the highest level and is the official, signed document. A CHANGE ORDER form may include one or more items of work, each of which is backed up by a SUMMARY. Each SUMMARY will be backed up with one or more BREAKDOWNs. Any unusual rates, unit costs or quantities may be explained on the COMMENT SHEET. It's simple. The BREAKDOWN form must be used for the general contractor and any subcontractor, at any level, that is to get OH&P. Use as many as needed.

Unit Pricing - Labor, material and equipment breakdown is the standard method of pricing change orders for Facility Planning and Control. However, unit pricing may be considered in some circumstances if the unit prices are clearly established such as by unit prices that were included in the bid. These prices may also be derived from a construction industry standard reference such as R.S. Means. If unit prices were included in the bid they are acceptable for pricing change order work and, in fact, must be used for any work that is included in the change order for which they were established . The UNIT PRICE BREAKDOWN is provided for this purpose.

CHANGE ORDER:

Project identification information: Complete as required.

Description: This will include a list of each attached SUMMARY that makes up this change order and a brief statement of the work included in each.

New Contract Sum: Calculate the new contract amount using the original contract amount, previous change orders and the new change order. Select the appropriate word for increase, decrease or unchanged, and delete the terms that don't apply.

New Contract Completion Date and Revised Time: Calculate the new contract time using the original Contract Completion Date and Contract Time, previous changes in time and the change in time by this change order. Select the appropriate word for increase, decrease or unchanged and delete the terms that don't apply. Show days in the main column and the date in the blank indicated.

Added Building Area: Show any building area added by this change order. If none, enter "None."

RECOMMENDED: Show the Designer's name and address, sign on the line indicated as "By:" and date on the indicated line.

ACCEPTED: Show the Contractor's name and address, sign on the line indicated as "By:" and date on the indicated line.

APPROVED: For approval by AAEE, Inc.

SUMMARY: (Refer to Article 7 of the Supplementary and General Conditions)

Item No.: Show the Item number as it will appear on the CHANGE ORDER Form. Note: This may be one of several items included in one CHANGE ORDER form.

RFI No.: Show the number of the request for information. This may be known by another name such as COR (Change Order Request,) CPR (Change Proposal Request,) etc.

Project No., Date, Project Name. Complete as appropriate.

Contractor: Name of General Contractor.

Description of Work: Give a brief description of the work included in this **Item**.

General Contractor Direct Costs: Show the total General Contractor Cost from the BREAKDOWN and show the Breakdown No. in the space provided.

General Contractor Total Cost: Show the total General Contractor Cost plus the General Contractor's overhead and profit.

Subcontractor Cost Breakdowns: List each subcontractor, Breakdown No. and Total Direct Cost (in column "A") from the attached BREAKDOWN sheets. Show the subcontractor's overhead and profit percentage in column "B" and show the calculated total of the direct cost plus the percentage of the direct cost in column "C." If the electronic version of the form is being used, column "C" will be automatically calculated. The overhead and profit shall not exceed 8% of the Total Direct Cost.

Subcontractor Direct Costs Total: Sum of column "A." This will be used to calculate the General Contractor's overhead and profit on the subcontractors' work. If the electronic version is being used, this will be an automatic calculation.

Subcontractor Direct Costs + Subcontractor OH&P: Sum of column "C." This represents the total amount that subcontractors will be paid. Automatic calculation.

General Contractor OH&P on Subcontractor Direct Cost at ___%. The contractors overhead and profit on the subcontractors' direct cost (without subcontractor OH&P.) Enter the percentage of the contractor's OH&P on the subcontractors' work and show the calculated total of the subcontractors' direct cost plus the percentage of the direct cost in the space. Automatic calculation.

Total Subcontractor Costs: Total of the last two spaces.

Change Order Subtotal: Total of change order except bond.

Performance and Payment Bond at ____%: Enter bond percentage (from amount provided by the contractor at the Pre-Construction Conference) and calculate the amount for the bond.

Amount will be ¨ increased ¨ decreased ¨ unchanged by: Add bond and calculate total change order amount. Indicate "increase," "decrease" or "unchanged", and delete the terms that don't apply.

Days will be ¨ increased ¨ decreased ¨ unchanged by: Show the number of days to be added or deleted from the contract, if any, due to changes in scope, adverse weather, unusual delays or other factors, **only** if it is proven the critical path is affected. Note that a change in scope does not necessarily indicate a change in time. Indicate "increased," "decreased" or "unchanged", and delete the terms that don't apply.

BREAKDOWN:

Item No. Show the Item number as it will appear on the CHANGE ORDER Form and the SUMMARY. Note: This may be one of several items included in one CHANGE ORDER form.

RFI No.: Show the number of the request for information. This may be known by another name such as COR (Change Order Request,) CPR (Change Proposal Request,) etc.

Project No., Date, Project Name. Complete as appropriate.

Contractor: Name of General Contractor or Subcontractor.

Direct Cost of Work:

Check here if explained on the Comment Sheet: If rates, unit costs or quantities may appear unreasonable compared to standard costs or quantities the reasons may be explained on the attached comment sheet and the box checked to indicate that there is an explanation.

A. Labor: Include the "wages paid" hourly direct labor and/or foreman necessary to perform the required change. "Wages paid" is the amount actually paid the employee, not the fully burdened charge rate used in the bid, etc. Supervisory personnel in district or home office shall not be included. Do not include the project superintendent. Supervisory personnel on the job-site, but with broad supervisory responsibility shall not be included as Direct Labor. Typically there will be only one superintendent on the job and his/her time shall not be included. Typically all other employees are eligible for inclusion. List by job title each person employed on the work, his/her hourly rate, the number hours work and the extended Total Cost. Do not list crews unless the rates for them are readily available in standard cost estimating references such as R. S. Means. Add the labor burden that was provided at the Pre-Construction conference and total the amounts in LABOR TOTAL.

B. Material: Include the acquisition cost of all materials directly required to perform the required change. List each material used in the work, the price per unit, name of the unit, the number of units used and the extended Total Cost. Add the tax rate and tax and total the amounts in MATERIAL TOTAL.

C. Equipment: Include the rental cost of equipment items necessary to perform the change. For company-owned equipment items, include documentation of internal rental rates submitted at the pre-construction conference. Charges for small tools, and craft specific tools are not allowed. List each piece of equipment used in the work, the rate by units of time (hour, day, week, etc.,) number of units of time the piece was in service on the work and the extended total cost. Add the tax rate, calculate the tax and total the amounts in EQUIPMENT TOTAL.

TOTAL DIRECT COST FOR THIS BREAKDOWN: Total of A. Labor, B. Material and C. Equipment. This is the amount that will be carried forward to the SUMMARY Sheet. This amount does **NOT** include Overhead and Profit. This will be added on the SUMMARY Sheet.

COMMENTS SHEET:

The COMMENTS SHEET uses the same heading as the SUMMARY and BREAKDOWN.

The COMMENTS SHEET includes three sections, one each for A. Labor, B. Materials and C. Equipment. These correspond to the sections in the BREAKDOWN. Each comment should be entered in the section to which it corresponds on the BREAKDOWN and numbered to correspond to the appropriate line. Comments are to used only to explain unusual rates, costs or quantities.

UNIT PRICE BREAKDOWN:

The UNIT PRICE BREAKDOWN uses the same heading as the BREAKDOWN.

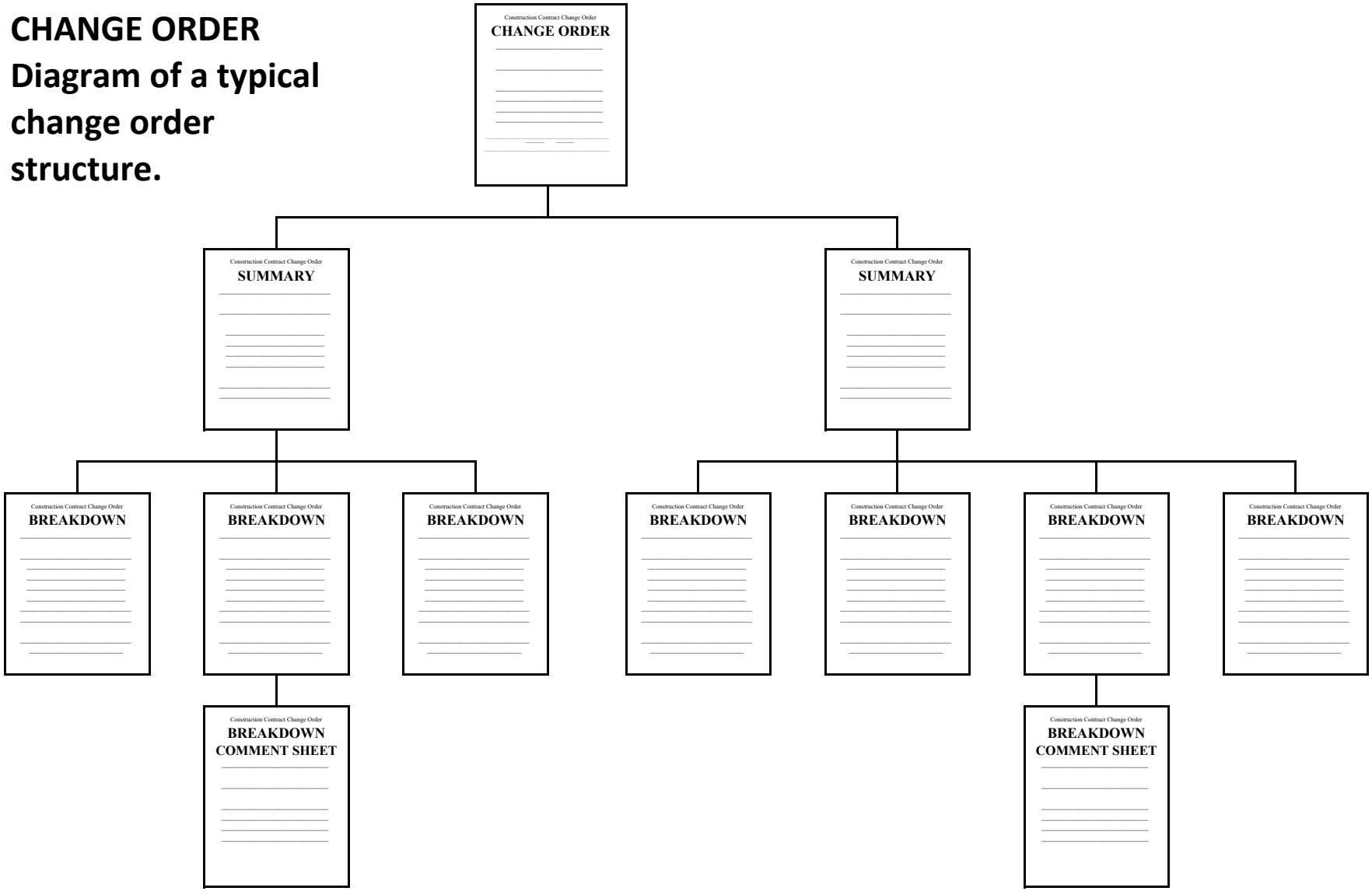
The UNIT PRICE BREAKDOWN is similar to the BREAKDOWN.

Unit Price Tabulation: Each unit price is listed along with its corresponding price and the number of units used in the work. The price and number of units are multiplied to provide the total cost of each unit price item. The pricing reference, such as the bid form for the project or a construction industry standard reference, must be cited for each unit price. This may be more fully described in "Reference Legend,"

Unit Price Total: Sum the unit prices to obtain the total cost for unit prices.

CHANGE ORDER

Diagram of a typical change order structure.



DISADVANTAGED BUSINESS ENTERPRISE (DBE) PROGRAM

ARTICLE 1 - GENERAL

DBE Compliance: The goals of YWCA Greater New Orleans DBE Program apply to this contract. It is the policy of YWCA Greater New Orleans to practice nondiscrimination based on social and economic disadvantage, race, color, sex, gender, disability, or national origin. All firms qualifying under this solicitation are encouraged to submit proposals/bids. Award of this contract shall be conditioned upon satisfying the requirements of the DBE Program. A DBE contract goal of 30 percent has been established for this contract. The offeror/bidder shall agree to use its best efforts, as determined by YWCA Greater New Orleans, to meet the contract goal for DBE participation in the performance of this contract.

ARTICLE 2 – DBE PARTICIPATION

The bidder shall be required to submit the following information on the DBE Participation Summary Sheet:

a. The names and addresses of all DBE firms that will participate in the contract;
b. The dollard amount commitment of the participation of each DBE firm participating in the contract;
c. Written confirmation from the name DBE (s), verifying their participation in the contract as provided in the commitments made under (a) and (b) above; and
d. If the contract goal is not met, evidence of best effort.

5.5.3 Upon receipt of the above-referenced materials, YWCA Greater New Orleans shall then make a determination as to whether the bidder/offeror was responsive as to the DBE contract goal. If it is determined that the bidder/offeror was not responsive to the DBE contract goal, the bid may be rejected as non-responsive.

ARTICLE 3 - DBE CONTRACT PROVISIONS

DBE Program Compliance: Contractor agrees to use its best efforts to fully and completely carry out the applicable requirements of YWCA Greater New Orleans' DBE Program in the award and administration of this Agreement, including, without limitation, all reporting requirements and specific DBE participation goals. Contractor's failure to carry out these requirements, as determined in good faith by YWCA Greater New Orleans, shall be deemed a material breach of this Agreement, which may result in the termination of this Agreement.

DME Compliance Reporting: Contractor agrees to provide quarterly written reports to YWCA Greater New Orleans on all expenditures made to achieve compliance with the DBE

participation goals for this Agreement. The report shall, at a minimum, include the following:

a. The name and business address of each DBE involved in the contract;
b. A description of the work performed and/or the product or service supplied by each DBE;
c. The date and amount of each expenditure made to a DBE; and
d. Such other information as may assist YWCA Greater New Orleans in determining Contractors compliance with the DBE Program and the status of any DBE performing any portion of the Contract.

Access to Books and Records: Contractor agrees to grant YWCA Greater New Orleans reasonable access to its books and records for purposes of verifying compliance with the DBE Program.

FORM DBE-1 **05/04**

DISADVANTAGED BUSINESS ENTERPRISE (DBE) RESPONSIVENESS FORM

This form or a similar form should be provided by the lowest responsible Prime Contractor within ten (10) days of receipt of written notification by YWCA Greater New Orleans

The undersigned bidder/offer or has satisfied the requirements of the bid specification in the following manner (Please check the appropriate space):

_____ The bidder/offerer is committed to a minimum of 30 % DBE utilization on this contract.
_____ The bidder/offerer (if unable to meet the DBE goal of 30 %) is committed to a minimum of
_____ % DBE utilization on this contract and will submit documentation demonstrating best efforts.

Name of bidder/offerer's firm: _____

State Registration No. _____

By _____
(Signature) (Title)

Name of DBE firm: _____

Address: _____

City: _____ State: _____ Zip: _____

Telephone: _____

Description of work to be performed by DBE firm:
_____

_____

_____

The bidder/offerer is committed to utilizing the above-named DBE firm for the work described above. The estimated dollar value of this work is $ _____.

Affirmation
The above-named DBE firm affirms that it will perform the portion of the contract for the estimated dollar value as stated above.

By _____
(Signature) (Title)

If the bidder/offerer does not receive award of the prime contract, any and all representations in this DBE Responsiveness Form and Affirmation shall be null and void.

FORM DBE-2 **05/04**

EVIDENCE OF BEST EFFORTS

This form should be provided by the lowest responsible bidder within ten (10) days of receipt of written notification by YWCA Greater New Orleans if the bidder /offerer is unable to meet the DBE goal. YWCA Greater New Orleans shall be responsible for determining whether the general contractor has made his best efforts to achieve the DBE Program contracting objectives in either bid submission commitments or, upon award of the contract, actual achievement of their stated contractual DBE participation commitment in making this determination, YWCA of New Orleans shall consider the following factors:

Name of bidder/offerer's firm: _____

Address: _____

City: _____ State: _____ Zip: _____

Telephone: _____

_____ PRE-BID MEETINGS: Whether the general contractor or subcontractor attended any pre-bid meetings scheduled by YWCA Greater New Orleans to inform DBEs of contracting and subcontracting opportunities.

_____ SUBCONTRACTORS LISTS: Whether the general contractor or subcontractor requested from the Mayor's Office of Economic Development a list of certified DBEs

_____ SMALL CONTRACTS: Whether the general contractor or subcontractor broke down contracts into dollar or work units to facilitate DBE participation, as consistent with the nature of the work to be performed and its relationship to other aspects of the project.

_____ FOLLOW-UP: Whether the general contractor or subcontractor followed up initial indications of interest by DBEs to determine with certainty if they remained interested in bidding.

_____ ADVERTISEMENT: Whether the general contractor or subcontractor advertised in general circulation and trade association publications concerning subcontracting opportunities, and allowed subcontractors reasonable time to respond.

_____ GOOD FAITH NEGOTIATIONS: Whether the general contractor or subcontractor negotiated in good faith with interested DBEs and did not reject DBEs as unqualified without sound business reasons based on a thorough investigation of their capabilities.

_____ INFORMATION: Whether the general contractor or subcontractor provided interested DBEs with adequate information about the plans, specifications and requirements of the subcontract.

_____ WRITTEN NOTICE: Whether the general contractor or subcontractor took the necessary steps to provide written notice in a manner reasonably calculated to inform DBEs of subcontracting opportunities and allowed sufficient time for them to participate effectively.

_____ COMMUNITY RESOURCES: Whether the general contractor or subcontractor used the services available to DBE community organizations, DBE contractors' groups, local, state and federal disadvantaged business assistance offices, disability rights organizations, and other organizations that provide assistance in the recruitment and placement of DBE firms.

_____ CONTRACT RECORDS: Whether the general contractor or subcontractor has maintained the following records for each DBE that bids on any subcontract:

1. Name, address and telephone number;
2. A description of information provided by the general contractor or subcontractor; and
3. A statement of whether an agreement was reached, and if not, why not, including any reasons for concluding that the bidder was deemed unqualified to perform the job.

Intended DBE Participation Summary Sheet

Contract #, and Name_____ DBE Goal _____

Total Bid/Proposal Amount _____

Name and Address of DBE Participants	Name of Contact Person	Certifying Agency, page number, and date of DBE directory used	Scope of Work to be performed	DBE dollar Amount	Percentage of Dollar Amount of Total Bid/Proposal

Submitted by: _____ Submitted by: _____
(Print Name) (Signature)

Company's Name:_____ Date:_____

On business stationary (of the DBE Applicant), attach verification of agreement to stated terms.

Project Wage Rate Sheet

U.S. Department of Housing and Urban Development
Office of Labor Relations

PROJECT NAME: YWCA Greater New Orleans			WAGE DECISION NUMBER/MODIFICATION NUMBER:		
PROJECT NUMBER: CN09418			PROJECT COUNTY:		
WORK CLASSIFICATION	BASIC HOURLY RATE (BHR)	FRINGE BENEFITS	TOTAL HOURLY WAGE RATE	LABORERS FRINGE BENEFITS:	$
Bricklayers			$	GROUP # / BHR	TOTAL WAGE
Carpenters			$		$
Cement Masons			$		$
Drywall Hangers			$		$
Electricians			$		$
Iron Workers			$		$
Painters			$	OPERATORS FRINGE BENEFITS:	$
Plumbers			$	GROUP # / BHR	TOTAL WAGE
Roofers			$		$
Sheet Metal Workers			$		$
Soft Floor Layers			$		$
Tapers			$		$
Tile Setters			$	TRUCK DRIVERS FRINGE BENEFITS:	$
OTHER CLASSIFICATIONS				GROUP # / BHR	TOTAL WAGE
			$		$
			$		$
			$		$

ADDITIONAL CLASSIFICATIONS (HUD Form 4230-A)

WORK CLASSIFICATION	BASIC HOURLY RATE	FRINGE BENEFITS	TOTAL HOURLY WAGE RATE	DATE OF HUD SUBMISSION TO DOL	DATE OF DOL APPROVAL
			$		
			$		
			$		
			$		

CSI Form 1.5C

SUBSTITUTION REQUEST
(During the Bid Period)

Project: YWCA Greater New Orleans

601 S. Norman C. Francis Parkway, New Orleans, LA 70119

To: _____

_____

Re: _____

Substitution Request Number: _____

From: _____

Date: _____

A/E Project Number: CN09418

Contract For: _____

Specification Title: _____

Description: _____

Section: _____ Page: _____

Article/Paragraph: _____

Proposed Substitution: _____

Manufacturer: _____ Address: _____ Phone: _____

Trade Name: _____ Model No.: _____

Attached data includes product description, specifications, drawings, photographs, and performance and test data adequate for evaluation of the request; applicable portions of the data are clearly identified.

Attached data also includes a description of changes to the Contract Documents that the proposed substitution will require for its proper installation.

The Undersigned certifies:

- Proposed substitution has been fully investigated and determined to be equal or superior in all respects to specified product.
- Same warranty will be furnished for proposed substitution as for specified product.
- Same maintenance service and source of replacement parts, as applicable, is available.
- Proposed substitution will have no adverse effect on other trades and will not affect or delay progress schedule.
- Proposed substitution does not affect dimensions and functional clearances.
- Payment will be made for changes to building design, including A/E design, detailing, and construction costs caused by the substitution.

Submitted by: _____

Signed by: _____

Firm: _____

Address: _____

_____

Telephone: _____

A/E's REVIEW AND ACTION

☐ Substitution approved - Make submittals in accordance with Specification Section 01 25 00 Substitution Procedures.
☐ Substitution approved as noted - Make submittals in accordance with Specification Section 01 25 00 Substitution Procedures.
☐ Substitution rejected - Use specified materials.
☐ Substitution Request received too late - Use specified materials.

Signed by: Date:

Supporting Data Attached: ☐ Drawings ☐ Product Data ☐ Samples ☐ Tests ☐ Reports ☐ _____

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This is not an official CSI Construction Contract Administration (CCA) Form. Please use CSI's official CCA Forms if required by your project needs.

Advancement of Construction Technology

SUBMITTAL TRANSMITTAL

Project: YWCA Greater New Orleans

601 S. Norman C. Francis Parkway, New Orleans, LA 70119

Date:

A/E Project Number: CN09418

TRANSMITTAL A

To (Contractor): _____ Date: _____ Submittal No. _____

From (Subcontractor): _____ By: _____ ☐ Resubmission

Qty.	Reference / Number	Title / Description / Manufacturer	Spec. Section Title and Paragraph / Drawing Detail Reference

☐ Submitted for review and approval
☐ Resubmitted for review and approval
☐ Complies with contract requirements
☐ Will be available to meet construction schedule
☐ A/E review time included in construction schedule
☐ Substitution involved - Substitution request attached
☐ If substitution involved, submission includes point-by-point comparative data or preliminary details
☐ Items included in submission will be ordered immediately upon receipt of approval

Other remarks on above submission:

☐ One copy retained by sender

TRANSMITTAL B

To (A/E): _____ Attn: _____ Date Rec'd by Contractor: _____

From (Contractor): _____ By: _____ Date Trnsmt'd by Contractor: _____

☐ Approved
☐ Approved as noted
☐ Revise / Resubmit
☐ Rejected / Resubmit

Other remarks on above submission:

☐ One copy retained by sender

TRANSMITTAL C

To (Contractor): _____ Attn: _____ Date Rec'd by A/E: _____

From (A/E): _____ ☐ Other By: _____ Date Trnsmt'd by A/E: _____

☐ Approved
☐ Approved as noted
☐ Not subject to review
☐ No action required
☐ Revise / Resubmit
☐ Rejected / Resubmit
☐ Approved as noted / Resubmit
☐ Provide file copy with corrections identified
☐ Sepia copies only returned
☐ Point-by-point comparative data required to complete approval process
☐ Submission Incomplete / Resubmit

Other remarks on above submission:

☐ One copy retained by sender

TRANSMITTAL D

To (Subcontractor): _____ Attn: _____ Date Rec'd by Contractor: _____

From (Contractor): _____ By: _____ Date Trnsmt'd by Contractor: _____

Copies: ☐ Owner ☐ Consultants ☐ _____ ☐ _____ ☐ _____ ☐ One copy retained by sender

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September 1996
CSI Form 12.1A

Advancement of Construction Technology

SUBCONTRACTORS AND MAJOR MATERIAL SUPPLIERS LIST

Project: YWCA Greater New Orleans

601 S. Norman C Francis Parkway, New Orleans, LA 70119

To (A/E): Trapolin-Peer Architects APC

850 Tchoupitoulas Street, New Orleans, LA 70130

From (Contractor): _____

Date: _____

A/E Project Number: CN09418

Contract For: _____

List Subcontractors and Major Material Suppliers proposed for use on this Project as required by the Construction Documents. Attach supplemental sheets if necessary.

Section Number	Section Title	Firm	Address	Phone Number (Fax Number)	Contact

☐ Attachments

Signed by: Date:

Copies: ☐ Owner ☐ Consultants ☐ _____ ☐ _____ ☐ _____ ☐ _____ ☐ _____ ☐ _____ ☐ _____ ☐ File

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Advancement of Construction Technology

SUBSTITUTION REQUEST
(After the Bidding Phase)

Project: YWCA Greater New Orleans
601 S. Norman C Francis Parkway, New Orleans, LA 70119

To: Trapolin-Peer Architects APC
850 Tchoupitoulas Street, New Orleans, LA 70130

Re:

Substitution Request Number:

From:

Date:

A/E Project Number: CN09418

Contract For:

Specification Title: Description:

Section: Page: Article/Paragraph:

Proposed Substitution:

Manufacturer: Address: Phone:

Trade Name: Model No.:

Installer: Address: Phone:

History: ☐ New product ☐ 2-5 years old ☐ 5-10 yrs old ☐ More than 10 years old

Differences between proposed substitution and specified product:

☐ Point-by-point comparative data attached - REQUIRED BY A/E

Reason for not providing specified item:

Similar Installation:

Project: Architect:

Address: Owner:

Date Installed:

Proposed substitution affects other parts of Work: ☐ No ☐ Yes; explain

Savings to Owner for accepting substitution: ($).

Proposed substitution changes Contract Time: ☐ No ☐ Yes [Add] [Deduct] days.

Supporting Data Attached: ☐ Drawings ☐ Product Data ☐ Samples ☐ Tests ☐ Reports ☐

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September 1996
CSI Form 13.1A

SUBSTITUTION REQUEST
(Continued)

The Undersigned certifies:

- Proposed substitution has been fully investigated and determined to be equal or superior in all respects to specified product.
- Same warranty will be furnished for proposed substitution as for specified product.
- Same maintenance service and source of replacement parts, as applicable, is available.
- Proposed substitution will have no adverse effect on other trades and will not affect or delay progress schedule.
- Cost data as stated above is complete. Claims for additional costs related to accepted substitution which may subsequently become apparent are to be waived.
- Proposed substitution does not affect dimensions and functional clearances.
- Payment will be made for changes to building design, including A/E design, detailing, and construction costs caused by the substitution.
- Coordination, installation, and changes in the Work as necessary for accepted substitution will be complete in all respects.

Submitted by: _____

Signed by: _____

Firm: _____

Address: _____

_____

Telephone: _____

Attachments: _____

_____

_____

_____

A/E's REVIEW AND ACTION

☐ Substitution approved - Make submittals in accordance with Specification Section 01330.
☐ Substitution approved as noted - Make submittals in accordance with Specification Section 01330.
☐ Substitution rejected - Use specified materials.
☐ Substitution Request received too late - Use specified materials.

Signed by: Date:

Additional Comments: ☐ Contractor ☐ Subcontractor ☐ Supplier ☐ Manufacturer ☐ A/E ☐ _____

_____

_____

_____

_____

_____

_____

_____

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Advancement of Construction Technology

REQUEST FOR INTERPRETATION

Project: YWCA Greater New Orleans
601 S. Norman C Francis Parkway, New Orleans, LA 70119

To: Trapolin-Peer Architects APC
850 Tchoupitoulas Street, New Orleans, LA 70130

Re:

R.F.I. Number:

From:

Date:

A/E Project Number: CN09418

Contract For:

Specification Section: Paragraph: Drawing Reference: Detail:

Request:

Signed by: Date:

Response:

☐ Attachments

Response From: To: Date Rec'd: Date Ret'd:

Signed by: Date:

Copies: ☐ Owner ☐ Consultants ☐ _____ ☐ _____ ☐ _____ ☐ _____ ☐ File

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Advancement of Construction Technology

PUNCH LIST

Project: YWCA Greater New Orleans

601 S. Norman C Francis Parkway, New Orleans, LA 70119

To (Contractor): _____

_____

From (A/E): Trapolin-Peer Architects APC

Site Visit Date: _____

A/E Project Number: CN09418

Contract For: _____

The following items require the attention of the Contractor for completion or correction. This list may not be all-inclusive, and the failure to include any items on this list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents.

Item Number	Room Number	Location (Area)	Description	Correction/Completion Date	Verification A/E Check

☐ Attachments

Signed by: Date:

Copies: ☐ Owner ☐ Consultants ☐ _____ ☐ _____ ☐ _____ ☐ _____ ☐ _____ ☐ _____ ☐ _____ ☐ File

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❖ NOT FOR RECORDATION PURPOSES ❖

Young Women's Christian Association (YWCA) Greater New Orleans

RECOMMENDATION OF ACCEPTANCE

TO: YWCA Greater New Orleans
601-605 S Norman C. Francis Parkway
(Aka 601-605 S. Jefferson Davis Parkway)
New Orleans, LA 70119

FROM: Trapolin-Peer Architects, APC
850 Tchoupitoulas Street
New Orleans, LA 70112

DATE: _____, 20____

PROJECT NAME: **YWCA of New Orleans**

CONTRACTOR: _____

ORIGINAL CONTRACT AMOUNT: $_____

FINAL CONTRACT AMOUNT: $_____

FINAL BUILDING AREA (SQ. FEET): _____ SF

I certify that, to the best of my knowledge and belief, this project is substantially complete in accordance with the Plans and Specifications to the point where it can be used for the purpose which was intended. It is recommended that it be accepted.

DATE OF ACCEPTANCE: _____, 20____

CONTRACT DATE OF COMPLETION: _____, 20____

NUMBER OF DAYS (OVERRUN) (UNDERRUN) (As of Acceptance Date): _____Days

LIQUIDATED DAMAGES PER DAY STIPULATED IN CONTRACT: $ 1,500.00

VALUE OF PUNCH LIST *(Attach punch list)*: $_____

Was part of project occupied prior to Acceptance?

PORTION OCCUPIED: *(Attach Partial Occupancy Forms)*

_____

ROOF GUAR-MANUFACTURER: _____

START DATE: _____/20____ END DATE: _____/20____

ROOFER: _____

START DATE: _____/20____ END DATE: _____/20____

_____ /20____
Architect Date

FOR USE OF PROJECT MANAGER:

_____ /20____
Owner Date

❖ NOT FOR RECORDATION PURPOSES ❖

CERTIFICATE OF COMPLIANCE

with

Americans with Disabilities Act and Architectural Barriers Act Accessibility Guidelines

TO: **YWCA Greater New Orleans**
601-605 S. Norman C. Francis Parkway (aka 601-605 S. Jefferson Davis Parkway)
New Orleans, LA 70119

FROM: **Trapolin-Peer Architects, APC**
850 Tchoupitoulas Street, New Orleans, LA 70122

PROJECT NAME: **YWCA Greater New Orleans**

DATE OF ACCEPTANCE: _____, 20____

I, _____, certify that, to the best of my knowledge and belief, this project has been constructed in compliance with the Americans with Disabilities Act and Architectural Barriers Act Accessibility Guidelines as reviewed by the Office of State Fire Marshal.

_____ Date: _____, 20____

Architect Signa

❖ NOT FOR RECORDATION PURPOSES ❖

SPECIFICATION DIVISONS 01- 32

SECTION 01100 - SUMMARY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Project information.
2. Work covered by Contract Documents.
3. Work by Owner.
4. Work under separate contracts.
5. Owner-furnished products.
6. Contractor-furnished, Owner-installed products.
7. Access to site.
8. Coordination with occupants.
9. Work restrictions.
10. Specification and drawing conventions.

B. Related Requirements:

1. Section 01500 "Temporary Facilities and Controls" for limitations and procedures governing temporary use of Owner's facilities.

1.3 PROJECT INFORMATION

A. Project Identification: YWCA New Orleans

1. Project Location: 601 South Norman C. Francis (aka 601-605 South Jefferson Davis Parkway, New Orleans, LA 70119

B. Owner: YWCA Greater New Orleans; 601-605 South Norman C. Francis (aka 601-605 S Jefferson Davis Parkway, New Orleans, LA 70119

1. Owner's Representative: Keely Thibodeaux/ Project Manager, Landmark Consulting. (504) 524-8880.

C. Architect: Trapolin-Peer Architects; 850 Tchoupitoulas St., New Orleans, LA 70130. (504) 523-2772

D. Architect's Consultants: The Architect has retained the following design professionals who have prepared designated portions of the Contract Documents:

1. Mechanical, Electrical, Plumbing Consultant: IMC. Consulting Engineers; 3120 20th Street, Metairie, LA 70002. (504) 831-919.

2. Structural Consultant: Axis Engineering LLC, 3500 N. Causeway Blvd., Suite 200, Metairie, LA 70002.

3. Civil Consultant: Kyle and Associates, LLC., 638 Village Lane North, Mandeville, LA 70471.

E. Other Owner Consultants: The Owner has retained the following design professionals who have prepared designated portions of the Contract Documents:

1. Hotel & Restaurant Supply: Bill Young, C.F.S.P., (504) 281-5024 or (800) 530-7194.

2. Spackman Mossop Michaels: Emily Bullock, Principal, 1824 Sophie Wright Place, New Orleans, LA. 70130

1.4 WORK COVERED BY CONTRACT DOCUMENTS

A. The Work of Project is defined by the Contract Documents and consists of the following:

1. YWCA is a two story building approximately 17,000 square feet. The construction type is IIB and occupancy type is Educational and Business. The structural system is steel columns, masonry infill, steel beams, load bearing studs and bar joists. The exterior façade is masonry, stucco, and cast stone.

B. Type of Contract:

1. Project will be constructed under a single prime contract.

1.5 WORK BY OWNER

A. General: Cooperate fully with Owner so work may be carried out smoothly, without interfering with or delaying work under this Contract or work by Owner. Coordinate the Work of this Contract with work performed by Owner.

B. Subsequent Work: Owner will perform the following additional work at site after Substantial Completion. Completion of that work will depend on successful completion of preparatory work under this Contract.

1. Installation of playground equipment will be provided by the owner.

1.6 OWNER-FURNISHED PRODUCTS

A. Owner will furnish products indicated. The Work includes receiving, unloading, handling, storing, protecting, and installing Owner-furnished products.

B. Owner-Furnished Products:
   1. Security Cameras and IT equipment
   2. Playground Equipment
   3. Window Coverings

1.7 ACCESS TO SITE

A. Use of Site: Limit use of Project site to areas within the Contract limits indicated. Do not disturb portions of Project site beyond areas in which the Work is indicated.

   1. Limits: Confine construction operations to area defined by the contract documents. Contractor is not to disturb the operations of the existing building.

1.8 WORK RESTRICTIONS

A. Work Restrictions, General: Comply with restrictions on construction operations.

   1. Comply with limitations on use of public streets and with other requirements of authorities having jurisdiction.

B. Existing Utility Interruptions: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after providing temporary utility services according to requirements indicated:

   1. Notify Architect and Owner not less than two days in advance of proposed utility interruptions.
   2. Obtain Owner's written permission before proceeding with utility interruptions.

C. Noise, Vibration, and Odors: Coordinate operations that may result in high levels of noise and vibration, odors, or other disruption to Owner occupancy with Owner.

   1. Notify Architect and Owner not less than two days in advance of proposed disruptive operations.
   2. Obtain Owner's written permission before proceeding with disruptive operations.

D. Nonsmoking Building: Smoking is not permitted within the building or within 25 feet (8 m) of entrances, operable windows, or outdoor-air intakes.

E. Controlled Substances: Use of tobacco products and other controlled substances on Project site is not permitted.

F. Employee Identification: Provide identification tags for Contractor personnel working on Project site. Require personnel to use identification tags at all times.

1.9 SPECIFICATION AND DRAWING CONVENTIONS

A. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:

1. Imperative mood and streamlined language are generally used in the Specifications. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.
2. Specification requirements are to be performed by Contractor unless specifically stated otherwise.

B. Division 01 General Requirements: Requirements of Sections in Division 01 apply to the Work of all Sections in the Specifications.

C. Drawing Coordination: Requirements for materials and products identified on Drawings are described in detail in the Specifications. One or more of the following are used on Drawings to identify materials and products:

1. Terminology: Materials and products are identified by the typical generic terms used in the individual Specifications Sections.
2. Abbreviations: Materials and products are identified by abbreviations published as part of the U.S. National CAD Standard and scheduled on Drawings.
3. Keynoting: Materials and products are identified by reference keynotes referencing Specification Section numbers found in this Project Manual.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01100

SECTION 012100 - ALLOWANCES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements governing allowances.

B. Types of allowances include the following:

1. Lump-sum allowances as determined by Owner
2. Contingency allowances as determined by Owner

C. Related Requirements:
1. Section 012600 "Contract Modification Procedures" for procedures for submitting and handling Change Orders.
2. Section 014000 "Quality Requirements" for procedures governing the use of allowances for field testing by an independent testing agency.

1.3 DEFINITIONS

A. Allowance: A quantity of work or dollar amount included in the Contract, established in lieu of additional requirements, used to defer selection of actual materials and equipment to a later date when direction will be provided to Contractor. If necessary, additional requirements will be issued by Change Order.

1.4 SELECTION AND PURCHASE

A. At the earliest practical date after award of the Contract, advise Architect of the date when final selection, or purchase and delivery, of each product or system described by an allowance must be completed by the Owner to avoid delaying the Work.

B. At Architect's request, obtain proposals for each allowance for use in making final selections. Include recommendations that are relevant to performing the Work.

C. Purchase products and systems selected by Architect from the designated supplier.

1.5 ACTION SUBMITTALS

A. Submit proposals for purchase of products or systems included in allowances in the form specified for Change Orders.

1.6 INFORMATIONAL SUBMITTALS

A. Submit invoices or delivery slips to show actual quantities of materials delivered to the site for use in fulfillment of each allowance.

B. Submit time sheets and other documentation to show labor time and cost for installation of allowance items that include installation as part of the allowance.

C. Coordinate and process submittals for allowance items in same manner as for other portions of the Work.

1.7 LUMP-SUM ALLOWANCES

A. Allowance shall include cost to Contractor of specific products and materials ordered by Owner or selected by Architect under allowance and shall include **taxes,** freight**,** and delivery to Project site.

B. Unless otherwise indicated, Contractor's costs for receiving and handling at Project site, labor, installation, overhead and profit, and similar costs related to products and materials ordered by Owner or selected by Architect under allowance shall be included as part of the of the allowance.

C. Unused Materials: Return unused materials purchased under an allowance to manufacturer or supplier for credit to Owner, after installation has been completed and accepted.

1. If requested by Architect, retain and prepare unused material for storage by Owner. Deliver unused material to Owner's storage space as directed.

1.8 CONTINGENCY ALLOWANCES

A. Use the contingency allowance only as directed by Architect for Owner's purposes and only by Change Orders that indicate amounts to be charged to the allowance.

B. Contractor's overhead, profit, and related costs for products and equipment ordered by Owner under the contingency allowance are included in the allowance and are not part of the Contract Sum. These costs include delivery, installation**, taxes**, insurance, equipment rental, and similar costs.

C. Change Orders authorizing use of funds from the contingency allowance will include Contractor's related costs and reasonable overhead and profit.

D. At Project closeout, credit unused amounts remaining in the contingency allowance to Owner by Change Order.

1.9 ADJUSTMENT OF ALLOWANCES

A. Allowance Adjustment: To adjust allowance amounts, prepare a Change Order proposal based on the difference between purchase amount and the allowance, multiplied by final measurement of work-in-place where applicable. If applicable, include reasonable allowances for cutting losses, tolerances, mixing wastes, normal product imperfections, required maintenance materials, and similar margins.

1. Include installation costs in purchase amount only where indicated as part of the allowance.
2. If requested, prepare explanation and documentation to substantiate distribution of overhead costs and other markups.
3. Submit substantiation of a change in scope of Work, if any, claimed in Change Orders related to unit-cost allowances.
4. Owner reserves the right to establish the quantity of work-in-place by independent quantity survey, measure, or count.

B. Submit claims for increased costs due to a change in the scope or nature of the allowance described in the Contract Documents, whether for the purchase order amount or Contractor's handling, labor, installation, overhead, and profit.

1. Do not include Contractor's or subcontractor's indirect expense in the Change Order cost amount unless it is clearly shown that the nature or extent of Work has changed from what could have been foreseen from information in the Contract Documents.
2. No change to Contractor's indirect expense is permitted for selection of higher- or lower-priced materials or systems of the same scope and nature as originally indicated.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine products covered by an allowance promptly on delivery for damage or defects. Return damaged or defective products to manufacturer for replacement.

3.2 PREPARATION

A. Coordinate materials and their installation for each allowance with related materials and installations to ensure that each allowance item is completely integrated and interfaced with related work.

3.3 SCHEDULE OF ALLOWANCES

A. Allowance No. 1: Lump-Sum Allowance:

1. This allowance includes material, receiving, handling, and installation costs, and Contractor overhead and profit.

B. Allowance No. 2: Quantity Allowance:

C. Allowance No. 3: Contingency Allowance: Include a contingency allowance for use according to Owner's written instructions.

END OF SECTION 012100

SECTION 01230 - ALTERNATES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

B. Related Sections:
   1. Section 01290 “Payment Procedures” for Pay Application requirements for Base Bid and Alternates.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for alternates.

1.3 DEFINITIONS

A. Alternate: An amount proposed by bidders and stated on the Bid Form for certain work defined in the bidding requirements that may be added to or deducted from the base bid amount if Owner decides to accept a corresponding change either in the amount of construction to be completed or in the products, materials, equipment, systems, or installation methods described in the Contract Documents.

   1. Alternates described in this Section are part of the Work only if enumerated in the Agreement.
   2. The cost or credit for each alternate is the net addition to or deduction from the Contract Sum to incorporate alternate into the Work. No other adjustments are made to the Contract Sum.

1.4 PROCEDURES

A. Coordination: Revise or adjust affected adjacent work as necessary to completely integrate work of the alternate into Project.

   1. Include as part of each alternate, miscellaneous devices, accessory objects, and similar items incidental to or required for a complete installation whether or not indicated as part of alternate.

B. Notification: Immediately following award of the Contract, notify each party involved, in writing, of the status of each alternate. Indicate if alternates have been accepted,

SECTION 01250 - CONTRACT MODIFICATION PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for handling and processing Contract modifications.

B. Related Requirements:

1. Section 01635 "Substitution Procedures" for administrative procedures for handling requests for substitutions made after the Contract award.

1.3 MINOR CHANGES IN THE WORK

A. Architect will issue supplemental instructions authorizing minor changes in the Work, not involving adjustment to the Contract Sum or the Contract Time, on AIA Document G710, "Architect's Supplemental Instructions."

1.4 PROPOSAL REQUESTS

A. Owner-Initiated Proposal Requests: Architect will issue a detailed description of proposed changes in the Work that may require adjustment to the Contract Sum or the Contract Time. If necessary, the description will include supplemental or revised Drawings and Specifications.

1. Work Change Proposal Requests issued by Architect are not instructions either to stop work in progress or to execute the proposed change.
2. Within 20 days, when not otherwise specified, after receipt of Proposal Request, submit a quotation estimating cost adjustments to the Contract Sum and the Contract Time necessary to execute the change.

    a. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
    b. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
    c. Include costs of labor and supervision directly attributable to the change.
    d. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
    e. Quotation Form: Use forms acceptable to Architect.

B. Contractor-Initiated Proposals: If latent or changed conditions require modifications to the Contract, Contractor may initiate a claim by submitting a request for a change to Architect .

1. Include a statement outlining reasons for the change and the effect of the change on the Work. Provide a complete description of the proposed change. Indicate the effect of the proposed change on the Contract Sum and the Contract Time.
2. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
3. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
4. Include costs of labor and supervision directly attributable to the change.
5. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
6. Comply with requirements in Section 01635 "Substitution Procedures" if the proposed change requires substitution of one product or system for product or system specified.
7. Proposal Request Form: Use form acceptable to Architect.

1.5 CHANGE ORDER PROCEDURES

A. On Owner's approval of a Work Changes Proposal Request, Architect will issue a Change Order for signatures of Owner and Contractor on AIA Document G701 .

1.6 CONSTRUCTION CHANGE DIRECTIVE

A. Construction Change Directive: Architect may issue a Construction Change Directive on AIA Document G714 . Construction Change Directive instructs Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.

1. Construction Change Directive contains a complete description of change in the Work. It also designates method to be followed to determine change in the Contract Sum or the Contract Time.

B. Documentation: Maintain detailed records on a time and material basis of work required by the Construction Change Directive.

1. After completion of change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01250

SECTION 01290 - PAYMENT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements necessary to prepare and process Applications for Payment.

B. Related Requirements:

1. Section 01210 "Allowances" for procedural requirements governing the handling and processing of allowances.
2. Section 01250 "Contract Modification Procedures" for administrative procedures for handling changes to the Contract.
3. Section 01320 "Construction Progress Documentation" for administrative requirements governing the preparation and submittal of Contractor's construction schedule.

1.3 DEFINITIONS

A. Schedule of Values: A statement furnished by Contractor allocating portions of the Contract Sum to various portions of the Work and used as the basis for reviewing Contractor's Applications for Payment.

1.4 SCHEDULE OF VALUES

A. Coordination: Coordinate preparation of the schedule of values with preparation of Contractor's construction schedule.

1. Base Bid and Alternates as described on Sheet A0.06, shall be separated into their own schedule of values. Food Equipment to be itemized within pay application for each type of equipment. Integrated Mockups to be itemized as a separate line item. Each item listed under Alternates shall be itemized a separate line item within the Pay Application

2. The total of all items shall equal the total contract sum This schedule, when approved by the architect, shall be used as the basis for the contractor’s application for payment and it may be used for determining the cost of the work in deductive change orders, when a specific item of work listed on the schedule of values is to be removed. Once the schedule of values is submitted at the pre-construction conference, the schedule shall not be modified without the approval of the Project Manager and Architect.

3. Coordinate line items in the schedule of values with other required administrative forms and schedules, including the following:

a. Application for Payment forms with continuation sheets.
b. Submittal schedule.
c. Items required to be indicated as separate activities in Contractor's construction schedule.

4. Submit the schedule of values to Architect at earliest possible date, but no later than seven days before the date scheduled for submittal of initial Applications for Payment.
5. Subschedules for Separate Elements of Work: Where the Contractor's construction schedule defines separate elements of the Work, provide subschedules showing values coordinated with each element.
6. Subschedules for Separate Design Contracts: Where the Owner has retained design professionals under separate contracts who will each provide certification of payment requests, provide subschedules showing values coordinated with the scope of each design services contract as described in Section 01100 "Summary."

B. Format and Content: Use Project Manual table of contents as a guide to establish line items for the schedule of values. Provide at least one line item for each Specification Section.

1. Identification: Include the following Project identification on the schedule of values:

a. Project name and location.
b. Name of Architect.
c. Architect's project number.
d. Contractor's name and address.
e. Date of submittal.

2. Arrange schedule of values consistent with format of AIA Document G703 .
3. Arrange the schedule of values in tabular form with separate columns to indicate the following for each item listed:

a. Related Specification Section or Division.
b. Description of the Work.
c. Name of subcontractor.
d. Change Orders (numbers) that affect value.
e. Dollar value of the following, as a percentage of the Contract Sum to nearest one-hundredth percent, adjusted to total 100 percent.

4. Provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Coordinate with Project Manual table of contents. Provide multiple line items for principal subcontract amounts in excess of five percent of the Contract Sum.

a. Include separate line items under Contractor and principal subcontracts for Project closeout requirements in an amount totaling five percent of the Contract Sum and subcontract amount.

5. Round amounts to nearest whole dollar; total shall equal the Contract Sum.
6. Provide a separate line item in the schedule of values for each part of the Work where Applications for Payment may include materials or equipment purchased or fabricated and stored, but not yet installed.

a. Differentiate between items stored on-site and items stored off-site. If required, include evidence of insurance.

7. Allowances: Provide a separate line item in the schedule of values for each allowance. Show line-item value of allowances, as a product of the unit cost, multiplied by measured quantity. Use information indicated in the Contract Documents to determine quantities.

8. Provide separate line items in the schedule of values for initial cost of materials, for each subsequent stage of completion, and for total installed value of that part of the Work.
9. Each item in the schedule of values and Applications for Payment shall be complete. Include total cost and proportionate share of general overhead and profit for each item.

    a. Temporary facilities and other major cost items that are not direct cost of actual work-in-place will be shown as separate line items in the schedule of values.

10. Schedule Updating: Update and resubmit the schedule of values before the next Applications for Payment when Change Orders or Construction Change Directives result in a change in the Contract Sum.

11. Closeout Costs. Include separate line items under Contractor and principal subcontractors for Project closeout requirements in an amount totaling five percent of the Contract Sum and subcontract amount.

12. Schedule of Values Revisions: Revise the schedule of values when Change Orders or Construction Change Directives result in a change in the Contract Sum. Include at least one separate line item for each Change Order and Construction Change Order Directive.

1.5 APPLICATIONS FOR PAYMENT

A. Each Application for Payment following the initial Application for Payment shall be consistent with previous applications and payments as certified by Architect and Project Manager and paid for by Owner.

    1. Initial Application for Payment, Application for Payment at time of Substantial Completion, and final Application for Payment involve additional requirements.

B. Base Bid and Alternates, as described in A-0.06 shall be separated into their owner application for payment. Food Equipment to be itemized within pay application for each type of equipment. Integrated Mock ups to be itemized as a separate line item. Each item listed under Alternates shall be itemized a separate line item within the Pay Application.

C. Payment Application Times: The date for each progress payment is indicated in the Agreement between Owner and Contractor. The period of construction work covered by each Application for Payment is the period indicated in the Agreement.

    1. Submit draft copy of Application for Payment seven days prior to due date for review by Architect.

D. Application for Payment Forms: Use AIA Document G702 and AIA Document G703 as form for Applications for Payment.

E. Application for Payment Forms: Use forms acceptable to Architect and Owner for Applications for Payment. Submit forms for approval with initial submittal of schedule of values.

F. Application Preparation: Complete every entry on form. Notarize and execute by a person authorized to sign legal documents on behalf of Contractor. Architect will return incomplete applications without action.

1. Entries shall match data on the schedule of values and Contractor's construction schedule. Use updated schedules if revisions were made.
2. Include amounts for work completed following previous Application for Payment, whether or not payment has been received. Include only amounts for work completed at time of Application for Payment.
3. Include amounts of Change Orders and Construction Change Directives issued before last day of construction period covered by application.
4. Indicate separate amounts for work being carried out under Owner-requested project acceleration.

G. Stored Materials: Include in Application for Payment amounts applied for materials or equipment purchased or fabricated and stored, but not yet installed. Differentiate between items stored on-site and items stored off-site.

1. Provide certificate of insurance, evidence of transfer of title to Owner, and consent of surety to payment, for stored materials.
2. Provide supporting documentation that verifies amount requested, such as paid invoices. Match amount requested with amounts indicated on documentation; do not include overhead and profit on stored materials.
3. Provide summary documentation for stored materials indicating the following:

    a. Value of materials previously stored and remaining stored as of date of previous Applications for Payment.
    b. Value of previously stored materials put in place after date of previous Application for Payment and on or before date of current Application for Payment.
    c. Value of materials stored since date of previous Application for Payment and remaining stored as of date of current Application for Payment.

H. Transmittal: Submit three signed and notarized original copies of each Application for Payment to Architect by a method ensuring receipt within 24 hours. One copy shall include waivers of lien and similar attachments if required.

1. Transmit each copy with a transmittal form listing attachments and recording appropriate information about application.

I. Waivers of Mechanic's Lien: With each Application for Payment, submit waivers of mechanic's lien from entities lawfully entitled to file a mechanic's lien arising out of the Contract and related to the Work covered by the payment.

1. Submit partial waivers on each item for amount requested in previous application, after deduction for retainage, on each item.
2. When an application shows completion of an item, submit conditional final or full waivers.
3. Owner reserves the right to designate which entities involved in the Work must submit waivers.
4. Waiver Forms: Submit executed waivers of lien on forms acceptable to Owner.

J. Waivers of Mechanic's Lien: With each Application for Payment, submit waivers of mechanic's liens from subcontractors, sub-subcontractors, and suppliers for construction period covered by the previous application.

1. Submit partial waivers on each item for amount requested in previous application, after deduction for retainage, on each item.
2. When an application shows completion of an item, submit conditional final or full waivers.
3. Owner reserves the right to designate which entities involved in the Work must submit waivers.
4. Submit final Application for Payment with or preceded by conditional final waivers from every entity involved with performance of the Work covered by the application who is lawfully entitled to a lien.
5. Waiver Forms: Submit executed waivers of lien on forms, acceptable to Owner.

K. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of first Application for Payment include the following:

1. Overhead and Profit enumerated separately from Construction Costs

2. List of subcontractors. Identify DBE subcontractors.
3. Schedule of values.
4. Contractor's construction schedule (preliminary if not final).
5. Products list (preliminary if not final).
6. Submittal schedule (preliminary if not final).
7. List of Contractor's staff assignments.
8. List of Contractor's principal consultants.
9. Copies of building permits.
10. Copies of authorizations and licenses from authorities having jurisdiction for performance of the Work.
11. Initial progress report.
12. Report of preconstruction conference.
13. Certificates of insurance and insurance policies.
14. Performance and payment bonds.
15. Data needed to acquire Owner's insurance.

L. Application for Payment at Substantial Completion: After Architect issues the Certificate of Substantial Completion, submit an Application for Payment showing 100 percent completion for portion of the Work claimed as substantially complete.

1. Include documentation supporting claim that the Work is substantially complete and a statement showing an accounting of changes to the Contract Sum.
2. This application shall reflect Certificate(s) of Substantial Completion issued previously for Owner occupancy of designated portions of the Work.

M. Final Payment Application: After completing Project closeout requirements, submit final Application for Payment with releases and supporting documentation not previously submitted and accepted, including, but not limited, to the following:

1. Evidence of completion of Project closeout requirements.
2. Insurance certificates for products and completed operations where required and proof that taxes, fees, and similar obligations were paid.
3. Updated final statement, accounting for final changes to the Contract Sum.
4. AIA Document G706, "Contractor's Affidavit of Payment of Debts and Claims."
5. AIA Document G706A, "Contractor's Affidavit of Release of Liens."
6. AIA Document G707, "Consent of Surety to Final Payment."
7. Evidence that claims have been settled.

8. Final meter readings for utilities, a measured record of stored fuel, and similar data as of date of Substantial Completion or when Owner took possession of and assumed responsibility for corresponding elements of the Work.
9. Final liquidated damages settlement statement.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01290

SECTION 01310 - PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:

1. General coordination procedures.
2. Coordination drawings.
3. Requests for Information (RFIs).
4. Project meetings.

B. Related Requirements:
1. Section 01320 "Construction Progress Documentation" for preparing and submitting Contractor's construction schedule.
2. Section 01700 "Execution Requirements" for procedures for coordinating general installation and field-engineering services, including establishment of benchmarks and control points.
3. Section 01770 "Closeout Procedures" for coordinating closeout of the Contract.

1.3 DEFINITIONS

A. RFI: Request from Owner,Architect, or Contractor seeking information required by or clarifications of the Contract Documents.

1.4 INFORMATIONAL SUBMITTALS

A. Subcontract List: Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Use CSI Form 1.5A. Include the following information in tabular form:

1. Name, address, and telephone number of entity performing subcontract or supplying products.
2. Number and title of related Specification Section(s) covered by subcontract.
3. Drawing number and detail references, as appropriate, covered by subcontract.

B. Key Personnel Names: Within 15 days of starting construction operations, submit a list of key personnel assignments, including superintendent and other personnel in attendance at Project site. Identify individuals and their duties and responsibilities; list addresses and telephone numbers, including home, office, and cellular telephone numbers and e-mail addresses. Provide names, addresses, and telephone numbers of individuals assigned as alternates in the absence of individuals assigned to Project.

1. Post copies of list in project meeting room, in temporary field office, and by each temporary telephone. Keep list current at all times.

1.5 GENERAL COORDINATION PROCEDURES

A. Coordination: Coordinate construction operations included in different Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations, included in different Sections, that depend on each other for proper installation, connection, and operation.

1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
2. Coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair.
3. Make adequate provisions to accommodate items scheduled for later installation.

B. Prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.

1. Prepare similar memoranda for Owner and separate contractors if coordination of their Work is required.

C. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:

1. Preparation of Contractor's construction schedule.
2. Preparation of the schedule of values.
3. Installation and removal of temporary facilities and controls.
4. Delivery and processing of submittals.
5. Progress meetings.
6. Preinstallation conferences.
7. Project closeout activities.
8. Startup and adjustment of systems.

D. Conservation: Coordinate construction activities to ensure that operations are carried out with consideration given to conservation of energy, water, and materials. Coordinate use of temporary utilities to minimize waste.

1. Salvage materials and equipment involved in performance of, but not actually incorporated into, the Work. See other Sections for disposition of salvaged materials that are designated as Owner's property.

1.6 COORDINATION DRAWINGS

A. Coordination Drawings, General: Prepare coordination drawings according to requirements in individual Sections, and additionally where installation is not completely shown on Shop Drawings, where limited space availability necessitates coordination, or if coordination is required to facilitate integration of products and materials fabricated or installed by more than one entity.

1. Content: Project-specific information, drawn accurately to a scale large enough to indicate and resolve conflicts. Do not base coordination drawings on standard printed data. Include the following information, as applicable:

    a. Use applicable Drawings as a basis for preparation of coordination drawings. Prepare sections, elevations, and details as needed to describe relationship of various systems and components.
    b. Indicate functional and spatial relationships of components of architectural, structural, civil, mechanical, and electrical systems.
    c. Indicate space requirements for routine maintenance and for anticipated replacement of components during the life of the installation.
    d. Show location and size of access doors required for access to concealed dampers, valves, and other controls.
    e. Indicate required installation sequences.
    f. Indicate dimensions shown on the Drawings. Specifically note dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements. Provide alternate sketches to Architect indicating proposed resolution of such conflicts. Minor dimension changes and difficult installations will not be considered changes to the Contract.

B. Coordination Drawing Organization: Organize coordination drawings as follows:

1. Floor Plans and Reflected Ceiling Plans: Show architectural and structural elements, and mechanical, plumbing, fire-protection, fire-alarm, and electrical Work. Show locations of visible ceiling-mounted devices relative to acoustical ceiling grid. Supplement plan drawings with section drawings where required to adequately represent the Work.
2. Plenum Space: Indicate subframing for support of ceiling and wall systems, mechanical and electrical equipment, and related Work. Locate components within ceiling plenum to accommodate layout of light fixtures indicated on Drawings. Indicate areas of conflict between light fixtures and other components.
3. Mechanical Rooms: Provide coordination drawings for mechanical rooms showing plans and elevations of mechanical, plumbing, fire-protection, fire-alarm, and electrical equipment.
4. Structural Penetrations: Indicate penetrations and openings required for all disciplines.
5. Slab Edge and Embedded Items: Indicate slab edge locations and sizes and locations of embedded items for metal fabrications, sleeves, anchor bolts, bearing plates, angles, door floor closers, slab depressions for floor finishes, curbs and housekeeping pads, and similar items.
6. Mechanical and Plumbing Work: Show the following:

    a. Sizes and bottom elevations of ductwork, piping, and conduit runs, including insulation, bracing, flanges, and support systems.
    b. Dimensions of major components, such as dampers, valves, diffusers, access doors, cleanouts and electrical distribution equipment.
    c. Fire-rated enclosures around ductwork.

7. Electrical Work: Show the following:

    a. Runs of vertical and horizontal conduit 1-1/4 inches (32 mm) in diameter and larger.
    b. Light fixture, exit light, emergency battery pack, smoke detector, and other fire-alarm locations.
    c. Panel board, switch board, switchgear, transformer, busway, generator, and motor control center locations.
    d. Location of pull boxes and junction boxes, dimensioned from column center lines.

8. Fire-Protection System: Show the following:

    a. Locations of standpipes, mains piping, branch lines, pipe drops, and sprinkler heads.

9. Review: Architect will review coordination drawings to confirm that the Work is being coordinated, but not for the details of the coordination, which are Contractor's responsibility. If Architect determines that coordination drawings are not being prepared in sufficient scope or detail, or are otherwise deficient, Architect will so inform Contractor, who shall make changes as directed and resubmit.
10. Coordination Drawing Prints: Prepare coordination drawing prints according to requirements in Section 01330 "Submittal Procedures."

1.7 REQUESTS FOR INFORMATION (RFIs)

A. General: Immediately on discovery of the need for additional information or interpretation of the Contract Documents, Contractor shall prepare and submit an RFI in the form specified.

1. Architect will return RFIs submitted to Architect by other entities controlled by Contractor with no response.
2. Coordinate and submit RFIs in a prompt manner so as to avoid delays in Contractor's work or work of subcontractors.

B. Content of the RFI: Include a detailed, legible description of item needing information or interpretation and the following:

1. Project name.
2. Project number.
3. Date.
4. Name of Contractor.
5. Name of Architect.
6. RFI number, numbered sequentially.
7. RFI subject.
8. Specification Section number and title and related paragraphs, as appropriate.
9. Drawing number and detail references, as appropriate.
10. Field dimensions and conditions, as appropriate.
11. Contractor's suggested resolution. If Contractor's suggested resolution impacts the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
12. Contractor's signature.
13. Attachments: Include sketches, descriptions, measurements, photos, Product Data, Shop Drawings, coordination drawings, and other information necessary to fully describe items needing interpretation.

    a. Include dimensions, thicknesses, structural grid references, and details of affected materials, assemblies, and attachments on attached sketches.

C. RFI Forms: AIA Document G716 .

1. Attachments shall be electronic files in Adobe Acrobat PDF format.

D. Architect's Action: Architect will review each RFI, determine action required, and respond. Allow seven working days for Architect's response for each RFI. RFIs received by Architectafter 1:00 p.m. will be considered as received the following working day.

1. The following Contractor-generated RFIs will be returned without action:

    a. Requests for approval of submittals.
    b. Requests for approval of substitutions.
    c. Requests for approval of Contractor's means and methods.
    d. Requests for coordination information already indicated in the Contract Documents.
    e. Requests for adjustments in the Contract Time or the Contract Sum.
    f. Requests for interpretation of Architect's actions on submittals.
    g. Incomplete RFIs or inaccurately prepared RFIs.

2. Architect's action may include a request for additional information, in which case Architect's time for response will date from time of receipt of additional information.
3. Architect's action on RFIs that may result in a change to the Contract Time or the Contract Sum may be eligible for Contractor to submit Change Proposal according to Section 01250 "Contract Modification Procedures."

    a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Architect in writing within 10 days of receipt of the RFI response.

E. RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by the RFI number. Submit log weekly . Use CSI Log Form 13.2B.

1. Project name.
2. Name and address of Contractor.
3. Name and address of Architect.
4. RFI number including RFIs that were returned without action or withdrawn.
5. RFI description.
6. Date the RFI was submitted.
7. Date Architect's response was received.

F. On receipt of Architect's action, update the RFI log and immediately distribute the RFI response to affected parties. Review response and notify Architectwithin seven days if Contractor disagrees with response.

1. Identification of related Minor Change in the Work, Construction Change Directive, and Proposal Request, as appropriate.

1.8 PROJECT MEETINGS

A. General: Schedule and conduct meetings and conferences at Project site unless otherwise indicated.

1. Attendees: Inform participants and others involved, and individuals whose presence is required, of date and time of each meeting. Notify Owner and Architect of scheduled meeting dates and times.
2. Agenda: Prepare the meeting agenda. Distribute the agenda to all invited attendees.
3. Minutes: Entity responsible for conducting meeting will record significant discussions and agreements achieved. Distribute the meeting minutes to everyone concerned, including Owner and Architect, within three days of the meeting.

B. Preconstruction Conference: Architect will schedule and conduct a preconstruction conference before starting construction, at a time convenient to Owner and Architect, but no later than 15 days after execution of the Agreement.

1. Conduct the conference to review responsibilities and personnel assignments.
2. Attendees: Authorized representatives of Owner Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the conference. Participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
3. Agenda: Discuss items of significance that could affect progress, including the following:

    a. Tentative construction schedule.
    b. Phasing.
    c. Critical work sequencing and long-lead items.
    d. Designation of key personnel and their duties.
    e. Lines of communications.
    f. Procedures for processing field decisions and Change Orders.
    g. Procedures for RFIs.
    h. Procedures for testing and inspecting.
    i. Procedures for processing Applications for Payment.
    j. Distribution of the Contract Documents.
    k. Submittal procedures.
    l. Preparation of record documents.
    m. Use of the premises and existing building.
    n. Work restrictions.
    o. Working hours.
    p. Owner's occupancy requirements.
    q. Responsibility for temporary facilities and controls.
    r. Procedures for moisture and mold control.
    s. Procedures for disruptions and shutdowns.
    t. Construction waste management and recycling.
    u. Parking availability.
    v. Office, work, and storage areas.
    w. Equipment deliveries and priorities.
    x. First aid.
    y. Security.
    z. Progress cleaning.

4. Minutes: Entity responsible for conducting meeting will record and distribute meeting minutes.

C. Preinstallation Conferences: Conduct a preinstallation conference at Project site before each construction activity that requires coordination with other construction.

1. Attendees: Installer and representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Advise Architect of scheduled meeting dates.
2. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration, including requirements for the following:

    a. Contract Documents.
    b. Options.
    c. Related RFIs.
    d. Related Change Orders.

e. Purchases.
f. Deliveries.
g. Submittals.
h. Review of mockups.
i. Possible conflicts.
j. Compatibility requirements.
k. Time schedules.
l. Weather limitations.
m. Manufacturer's written instructions.
n. Warranty requirements.
o. Compatibility of materials.
p. Acceptability of substrates.
q. Temporary facilities and controls.
r. Space and access limitations.
s. Regulations of authorities having jurisdiction.
t. Testing and inspecting requirements.
u. Installation procedures.
v. Coordination with other work.
w. Required performance results.
x. Protection of adjacent work.
y. Protection of construction and personnel.

3. Record significant conference discussions, agreements, and disagreements, including required corrective measures and actions.
4. Reporting: Distribute minutes of the meeting to each party present and to other parties requiring information.
5. Do not proceed with installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of the Work and reconvene the conference at earliest feasible date.

D. Project Closeout Conference: Schedule and conduct a project closeout conference, at a time convenient to Owner and Architect, but no later than 90 days prior to the scheduled date of Substantial Completion.

1. Conduct the conference to review requirements and responsibilities related to Project closeout.
2. Attendees: Authorized representatives of Owner, Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the meeting. Participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
3. Agenda: Discuss items of significance that could affect or delay Project closeout, including the following:

a. Preparation of record documents.
b. Procedures required prior to inspection for Substantial Completion and for final inspection for acceptance.
c. Submittal of written warranties.
d. Requirements for preparing operations and maintenance data.
e. Requirements for delivery of material samples, attic stock, and spare parts.
f. Requirements for demonstration and training.
g. Preparation of Contractor's punch list.
h. Procedures for processing Applications for Payment at Substantial Completion and for final payment.
i. Submittal procedures.
j. Owner's partial occupancy requirements.
k. Installation of Owner's furniture, fixtures, and equipment.

l. Responsibility for removing temporary facilities and controls.

4. Minutes: Entity conducting meeting will record and distribute meeting minutes.

E. Progress Meetings: Conduct progress meetings at regular intervals.

1. Coordinate dates of meetings with preparation of payment requests.
2. Attendees: In addition to representatives of Owner and Architect, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
3. Agenda: Review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.

    a. Contractor's Construction Schedule: Review progress since the last meeting. Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor's construction schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.

        1) Review schedule for next period.

    b. Review present and future needs of each entity present, including the following:

        1) Interface requirements.
        2) Sequence of operations.
        3) Status of submittals.
        4) Deliveries.
        5) Off-site fabrication.
        6) Access.
        7) Site utilization.
        8) Temporary facilities and controls.
        9) Progress cleaning.
        10) Quality and work standards.
        11) Status of correction of deficient items.
        12) Field observations.
        13) Status of RFIs.
        14) Status of proposal requests.
        15) Pending changes.
        16) Status of Change Orders.
        17) Pending claims and disputes.
        18) Documentation of information for payment requests.

4. Minutes: Entity responsible for conducting the meeting will record and distribute the meeting minutes to each party present and to parties requiring information.

    a. Schedule Updating: Revise Contractor's construction schedule after each progress meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with the report of each meeting.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01310

SECTION 01320 - CONSTRUCTION PROGRESS DOCUMENTATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for documenting the progress of construction during performance of the Work, including the following:

1. Startup construction schedule.
2. Contractor's construction schedule.
3. Construction schedule updating reports.
4. Weekly construction reports.
5. Material location reports.
6. Site condition reports.
7. Special reports.

B. Related Requirements:
1. Section 01330 "Submittal Procedures" for submitting schedules and reports.
2. Section 01400 "Quality Requirements" for submitting a schedule of tests and inspections.

1.3 DEFINITIONS

A. Activity: A discrete part of a project that can be identified for planning, scheduling, monitoring, and controlling the construction project. Activities included in a construction schedule consume time and resources.

1. Critical Activity: An activity on the critical path that must start and finish on the planned early start and finish times.
2. Predecessor Activity: An activity that precedes another activity in the network.
3. Successor Activity: An activity that follows another activity in the network.

B. Cost Loading: The allocation of the schedule of values for the completion of an activity as scheduled. The sum of costs for all activities must equal the total Contract Sum unless otherwise approved by Architect.

C. CPM: Critical path method, which is a method of planning and scheduling a construction project where activities are arranged based on activity relationships. Network calculations determine when activities can be performed and the critical path of Project.

D. Critical Path: The longest connected chain of interdependent activities through the network schedule that establishes the minimum overall Project duration and contains no float.

E. Event: The starting or ending point of an activity.

F. Float: The measure of leeway in starting and completing an activity.

1. Float time is not for the exclusive use or benefit of either Owner or Contractor, but is a jointly owned, expiring Project resource available to both parties as needed to meet schedule milestones and Contract completion date.
2. Free float is the amount of time an activity can be delayed without adversely affecting the early start of the successor activity.
3. Total float is the measure of leeway in starting or completing an activity without adversely affecting the planned Project completion date.

G. Resource Loading: The allocation of manpower and equipment necessary for the completion of an activity as scheduled.

1.4 INFORMATIONAL SUBMITTALS

A. Format for Submittals: Submit required submittals in the following format:

1. Working electronic copy of schedule file, where indicated.
2. PDF electronic file.
3. [Two paper copies.

B. Startup construction schedule.

C. Startup Network Diagram: Of size required to display entire network for entire construction period. Show logic ties for activities.

D. Contractor's Construction Schedule: Initial schedule, of size required to display entire schedule for entire construction period.

E. Construction Schedule Updating Reports: Submit with Applications for Payment.

F. Weekly Construction Reports: Submit at monthly intervals with Application for Payment.

G. Material Location Reports: Submit at monthly intervals with Application for Payment.

H. Site Condition Reports: Submit at time of discovery of differing conditions.

I. Special Reports: Submit at time of unusual event.

J. Qualification Data: For scheduling consultant.

1.5 QUALITY ASSURANCE

A. Prescheduling Conference: Conduct conference at Project site to comply with requirements in Section 01310 "Project Management and Coordination." Review methods and procedures related to the preliminary construction schedule and Contractor's construction schedule, including, but not limited to, the following:

1. Review software limitations and content and format for reports.
2. Verify availability of qualified personnel needed to develop and update schedule.
3. Discuss constraints, including phasing work stages area separations interim milestones and partial Owner occupancy.

4. Review delivery dates for Owner-furnished products.
5. Review schedule for work of Owner's separate contracts.
6. Review submittal requirements and procedures.
7. Review time required for review of submittals and resubmittals.
8. Review requirements for tests and inspections by independent testing and inspecting agencies.
9. Review time required for Project closeout and Owner startup procedures.
10. Review and finalize list of construction activities to be included in schedule.
11. Review procedures for updating schedule.

1.6 COORDINATION

A. Coordinate Contractor's construction schedule with the schedule of values, list of subcontracts, submittal schedule, progress reports, payment requests, and other required schedules and reports.

1. Secure time commitments for performing critical elements of the Work from entities involved.
2. Coordinate each construction activity in the network with other activities and schedule them in proper sequence.

PART 2 - PRODUCTS

2.1 CONTRACTOR'S CONSTRUCTION SCHEDULE, GENERAL

A. Time Frame: Extend schedule from date established for commencement of the Work the Notice to Proceed to date of final completion.

1. Contract completion date shall not be changed by submission of a schedule that shows an early completion date, unless specifically authorized by Change Order.

B. Activities: Treat each story or separate area as a separate numbered activity for each main element of the Work. Comply with the following:

1. Activity Duration: Define activities so no activity is longer than 20 days, unless specifically allowed by Architect.
2. Procurement Activities: Include procurement process activities for long lead items and major items, requiring a cycle of more than 60 days, as separate activities in schedule. Procurement cycle activities include, but are not limited to, submittals, approvals, purchasing, fabrication, and delivery.
3. Submittal Review Time: Include review and resubmittal times indicated in Section 01330 "Submittal Procedures" in schedule. Coordinate submittal review times in Contractor's construction schedule with submittal schedule.
4. Startup and Testing Time: Include no fewer than 15 days for startup and testing.
5. Substantial Completion: Indicate completion in advance of date established for Substantial Completion, and allow time for Architect's administrative procedures necessary for certification of Substantial Completion.
6. Punch List and Final Completion: Include not more than 30 days for completion of punch list items and final completion.

C. Constraints: Include constraints and work restrictions indicated in the Contract Documents and as follows in schedule, and show how the sequence of the Work is affected.

1. Phasing: Arrange list of activities on schedule by phase.
2. Products Ordered in Advance: Include a separate activity for each product. Include delivery date indicated in Section 01100 "Summary." Delivery dates indicated stipulate the earliest possible delivery date.
3. Owner-Furnished Products: Include a separate activity for each product. Include delivery date indicated in Section 01100 "Summary." Delivery dates indicated stipulate the earliest possible delivery date.
4. Work Restrictions: Show the effect of the following items on the schedule:

    a. Coordination with existing construction.
    b. Uninterruptible services.
    c. Use of premises restrictions.
    d. Provisions for future construction.
    e. Seasonal variations.
    f. Environmental control.

5. Work Stages: Indicate important stages of construction for each major portion of the Work, including, but not limited to, the following:

    a. Subcontract awards.
    b. Submittals.
    c. Purchases.
    d. Mockups.
    e. Fabrication.
    f. Sample testing.
    g. Deliveries.
    h. Installation.
    i. Tests and inspections.
    j. Adjusting.
    k. Curing.
    l. Startup and placement into final use and operation.

6.

D. Milestones: Include milestones indicated in the Contract Documents in schedule, including, but not limited to, the Notice to Proceed, Substantial Completion, and final completion**[.]**

E. Upcoming Work Summary: Prepare summary report indicating activities scheduled to occur or commence prior to submittal of next schedule update. Summarize the following issues:

1. Unresolved issues.
2. Unanswered Requests for Information.
3. Rejected or unreturned submittals.
4. Notations on returned submittals.
5. Pending modifications affecting the Work and Contract Time.

F. Recovery Schedule: When periodic update indicates the Work is 14 or more calendar days behind the current approved schedule, submit a separate recovery schedule indicating means by which Contractor intends to regain compliance with the schedule. Indicate changes to working hours, working days, crew sizes, and equipment required to achieve compliance, and date by which recovery will be accomplished.

G. Computer Scheduling Software: Prepare schedules using current version of a program that has been developed specifically to manage construction schedules.

2.2 CONTRACTOR'S CONSTRUCTION SCHEDULE (GANTT CHART)

A. Gantt-Chart Schedule: Submit a comprehensive, fully developed, horizontal, Gantt-chart-type, Contractor's construction schedule within 30 days of date established for commencement of the Work . Base schedule on the startup construction schedule and additional information received since the start of Project.

B. Preparation: Indicate each significant construction activity separately. Identify first workday of each week with a continuous vertical line.

1. For construction activities that require three months or longer to complete, indicate an estimated completion percentage in 10 percent increments within time bar.

2.3 REPORTS

A. Weekly Construction Reports: Prepare a daily construction report recording the following information concerning events at Project site:

1. List of subcontractors at Project site.
2. List of separate contractors at Project site.
3. Approximate count of personnel at Project site.
4. Equipment at Project site.
5. Material deliveries.
6. High and low temperatures and general weather conditions, including presence of rain or snow.
7. Accidents.
8. Meetings and significant decisions.
9. Unusual events (see special reports).
10. Stoppages, delays, shortages, and losses.
11. Meter readings and similar recordings.
12. Emergency procedures.
13. Orders and requests of authorities having jurisdiction.
14. Change Orders received and implemented.
15. Construction Change Directives received and implemented.
16. Services connected and disconnected.
17. Equipment or system tests and startups.
18. Partial completions and occupancies.
19. Substantial Completions authorized.

B. Material Location Reports: At monthly intervals, prepare and submit a comprehensive list of materials delivered to and stored at Project site. List shall be cumulative, showing materials previously reported plus items recently delivered. Include with list a statement of progress on and delivery dates for materials or items of equipment fabricated or stored away from Project site. Indicate the following categories for stored materials:

1. Material stored prior to previous report and remaining in storage.
2. Material stored prior to previous report and since removed from storage and installed.
3. Material stored following previous report and remaining in storage.

C. Site Condition Reports: Immediately on discovery of a difference between site conditions and the Contract Documents, prepare and submit a detailed report. Submit with a Request for Information. Include a detailed description of the differing conditions, together with recommendations for changing the Contract Documents.

2.4 SPECIAL REPORTS

A. General: Submit special reports directly to Owner within one day(s) of an occurrence. Distribute copies of report to parties affected by the occurrence.

B. Reporting Unusual Events: When an event of an unusual and significant nature occurs at Project site, whether or not related directly to the Work, prepare and submit a special report. List chain of events, persons participating, response by Contractor's personnel, evaluation of results or effects, and similar pertinent information. Advise Owner in advance when these events are known or predictable.

PART 3 - EXECUTION

3.1 CONTRACTOR'S CONSTRUCTION SCHEDULE

A. Contractor's Construction Schedule Updating: At monthly intervals, update schedule to reflect actual construction progress and activities. Issue schedule one week before each regularly scheduled progress meeting.

1. Revise schedule immediately after each meeting or other activity where revisions have been recognized or made. Issue updated schedule concurrently with the report of each such meeting.
2. Include a report with updated schedule that indicates every change, including, but not limited to, changes in logic, durations, actual starts and finishes, and activity durations.
3. As the Work progresses, indicate final completion percentage for each activity.

B. Distribution: Distribute copies of approved schedule to Architect Owner, separate contractors, testing and inspecting agencies, and other parties identified by Contractor with a need-to-know schedule responsibility.

1. Post copies in Project meeting rooms and temporary field offices.
2. When revisions are made, distribute updated schedules to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in performance of construction activities.

END OF SECTION 01320

SECTION 01330 - SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes requirements for the submittal schedule and administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals.

B. Related Requirements:

1. Section 01290 "Payment Procedures" for submitting Applications for Payment and the schedule of values.
2. Section 01320 "Construction Progress Documentation" for submitting schedules and reports, including Contractor's construction schedule.
3. Section 01781 "Project Record Documents" for submitting record Drawings, record Specifications, and record Product Data.

1.3 DEFINITIONS

A. Action Submittals: Written and graphic information and physical samples that require Architect's responsive action. Action submittals are those submittals indicated in individual Specification Sections as "action submittals."

B. Informational Submittals: Written and graphic information and physical samples that do not require Architect's responsive action. Submittals may be rejected for not complying with requirements. Informational submittals are those submittals indicated in individual Specification Sections as "informational submittals."

C. File Transfer Protocol (FTP): Communications protocol that enables transfer of files to and from another computer over a network and that serves as the basis for standard Internet protocols. An FTP site is a portion of a network located outside of network firewalls within which internal and external users are able to access files.

D. Portable Document Format (PDF): An open standard file format licensed by Adobe Systems used for representing documents in a device-independent and display resolution-independent fixed-layout document format.

1.4 ACTION SUBMITTALS

A. Submittal Schedule: Submit a schedule of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, ordering, manufacturing, fabrication, and delivery when establishing dates. Include additional time required for making

corrections or revisions to submittals noted by Architect and additional time for handling and reviewing submittals required by those corrections.

1. Coordinate submittal schedule with list of subcontracts, the schedule of values, and Contractor's construction schedule.
2. Final Submittal: Submit concurrently with the first complete submittal of Contractor's construction schedule.

    a. Submit revised submittal schedule to reflect changes in current status and timing for submittals.

3. Format: Arrange the following information in a tabular format:

    a. Scheduled date for first submittal.
    b. Specification Section number and title.
    c. Submittal category: Action; informational.
    d. Name of subcontractor.
    e. Description of the Work covered.
    f. Scheduled date for Architect's final release or approval.
    g. Scheduled date of fabrication.
    h. Scheduled dates for purchasing.
    i. Scheduled dates for installation.
    j. Activity or event number.

1.5 SUBMITTAL ADMINISTRATIVE REQUIREMENTS

A. Architect's Digital Data Files: Electronic digital data files of the Contract Drawings will not be provided by Architect for Contractor's use in preparing submittals.

1. Architect will furnish Contractor one set of digital data drawing files of the Contract Drawings for use in preparing Shop Drawings and Project record drawings.
    a. Contractor shall execute a data licensing agreement in the form of AIA Document C106, Digital Data Licensing Agreement or as provided by Architect & their Consultants.

B. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.

1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
2. Submit all submittal items required for each Specification Section concurrently unless partial submittals for portions of the Work are indicated on approved submittal schedule.
3. Submit action submittals and informational submittals required by the same Specification Section as separate packages under separate transmittals.
4. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.

    a. Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.

C. Processing Time: Allow time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Architect's receipt of submittal. No extension of the

Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.

1. Initial Review: Allow 15 days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Architect will advise Contractor when a submittal being processed must be delayed for coordination.
2. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.
3. Resubmittal Review: Allow 15 days for review of each resubmittal.
4. Sequential Review: Where sequential review of submittals by Architect's consultants, Owner, or other parties is indicated, allow 21 days for initial review of each submittal.

    a. Structural

    b. Elevator

    c. HVAC

    d. Plumbing

    e. Electrical

    f. Sprinkler

    g. Kitchen Equipment

D. Paper Submittals: Place a permanent label or title block on each submittal item for identification.

1. Indicate name of firm or entity that prepared each submittal on label or title block.
2. Provide a space approximately 6 by 8 inches on label or beside title block to record Contractor's review and approval markings and action taken by Architect.
3. Include the following information for processing and recording action taken:

    a. Project name.
    b. Date.
    c. Name of Architect.
    d. Name of Construction Manager.
    e. Name of Contractor.
    f. Name of subcontractor.
    g. Name of supplier.
    h. Name of manufacturer.
    i. Submittal number or other unique identifier, including revision identifier.

        1) Submittal number shall use Specification Section number followed by a decimal point and then a sequential number (e.g., 06100.01). Resubmittals shall include an alphabetic suffix after another decimal point (e.g., 06100.01.A).

    j. Number and title of appropriate Specification Section.
    k. Drawing number and detail references, as appropriate.
    l. Location(s) where product is to be installed, as appropriate.
    m. Other necessary identification.

4. Additional Paper Copies: Unless additional copies are required for final submittal, and unless Architect observes noncompliance with provisions in the Contract Documents, initial submittal may serve as final submittal.

    a. Submit one copy of submittal to concurrent reviewer in addition to specified number of copies to Architect.

5. Transmittal for Paper Submittals: Assemble each submittal individually and appropriately for transmittal and handling. Transmit each submittal using a transmittal form. Architect] will return without review submittals received from sources other than Contractor.

    a. Transmittal Form for Paper Submittals: Use AIA Document G810 .
    b. Transmittal Form for Paper Submittals: Provide locations on form for the following information:

        1) Project name.
        2) Date.
        3) Destination (To:).
        4) Source (From:).
        5) Name and address of Architect.
        6) Name of Contractor.
        7) Name of firm or entity that prepared submittal.
        8) Names of subcontractor, manufacturer, and supplier.
        9) Category and type of submittal.
        10) Submittal purpose and description.
        11) Specification Section number and title.
        12) Specification paragraph number or drawing designation and generic name for each of multiple items.
        13) Drawing number and detail references, as appropriate.
        14) Indication of full or partial submittal.
        15) Transmittal number, numbered consecutively.
        16) Submittal and transmittal distribution record.
        17) Remarks.
        18) Signature of transmitter.

E. Options: Identify options requiring selection by Architect.

F. Deviations and Additional Information: On an attached separate sheet, prepared on Contractor's letterhead, record relevant information, requests for data, revisions other than those requested by Architect on previous submittals, and deviations from requirements in the Contract Documents, including minor variations and limitations. Include same identification information as related submittal. Architect will advise Contactor when deviations must be delayed for further review and coordination.

G. Resubmittals: Make resubmittals in same form and number of copies as initial submittal.

1. Note date and content of previous submittal.
2. Note date and content of revision in label or title block and clearly indicate extent of revision.
3. Resubmit submittals until they are marked with approval notation from Architect'saction stamp.

H. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.

I. Use for Construction: Retain complete copies of submittals on Project site. Use only final action submittals that are marked with approval notation from Architect'saction stamp.

PART 2 - PRODUCTS

2.1 SUBMITTAL PROCEDURES

A. General Submittal Procedure Requirements: Prepare and submit submittals required by individual Specification Sections. Types of submittals are indicated in individual Specification Sections.

1. Action Submittals: Submit three paper copies of each submittal unless otherwise indicated. Architect will return two copies.
2. Informational Submittals: Submit two paper copies of each submittal unless otherwise indicated. Architect will not return copies.
3. Certificates and Certifications Submittals: Provide a statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity.
    a. Provide a notarized statement on original paper copy certificates and certifications where indicated.

B. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.

1. If information must be specially prepared for submittal because standard published data are not suitable for use, submit as Shop Drawings, not as Product Data.
2. Mark each copy of each submittal to show which products and options are applicable.
3. Include the following information, as applicable:

    a. Manufacturer's catalog cuts.
    b. Manufacturer's product specifications.
    c. Standard color charts.
    d. Statement of compliance with specified referenced standards.
    e. Testing by recognized testing agency.
    f. Application of testing agency labels and seals.
    g. Notation of coordination requirements.
    h. Availability and delivery time information.

4. For equipment, include the following in addition to the above, as applicable:

    a. Wiring diagrams showing factory-installed wiring.
    b. Printed performance curves.
    c. Operational range diagrams.
    d. Clearances required to other construction, if not indicated on accompanying Shop Drawings.

5. Submit Product Data before or concurrent with Samples.

6. Submit Product Data in the following format:

    a. PDF electronic file.
    b. Three paper copies of Product Data unless otherwise indicated. Architect will return two copies.

C. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data.

1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:

    a. Identification of products.
    b. Schedules.
    c. Compliance with specified standards.
    d. Notation of coordination requirements.
    e. Notation of dimensions established by field measurement.
    f. Relationship and attachment to adjoining construction clearly indicated.
    g. Seal and signature of professional engineer if specified.

2. Sheet Size: Except for templates, patterns, and similar full-size drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches, but no larger than 24 inches by 36 inches.
3. Submit Shop Drawings in the following format:
    a. Three opaque copies of each submittal. Architect will retain one copy; remainder will be returned.

D. Samples: Submit Samples for review of kind, color, pattern, and texture for a check of these characteristics with other elements and for a comparison of these characteristics between submittal and actual component as delivered and installed.

1. Transmit Samples that contain multiple, related components such as accessories together in one submittal package.
2. Identification: Attach label on unexposed side of Samples that includes the following:

    a. Generic description of Sample.
    b. Product name and name of manufacturer.
    c. Sample source.
    d. Number and title of applicable Specification Section.
    e. Specification paragraph number and generic name of each item.
3. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.

    a. Samples that may be incorporated into the Work are indicated in individual Specification Sections. Such Samples must be in an undamaged condition at time of use.
    b. Samples not incorporated into the Work, or otherwise designated as Owner's property, are the property of Contractor.

4. Samples for Initial Selection: Submit manufacturer's color charts consisting of physical units or sections of units showing the full range of colors, textures, and patterns available. If physical units are not provided, architect shall select no more than 3 options from the

range provided. Physical samples shall then be provided of those 3 options. If approved, one of those options shall be considered the accepted sample for verification.

a. Number of Samples: Submit one full set(s) of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Architect will return submittal with options selected.

5. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from same material to be used for the Work, cured and finished in manner specified, and physically identical with material or product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.

a. Number of Samples: Submit three sets of Samples. Architectwill retain two Sample sets; remainder will be returned. Mark up and retain one returned Sample set as a project record sample.

1) Submit a single Sample where assembly details, workmanship, fabrication techniques, connections, operation, and other similar characteristics are to be demonstrated.
2) If variation in color, pattern, texture, or other characteristic is inherent in material or product represented by a Sample, submit at least three sets of paired units that show approximate limits of variations.

E. Product Schedule: As required in individual Specification Sections, prepare a written summary indicating types of products required for the Work and their intended location. Include the following information in tabular form:

1. Type of product. Include unique identifier for each product indicated in the Contract Documents or assigned by Contractor if none is indicated.
2. Manufacturer and product name, and model number if applicable.
3. Number and name of room or space.
4. Location within room or space.
5. Submit product schedule in the following format:

a. PDF electronic file.
b. Three paper copies of product schedule or list unless otherwise indicated. Architect**,** will return two copies.

F. Coordination Drawing Submittals: Comply with requirements specified in Section 01310 "Project Management and Coordination."

G. Contractor's Construction Schedule: Comply with requirements specified in Section 01320 "Construction Progress Documentation."

H. Application for Payment and Schedule of Values: Comply with requirements specified in Section 01290 "Payment Procedures."

I. Test and Inspection Reports and Schedule of Tests and Inspections Submittals: Comply with requirements specified in Section 01400 "Quality Requirements."

J. Closeout Submittals and Maintenance Material Submittals: Comply with requirements specified in Section 01770 "Closeout Procedures."

K. Maintenance Data: Comply with requirements specified in Section 01782 "Operation and Maintenance Data."

L. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, contact information of architects and owners, and other information specified.

M. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of Welding Procedure Specification and Procedure Qualification Record on AWS forms. Include names of firms and personnel certified.

N. Installer Certificates: Submit written statements on manufacturer's letterhead certifying that Installer complies with requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.

O. Manufacturer Certificates: Submit written statements on manufacturer's letterhead certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.

P. Product Certificates: Submit written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.

Q. Material Certificates: Submit written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.

R. Material Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in the Contract Documents.

S. Product Test Reports: Submit written reports indicating that current product produced by manufacturer complies with requirements in the Contract Documents. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.

T. Research Reports: Submit written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for Project. Include the following information:

1. Name of evaluation organization.
2. Date of evaluation.
3. Time period when report is in effect.
4. Product and manufacturers' names.
5. Description of product.
6. Test procedures and results.
7. Limitations of use.

U. Preconstruction Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements in the Contract Documents.

V. Compatibility Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for primers and substrate preparation needed for adhesion.

W. Field Test Reports: Submit written reports indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.

X. Design Data: Prepare and submit written and graphic information, including, but not limited to, performance and design criteria, list of applicable codes and regulations, and calculations. Include list of assumptions and other performance and design criteria and a summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Include page numbers.

PART 3 - EXECUTION

3.1 CONTRACTOR'S REVIEW

A. Action and Informational Submittals: Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Architect.

B. Project Closeout and Maintenance Material Submittals: See requirements in Section 01770 "Closeout Procedures."

C. Approval Stamp: Stamp each submittal with a uniform, approval stamp. Include Project name and location, submittal number, Specification Section title and number, name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.

3.2 ARCHITECT'S ACTION

A. Action Submittals: Architect will review each submittal, make marks to indicate corrections or revisions required, and return it. Architect will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action.

1. “Reviewed or Reviewed as Noted” If submittals and/or shop drawings are marked such this indicates the shop drawing, product data or sample is reviewed for field use. This review does not authorize changes to the contract sum unless agreed to in writing by the owner and unless provided by change order.

   Review is only for conformance with the design concept of the work and with the information given in the contract documents. The contractor is responsible for determining and verifying all materials, field measurements and field construction criteria related thereto for information and fabricating requirements or to the means, methods, techniques, sequences and procedures of construction, and for the coordination of the work of all trades. The Architect’s and/or the Project Manager’s review shall not be construed to approve any deviation of the requirements for errors or omissions in the shop drawings, product data or sample by review thereof.

2. “Revise and Resubmit” or “Rejected”
   If submittals and /or shop drawings are marked as such then this indicates that the shop drawing, product data or sample is not approved for field use. Resubmission is required. Corrections shall be limited to items marked. If revisions other than those requested are made on subsequent submittals, the contractor shall direct specific attention thereto.

B. Informational Submittals: Architect will review each submittal and will not return it, or will return it if it does not comply with requirements. Architect will forward each submittal to appropriate party.

C. Partial submittals prepared for a portion of the Work will be reviewed when use of partial submittals has received prior review from Architect.

D. Incomplete submittals are unacceptable, will be considered nonresponsive, and will be returned for resubmittal without review.

E. Submittals not required by the Contract Documents may be returned by the Architect without action.

END OF SECTION 01330

SECTION 01400 - QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for quality assurance and quality control.

B. Testing and inspecting services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.

1. Specific quality-assurance and -control requirements for individual construction activities are specified in the Sections that specify those activities. Requirements in those Sections may also cover production of standard products.
2. Specified tests, inspections, and related actions do not limit Contractor's other quality-assurance and -control procedures that facilitate compliance with the Contract Document requirements.
3. Requirements for Contractor to provide quality-assurance and -control services required by Architect, Owner, or authorities having jurisdiction are not limited by provisions of this Section.
4. Specific test and inspection requirements are not specified in this Section.

1.3 DEFINITIONS

A. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.

B. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that actual products incorporated into the Work and completed construction comply with requirements. Services do not include contract enforcement activities performed by Architect.

C. Mockups: Full-size physical assemblies that are constructed on-site. Mockups are constructed to verify selections made under Sample submittals; to demonstrate aesthetic effects and, where indicated, qualities of materials and execution; to review coordination, testing, or operation; to show interface between dissimilar materials; and to demonstrate compliance with specified installation tolerances. Mockups are not Samples. Unless otherwise indicated, approved mockups establish the standard by which the Work will be judged.

1. Mockups must be approved by the Architect prior to preceding the work. The Architect has the right to reject an unsatisfactory mockup. In this case the Contractor is required to recreate the mockup for approval according to the Contract Documents.

2. Integrated Exterior Mockups: Mockups of the exterior envelope erected separately from the building but on Project site, consisting of multiple products, assemblies, and subassemblies. Construction of integrated exterior mockup specified in this section will serve to meet mockup requirements of individual listed sections unless otherwise noted.
3. Other Exterior Product Mockups: Mockups of exterior products not listed in this Section are required by individual specification sections, provide separate mockups and size of mockup construction.

D. Preconstruction Testing: Tests and inspections performed specifically for Project before products and materials are incorporated into the Work, to verify performance or compliance with specified criteria.

E. Product Testing: Tests and inspections that are performed by an NRTL, an NVLAP, or a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with specified requirements.

F. Source Quality-Control Testing: Tests and inspections that are performed at the source, e.g., plant, mill, factory, or shop.

G. Field Quality-Control Testing: Tests and inspections that are performed on-site for installation of the Work and for completed Work.

H. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.

I. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform a particular construction operation, including installation, erection, application, and similar operations.

1. Use of trade-specific terminology in referring to a trade or entity does not require that certain construction activities be performed by accredited or unionized individuals, or that requirements specified apply exclusively to specific trade(s).

J. Experienced: When used with an entity or individual, "experienced" means having successfully completed a minimum of five previous projects similar in nature, size, and extent to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.

1.4 CONFLICTING REQUIREMENTS

A. Referenced Standards: If compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer conflicting requirements that are different, but apparently equal, to Architect for a decision before proceeding.

B. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to Architect for a decision before proceeding.

1.5 ACTION SUBMITTALS

A. Shop drawings: For mockups, provide plans, sections, and elevations, indicating materials and size of mockup construction.
   1. Indicate manufacturer and model number of individual components.
   2. Provide axonometric drawings for conditions difficult to illustrate in two dimensions.

B. Coordination Date Information: For integrated exterior mockups provide product list indicating manufacturer and model number of individual components.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Contractor's quality-control personnel.

B. Contractor's Statement of Responsibility: When required by authorities having jurisdiction, submit copy of written statement of responsibility sent to authorities having jurisdiction before starting work on the following systems:
   1. Main wind-force-resisting system or a wind-resisting component listed in the wind-force-resisting system quality-assurance plan prepared by Architect.

C. Testing Agency Qualifications: For testing agencies specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include proof of qualifications in the form of a recent report on the inspection of the testing agency by a recognized authority.

D. Schedule of Tests and Inspections: Prepare in tabular form and include the following:

   1. Specification Section number and title.
   2. Entity responsible for performing tests and inspections.
   3. Description of test and inspection.
   4. Identification of applicable standards.
   5. Identification of test and inspection methods.
   6. Number of tests and inspections required.
   7. Time schedule or time span for tests and inspections.
   8. Requirements for obtaining samples.
   9. Unique characteristics of each quality-control service.

1.7 REPORTS AND DOCUMENTS

A. Test and Inspection Reports: Prepare and submit certified written reports specified in other Sections. Include the following:

   1. Date of issue.
   2. Project title and number.
   3. Name, address, and telephone number of testing agency.
   4. Dates and locations of samples and tests or inspections.
   5. Names of individuals making tests and inspections.
   6. Description of the Work and test and inspection method.
   7. Identification of product and Specification Section.
   8. Complete test or inspection data.
   9. Test and inspection results and an interpretation of test results.
   10. Record of temperature and weather conditions at time of sample taking and testing and inspecting.

11. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
12. Name and signature of laboratory inspector.
13. Recommendations on retesting and reinspecting.

B. Manufacturer's Technical Representative's Field Reports: Prepare written information documenting manufacturer's technical representative's tests and inspections specified in other Sections. Include the following:

1. Name, address, and telephone number of technical representative making report.
2. Statement on condition of substrates and their acceptability for installation of product.
3. Statement that products at Project site comply with requirements.
4. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
5. Results of operational and other tests and a statement of whether observed performance complies with requirements.
6. Statement whether conditions, products, and installation will affect warranty.
7. Other required items indicated in individual Specification Sections.

C. Permits, Licenses, and Certificates: For Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents, established for compliance with standards and regulations bearing on performance of the Work.

1.8 QUALITY ASSURANCE

A. General: Qualifications paragraphs in this article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.

B. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

C. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

D. Installer Qualifications: A firm or individual experienced in installing, erecting, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.

E. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or product that are similar in material, design, and extent to those indicated for this Project.

F. Specialists: Certain Specification Sections require that specific construction activities shall be performed by entities who are recognized experts in those operations. Specialists shall satisfy qualification requirements indicated and shall be engaged for activities indicated.

1. Requirements of authorities having jurisdiction shall supersede requirements for specialists.

G. Testing Agency Qualifications: An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspecting indicated, as documented according to ASTM E 329 ; and with additional qualifications specified in individual Sections; and, where required by authorities having jurisdiction, that is acceptable to authorities.

1. NRTL: A nationally recognized testing laboratory according to 29 CFR 1910.7.
2. NVLAP: A testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program.

H. Manufacturer's Technical Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to observe and inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.

I. Factory-Authorized Service Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.

J. Preconstruction Testing: Where testing agency is indicated to perform preconstruction testing for compliance with specified requirements for performance and test methods, comply with the following:

1. Contractor responsibilities include the following:

a. Provide test specimens representative of proposed and construction.
b. Submit specimens in a timely manner with sufficient time for testing and analyzing results to prevent delaying the Work.
c. Provide sizes and configurations of test assemblies, mockups, and laboratory mockups to adequately demonstrate capability of products to comply with performance requirements.
d. Build site-assembled test assemblies and mockups using installers who will perform same tasks for Project.
e. Build laboratory mockups at testing facility using personal, products, and methods of construction indicated for the completed Work.
f. When testing is complete, remove test specimens, assemblies, and mockups: do not refuse products on Project.

2. Testing Agency Responsibilities: Submit a certified written report of each test, inspection, and similar quality-assurance service to Architect, with copy to Contractor. Interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from the Contract Documents.

K. Mockups: Before installing portions of the Work requiring mockups, build mockups for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work:

1. Build mockups in location and of size indicated or, if not indicated, as directed by Architect.
2. Notify Architect seven days in advance of dates and times when mockups will be constructed.
3. Employ supervisory personnel who will oversee mockup construction. Employ workers that will be employed during the construction at Project.
4. Demonstrate the proposed range of aesthetic effects and workmanship.

5. Obtain Architect's approval of mockups before starting work, fabrication, or construction.

    a. Allow seven days for initial review and each re-review of each mockup.

6. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
7. Preinstallation Conference: Convene at Project site. Review requirements for construction of integrated exterior mockup with installers of all products required to be incorporated in mockup. Review approved mockup requirements in individual specification section. Resolve issues related to coordination and scheduling of work.
8. Integrated Exterior Mockups: Before installing portions of Exterior work requiring mockups, build integrated exterior mockup for each form of construction and finish required to comply with the following requirements, using material indicated for the completed Work:
    a. Build mockups in location and of size indicated or, if not indicated, as directed by Architect but not less than the following overall size and configuration:
        1) Build integrated mockup of adequate size to represent masonry products, stucco product, trim profiles, door and window not less than 12 feet wide by 8 feet high, incorporating wall assembly for each type unless otherwise shown on drawings.
9. Demolish and remove mockups when directed unless otherwise indicated.

1.9 QUALITY CONTROL

A. Owner Responsibilities: Where quality-control services are indicated as Owner's responsibility, Owner will engage a qualified testing agency to perform these services.

1. Owner will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of types of testing and inspecting they are engaged to perform.
2. Payment for these services will be made from testing and inspecting allowances, as authorized by Change Orders.
3. Costs for retesting and reinspecting construction that replaces or is necessitated by work that failed to comply with the Contract Documents will be charged to Contractor.

B. Contractor Responsibilities: Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. Perform additional quality-control activities required to verify that the Work complies with requirements, whether specified or not.

1. Unless otherwise indicated, provide quality-control services specified and those required by authorities having jurisdiction. Perform quality-control services required of Contractor by authorities having jurisdiction, whether specified or not.
2. Where services are indicated as Contractor's responsibility, engage a qualified testing agency to perform these quality-control services.

    a. Contractor shall not employ same entity engaged by Owner, unless agreed to in writing by Owner.

3. Notify testing agencies at least 24 hours in advance of time when Work that requires testing or inspecting will be performed.
4. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.

5. Testing and inspecting requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
6. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.

C. Manufacturer's Field Services: Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing as specified in Section 01330 "Submittal Procedures."

D. Manufacturer's Technical Services: Where indicated, engage a manufacturer's technical representative to observe and inspect the Work. Manufacturer's technical representative's services include participation in preinstallation conferences, examination of substrates and conditions, verification of materials, observation of Installer activities, inspection of completed portions of the Work, and submittal of written reports.

E. Retesting/Reinspecting: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and reinspecting, for construction that replaced Work that failed to comply with the Contract Documents.

F. Testing Agency Responsibilities: Cooperate with Architect and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.

1. Notify Architect and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
2. Determine the location from which test samples will be taken and in which in-situ tests are conducted.
3. Conduct and interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from requirements.
4. Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control service through Contractor.
5. Do not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the Work.
6. Do not perform any duties of Contractor.

G. Associated Services: Cooperate with agencies performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:

1. Access to the Work.
2. Incidental labor and facilities necessary to facilitate tests and inspections.
3. Adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples.
4. Facilities for storage and field curing of test samples.
5. Delivery of samples to testing agencies.
6. Preliminary design mix proposed for use for material mixes that require control by testing agency.
7. Security and protection for samples and for testing and inspecting equipment at Project site.

H. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and -control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.

1. Schedule times for tests, inspections, obtaining samples, and similar activities.

I. Coordination of Integrated Mock-ups: coordinate sequence of mock-up erection to enable assembly to duplicate conditions to be anticipated in the work.

J. Schedule of Tests and Inspections: Prepare a schedule of tests, inspections, and similar quality-control services required by the Contract Documents as a component of Contractor's quality-control plan. Coordinate and submit concurrently with Contractor's construction schedule. Update as the Work progresses.

1. Distribution: Distribute schedule to Owner, Architect, testing agencies, and each party involved in performance of portions of the Work where tests and inspections are required.

1.10 SPECIAL TESTS AND INSPECTIONS

A. Special Tests and Inspections: Conducted by a qualified testing agency as required by authorities having jurisdiction, as indicated in individual Specification Sections, and as follows:

1. Verifying that manufacturer maintains detailed fabrication and quality-control procedures and reviews the completeness and adequacy of those procedures to perform the Work.
2. Notifying Architect and Contractor promptly of irregularities and deficiencies observed in the Work during performance of its services.
3. Submitting a certified written report of each test, inspection, and similar quality-control service to Architect with copy to Contractor and to authorities having jurisdiction.
4. Submitting a final report of special tests and inspections at Substantial Completion, which includes a list of unresolved deficiencies.
5. Interpreting tests and inspections and stating in each report whether tested and inspected work complies with or deviates from the Contract Documents.
6. Retesting and reinspecting corrected work.
7.

PART 2 - PRODUCTS

2.1 INTEGRATED MOCKUP MATERIALS –

A. Materials and Products, General; Use specified products, or products approved by Architect prior to erection of mockup. Incorporate primary and accessory products specified in each section to be incorporated in exterior work where mockups are called for.

B. Exterior Mockup Components: Incorporate products in integrated exterior mockup specified in the following sections
1. 03450 Architectural Precast Concrete: to illustrate concrete copings in masonry walls and as required for support of integrated exterior mockup
2. 04220 Concrete Unit Masonry: to illustrate exposed exterior masonry and wall construction, and as required for support of integrated exterior mockup
3. 04720 Cast Stone: to illustrate exposed exterior masonry and wall construction, and as required for support of integrated exterior mockup
4. 04813 Brick Masonry: to illustrate exposed exterior masonry and wall construction, and as required for support of integrated exterior mockup
5. 05240 Cold Form Metal Studs: to illustrate wall construction, and as requirement support of integrated exterior mockup

6. 06160 Sheathing: Apply to framing where used as substrate for cladding materials incorporated in integrated exterior mockup
7. 07210 Insulation: apply in assemblies incorporated in integrated mockup
8. 07250 Weather Barriers: Apply to portion of each mockup material specified to receive weather barrier
9. 07272 Fluid Applied Membrane Air Barriers: Apply to portion of mockup material specified to receive air barrier
10. 07620 Sheet Metal Flashing and Trim: Include each exposed material and each material incorporated in wall assembly
11. 07920 Joint Sealants: Include sample of each typical exposed joint and each color within each cladding type.
12. 08411 Aluminum-Framed Entrances and Storefronts: Include frame in sample portion of opening as part of the integrated exterior mockup
13. 08520 Aluminum Windows: Include frame in sample portion of opening as part of the integrated exterior mockup
14. 09240 Portland Cement Plastering: to illustrate product in integrated mockup for installation and finish
15. 09220 Portland Cement Plaster: to illustrate product in integrated mockup for installation and finish
16. 09963 Elastomeric Coatings: to illustrate product on plaster surfaces
17. 09981 Cementitious Coatings: to illustrate product on concrete surfaces

PART 3 - EXECUTION

3.1 TEST AND INSPECTION LOG

A. Test and Inspection Log: Prepare a record of tests and inspections. Include the following:

1. Date test or inspection was conducted.
2. Description of the Work tested or inspected.
3. Date test or inspection results were transmitted to Architect.
4. Identification of testing agency or special inspector conducting test or inspection.

B. Maintain log at Project site. Post changes and revisions as they occur. Provide access to test and inspection log for Architect's reference during normal working hours.

3.2 REPAIR AND PROTECTION

A. General: On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.

1. Provide materials and comply with installation requirements specified in other Specification Sections or matching existing substrates and finishes. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible. Comply with the Contract Document requirements for cutting and patching in Section 01700 "Execution Requirements."

B. Assembly of integrated Exterior mockups: in locations indicated on the drawings, or if not indicated, as directed by Architect.
1. Maintain area around mockup free of stored materials and debris

2. Position mockup in location where lighting conditions are comparable to planned construction.
3. Assemble mockup to be self-bracing or provide adequate bracing against lateral forces
4. Masonry: Include masonry connection and insert details, ties, anchors, shelf angles, dowels and other related components.

C. Protect construction exposed by or for quality-control service activities.

D. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

3.3 DESCRIPTION OF LABORATORY SERVICES

A. Concrete;
1. Mix Design: In advance of concrete operations, materials proposed for use in concrete will be sampled and tested to determine their compliance with these Specifications. Mix proportions for each strength and type of concrete required shall be established by the Contractor and submitted to Laboratory. Laboratory shall review the designs for compliance with the specifications and shall submit a report to Engineer for his records.
2. Job Inspections: A representative of the Laboratory at the site will check the mixing of the concrete and conduct all field tests, such as slump determinations, yield, and air content checks, cast test cylinders, and regulate the consistency of the concrete. This representative shall also check and report any substandard concreting operations observed while at the site.
3. Concrete Cylinders: For each day's pour of one hundred (1000 cubic yards of fraction thereof, three(3) test cylinders shall be cast for each different strength of concrete placed. One (1) cylinder shall be tested and reported at seven (7) days and two (2) at twenty-eight (28) days, unless otherwise directed.

B. Reinforcing Steel: check for compliance with Specifications.

C. Piling:
1. Test Piles and Load Test: Laboratory shall inspect and log the placement of all test piles, and oversee the load testing of one (1) test pile as selected by the Engineer and as described in Section 316200 DRIVEN PILES. The load test shall be conducted in compliance with the requirements of the Orleans Parish Building Code as per ASTM 1143 to determine the safe bearing capacity of the piles.
2. Inspections: Perform inspections at source and at project site as specified in the Division 2 section for pilings.
3. Logging of Pile Driving: Log the driving all piling and record the following:
   a. Date driven
   b. Type of Hammer
   c. Pile description including actual tip
   d. Length and butt dimensions measured just prior to driving
   e. Location of Pile
   f. Size and depth of predrill
   g. Number of blows per foot for full length of the pile
   h. Tip and butt elevation
   i. Condition of shell, including depth of water removed (if any)
   j. Rate of concrete placement, volume of concrete placed, and elapsed time from start to finish
4. Concrete and Reinforcing steel quality control as specified herein above.
5. Reporting: Submit records daily.

D. Soil Compaction:
   1. Evaluate soil materials to determine optimum density in accordance with ASTM method specified (standard or modified Proctor).
   2. Test and inspect subgrades and fill layers to determine compliance with the Contract requirements.
   3. Test Methods: Perform field density tests in accordance with ASTM D 1556 (sand cone method) or ASTM D2922 (nuclear method).
   4. Building Slab Subgrade: make a least one field density test of subgrade for every 2000 sq. ft. of building slab, but in no case less than 4 tests.
   5. Paved Areas Subgrade: Make at least one field density test of subgrade for every 1,500 sq. ft. of paved area, but in no case less than 4 tests.

E. Granular Subbase and Soil-Cement Base Course:
   1. Perform in-place density tests as specified in Section 02540.
   2. Make at least one field density test of subbase and base course for every 1,500 sq. ft. of paved area, but not less than 4 tests of each material.

F. Structural Steel and Metal Deck:
   1. The testing laboratory shall visually inspect all connections to determine quality, size and compliance with approved erection drawings. Where the quality of a weld is in question, the Architect and Engineer will be advised. The Contractor may then be required to remove and reweld the connection or if the Contractor desires, may have the weld inspected further by radiography. The cost of this radiography inspection will be borne by the Contractor whether or not the weld is acceptable.
   2. All welders shall be approved by the laboratory in accordance with the American Society of Standards and qualified for the type of welding which they will perform.
   3. The testing laboratory shall inspect the high-strength bold connections in accordance with the requirements set forth in “Specifications for Structural Joints Using ASTM A 325 Bolts”, by the American Institute of Steel Construction.

G. Sprayed on Fireproofing:
   1. Certify that the sprayed-on fireproofing has been applied as required by Underwriter’s Laboratories, Inc. (UL) and that fireproofing has been tested in accordance with Section 07810 for thickness and density, and is undamaged and intact at the time of concealment.

END OF SECTION 01400

SECTION 01410- SPECIAL INSTRUCTIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SELECTION AND PAYMENT:

A. The Owner shall select and shall pay for the services of an independent testing laboratory to perform inspections and tests of materials and constructions as hereinafter specified and/or as specified in other sections of the specifications or as shown on the Drawings.

1.3 RELATED SECTIONS

A. 03300 – Cast-In-Place Concrete
B. 05120 – Structural Steel
C. 05210 – Steel Joist Framing
D. 05400 – Cold-Formed Metal Framing
E. 311000 – Clearing, Grubbing, and Proof-Rolling
F. 312000 – Earthwork
G. 315000 – Structural Excavation and Backfill

1.4 RESPONSIBILITY OF CONTRACTOR

A. Selection of the laboratory by the Owner in no way relieves the Contractor of his responsibility to furnish materials and construction in full compliance with the project plans and specifications. The Contractor accepts all processes, materials and their use which are approved by the testing laboratory unless the Contractor protests in writing prior to the approval by the testing laboratory.

1.5 COOPERATION OF CONTRACTOR

A. The Contractor shall cooperate with the laboratory and make available, without cost, samples of materials to be tested.

B. Furnish such nominal labor and sheltered working space as is necessary to obtain samples at the project.

C. Advise the laboratory of the identity of material sources and instruct the suppliers to allow tests or inspections by the laboratory.

D. Notify the laboratory sufficiently in advance of operations to allow for completion of initial tests and assignment of inspection personnel. Notification shall be not less than 48 hours in advance or as directed by the Architect.

1.6 REJECTION OF MATERIALS

A. The laboratory shall reject any materials which are not in full conformance with specifications, and promptly notify the Architect. The Architect shall notify the Contractor promptly of such rejections. Any materials rejected by the laboratory shall not be incorporated in the work without prior written approval of the Architect.

1.7 TEST METHODS

A. Tests and inspections shall be conducted in accordance with the requirements of these specifications or, if not herein specified, in accordance with latest ASTM, ACI, or other recognized authorities.

1.8 TEST REPORTS

A. The laboratory shall submit written reports of each test and inspection made to the Architect, Engineer and Contractor, suppliers of tested products and to such other parties the Architect may specify.

1.9 ADDITIONAL TESTS

A. The Architect reserves the right to require additional tests to those specified or upon materials not herein specified for testing. If such tests are necessary because of apparently defective materials or workmanship, the cost of these additional tests shall be borne by the Contractor.

1.10 DESCRIPTION OF TESTS AND INSPECTION

A. Concrete: The laboratory shall continuously monitor the delivery and placing of ready-mix concrete for compliance with the Drawings and the Specifications. The laboratory representative shall report any substandard concrete operations as soon as practicable. Laboratory shall comply with the requirements of ACI 301, Chapter 16.

1. Mix Design: In advance of concrete operations, materials proposed for use in concrete shall be sampled and tested to determine their compliance with the Specifications. Mix proportions shall be established by the Contractor for each strength and type of concrete and shall submit same to Laboratory. Laboratory shall review mix designs for compliance with the Specifications.

2. Concrete Plant Inspections: At all times during concrete operations, a representative of the laboratory at the batching plant shall witness the loading of each batch of concrete to determine that the approved mix designs are used

3. Sampling: The laboratory shall test the slump, air content, and temperature of the discharged concrete periodically from trucks selected at random and from all truckloads exhibiting visible inconsistencies. The laboratory representative shall have the authority to reject any truckload of concrete not delivered within the specified time limit, or not in compliance with the slump or air-entrainment requirements, or otherwise judged to be deficient.

4. Test cylinders: The laboratory shall cast a set of three (3) standard cylinders for each one hundred (100) cubic yards of concrete placed, but no less than one set per pour. The cylinders shall be broken in the laboratory to test the compressive strength; test one (1) at seven (7) days and two (2) at twenty-eight (28) days.

5. Testing procedures shall be in accordance with the following:

    a. Slump test, ASTM C143
    b. Sampling, ASTM C172
    c. Cylinder specimens, ASTM C31

d. Compression tests, ASTM C39
e. Criteria for acceptance, ACI 301 Chapter 17
f. Air content, ASTM C173 or C231
g. Obtaining and testing drilled cores and sawed beams of concrete, ASTM C42
h. Unit weight test, ASTM C138
i. Temperature of freshly mixed concrete, ASTM C1064

6. No testing laboratory services will be required for concrete in structurally unsupported sidewalks.

B. Soil Compaction: The Testing Laboratory shall obtain a sample of soil to be used as fill or backfill material and perform a sieve analysis test and a Moisture-Density Relation analysis per ASTM D698 or ASTM D1557 to determine optimum moisture content and maximum density in accordance with Section 02200 - Earthwork. If proposed fill material has more than 20% passing a number 200 sieve a complete soils classifications test shall be run per AASHTO M-145.

1. Fill under building structures and paving shall be analyzed for in place dry density and moisture content per ASTM D2922 and ASTM D3017. Test shall be taken no more than two days before placement of the next lift, slab or pavement. Fill must be retested if soil is heavily rained on after testing and before the next lift, pavement or slab is placed. Density tests shall be taken as follows:

2. Backfill of trench over 18" deep and behind grade walls; one test per 150 linear feet per 24" of depth.

3. Perform field density tests in accordance with ASTM D1556 (sand cone method) or ASTM D2922 (nuclear method).

4. Building Slab Subgrade: Make at least one (1) field density test of subgrade for every 5000 sq. ft. of building slab, but in no case less than four (4) tests.

5. Paved Areas Subgrade: Make at least one (1) field density test of subgrade for every 4500 sq. ft. of paved area but in no case less than four (4) tests. The testing laboratory shall also determine base course thickness at each density test.

6. Footing Subgrade: Visual inspection for type of soil and bearing capacity, and determining presence of loose materials.

C. Reinforcing Steel: The laboratory shall check mill test reports and monitor the placing of all reinforcing steel for compliance with the Specifications.

D. Structural Steel, Metal Deck and Steel Joists: The testing laboratory shall visually inspect all connections to determine quality, size, and compliance with reviewed erection drawings. Where the quality of a weld is in question, the Architect will be advised. The Contractor may then be required to remove and reweld the connection or if the Contractor desires, he may have the weld inspected further by radiography. The cost of this radiography inspection will be borne by the Contractor whether or not the weld is acceptable.

1. All welders shall be approved by the laboratory in accordance with American Welding Society Standards and qualified for the type of welding which they will perform. All field butt welds shall be witnessed by the laboratory while being welded. All field but welds shall be ultrasonic tested.

2. If high-strength bolts are used, the testing laboratory shall inspect the high-strength bolt connections in accordance with the requirements set forth in "Specifications for

Structural Joints Using ASTM A325 Bolts", by the American Institute of Steel Construction.

E. Grout: For every 5,000 sq. ft of wall area placed, grout strength shall be tested with a set of cubes in accordance with ASTM C1019.

PART 2 - PRODUCTS

Not Used

PART 3 - EXECUTION

Not Used

END OF SECTION 01 41 00

SECTION 01420 - REFERENCES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 DEFINITIONS

A. General: Basic Contract definitions are included in the Conditions of the Contract.

B. "Approved": When used to convey Architect's action on Contractor's submittals, applications, and requests, "approved" is limited to Architect's duties and responsibilities as stated in the Conditions of the Contract.

C. "Directed": A command or instruction by Architect. Other terms including "requested," "authorized," "selected," "required," and "permitted" have the same meaning as "directed."

D. "Indicated": Requirements expressed by graphic representations or in written form on Drawings, in Specifications, and in other Contract Documents. Other terms including "shown," "noted," "scheduled," and "specified" have the same meaning as "indicated."

E. "Regulations": Laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, and rules, conventions, and agreements within the construction industry that control performance of the Work.

F. "Furnish": Supply and deliver to Project site, ready for unloading, unpacking, assembly, installation, and similar operations.

G. "Install": Operations at Project site including unloading, temporarily storing, unpacking, assembling, erecting, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations.

H. "Provide": Furnish and install, complete and ready for the intended use.

I. "Project Site": Space available for performing construction activities. The extent of Project site is shown on Drawings and may or may not be identical with the description of the land on which Project is to be built.

1.3 INDUSTRY STANDARDS

A. Applicability of Standards: Unless the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into the Contract Documents to the extent referenced. Such standards are made a part of the Contract Documents by reference.

B. Publication Dates: Comply with standards in effect as of date of the Contract Documents unless otherwise indicated.

C. Copies of Standards: Each entity engaged in construction on Project should be familiar with industry standards applicable to its construction activity. Copies of applicable standards are not bound with the Contract Documents.

1. Where copies of standards are needed to perform a required construction activity, obtain copies directly from publication source.

1.4 ABBREVIATIONS AND ACRONYMS

A. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities indicated in Thomson Gale's "Encyclopedia of Associations" or in Columbia Books' "National Trade & Professional Associations of the U.S."

B. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Names, telephone numbers, and Web sites are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

AA	Aluminum Association (The) www.aluminum.org	(703) 358-2960
AABC	Associated Air Balance Council www.aabchq.com	(202) 737-0202
AAMA	American Architectural Manufacturers Association www.aamanet.org	(847) 303-5664
AASHTO	American Association of State Highway and Transportation Officials www.transportation.org	(202) 624-5800
AATCC	American Association of Textile Chemists and Colorists www.aatcc.org	(919) 549-8141
ABAA	Air Barrier Association of America www.airbarrier.org	(866) 956-5888
ABMA	American Bearing Manufacturers Association www.abma-dc.org	(202) 367-1155
ACI	American Concrete Institute www.concrete.org	(248) 848-3700
ACPA	American Concrete Pipe Association www.concrete-pipe.org	(972) 506-7216
AEIC	Association of Edison Illuminating Companies, Inc. (The) www.aeic.org	(205) 257-2530
AF&PA	American Forest & Paper Association www.afandpa.org	(800) 878-8878 (202) 463-2700
AGA	American Gas Association	(202) 824-7000

	www.aga.org	
AHAM	Association of Home Appliance Manufacturers www.aham.org	(202) 872-5955
AHRI	Air-Conditioning, Heating, andRefrigeration Institute, The www.ahrinet.org	(703) 524-8800
AI	Asphalt Institute www.asphaltinstitute.org	(859) 288-4960
AIA	American Institute of Architects (The) www.aia.org	(800) 242-3837 (202) 626-7300
AISC	American Institute of Steel Construction www.aisc.org	(800) 644-2400 (312) 670-2400
AISI	American Iron and Steel Institute www.steel.org	(202) 452-7100
AITC	American Institute of Timber Construction www.aitc-glulam.org	(303) 792-9559
ALSC	American Lumber Standard Committee, Incorporated www.alsc.org	(301) 972-1700
AMCA	Air Movement and Control Association International, Inc. www.amca.org	(847) 394-0150
ANSI	American National Standards Institute www.ansi.org	(202) 293-8020
AOSA	Association of Official Seed Analysts, Inc. www.aosaseed.com	(405) 780-7372
APA	APA - The Engineered Wood Association www.apawood.org	(253) 565-6600
APA	Architectural Precast Association www.archprecast.org	(239) 454-6989
API	American Petroleum Institute www.api.org	(202) 682-8000
ARI	Air-Conditioning & Refrigeration Institute www.ari.org	(703) 524-8800
ARMA	Asphalt Roofing Manufacturers Association www.asphaltroofing.org	(202) 207-0917
ASCE	American Society of Civil Engineers www.asce.org	(800) 548-2723 (703) 295-6300
ASCE/SEI	American Society of Civil Engineers/Structural Engineering Institute (See ASCE)	

ASHRAE	American Society of Heating, Refrigerating and Air-Conditioning Engineers www.ashrae.org	(800) 527-4723 (404) 636-8400
ASME	ASME International (American Society of Mechanical Engineers International) www.asme.org	(800) 843-2763 (973) 882-1170
ASSE	American Society of Sanitary Engineering www.asse-plumbing.org	(440) 835-3040
ASTM	ASTM International (American Society for Testing and Materials International) www.astm.org	(610) 832-9500
ATIS	Alliance for Telecommunications Industry Solutions www.atis.org	(202) 628-6380
AWCMA	American Window Covering Manufacturers Association (Now WCMA)	
AWCI	Association of the Wall and Ceiling Industry www.awci.org	(703) 534-8300
AWI	Architectural Woodwork Institute www.awinet.org	(571) 323-3636
AWPA	American Wood Protection Association (Formerly: American Wood Preservers' Association) www.awpa.com	(205) 733-4077
AWS	American Welding Society www.aws.org	(800) 443-9353 (305) 443-9353
AWWA	American Water Works Association www.awwa.org	(800) 926-7337 (303) 794-7711
BHMA	Builders Hardware Manufacturers Association www.buildershardware.com	(212) 297-2122
BIA	Brick Industry Association (The) www.bia.org	(703) 620-0010
BICSI	BICSI, Inc. www.bicsi.org	(800) 242-7405 (813) 979-1991
BIFMA	BIFMA International (Business and Institutional Furniture Manufacturer's Association International) www.bifma.com	(616) 285-3963
BISSC	Baking Industry Sanitation Standards Committee www.bissc.org	(866) 342-4772
CCC	Carpet Cushion Council	(610) 527-3880

	www.carpetcushion.org	
CDA	Copper Development Association www.copper.org	(800) 232-3282 (212) 251-7200
CEA	Canadian Electricity Association www.canelect.ca	(613) 230-9263
CEA	Consumer Electronics Association www.ce.org	(866) 858-1555 (703) 907-7600
CFFA	Chemical Fabrics & Film Association, Inc. www.chemicalfabricsandfilm.com	(216) 241-7333
CGA	Compressed Gas Association www.cganet.com	(703) 788-2700
CIMA	Cellulose Insulation Manufacturers Association www.cellulose.org	(888) 881-2462 (937) 222-2462
CISCA	Ceilings & Interior Systems Construction Association www.cisca.org	(630) 584-1919
CISPI	Cast Iron Soil Pipe Institute www.cispi.org	(423) 892-0137
CLFMI	Chain Link Fence Manufacturers Institute www.chainlinkinfo.org	(301) 596-2583
CPA	Composite Panel Association www.pbmdf.com	 (703) 724-1128
CRI	Carpet and Rug Institute (The) www.carpet-rug.com	(800) 882-8846 (706) 278-3176
CRRC	Cool Roof Rating Council www.coolroofs.org	(866) 465-2523 (510) 485-7175
CRSI	Concrete Reinforcing Steel Institute www.crsi.org	(847) 517-1200 (800) 328-6306
CRRC	Cool Roof Rating Council www.coolroofs.org	(866) 465-2523 (510) 485-7175
CSA	Canadian Standards Association www.csa.ca	(800) 463-6727 (416) 747-4000
CSA	CSA International (Formerly: IAS - International Approval Services) www.csa-international.org	(866) 797-4272 (416) 747-4000
CSI	Construction Specifications Institute (The) www.csinet.org	(800) 689-2900 (703) 684-0300
CSSB	Cedar Shake & Shingle Bureau www.cedarbureau.org	(604) 820-7700

CTI	Cooling Technology Institute (Formerly: Cooling Tower Institute) www.cti.org	(281) 583-4087
DHI	Door and Hardware Institute www.dhi.org	(703) 222-2010
ECA	Electrical Components Association www.ec-central.org	(703)907-8024
EIA	Electronic Industries Alliance www.eia.org	(703) 907-7500
EIMA	EIFS Industry Members Association www.eima.com	(800) 294-3462 (770) 968-7945
EJCDC	Engineers Joint Contract Documents Committee http://content.asce.org/ejcdc/	(703) 295-6000
EJMA	Expansion Joint Manufacturers Association, Inc. www.ejma.org	(914) 332-0040
ESD	ESD Association (Electrostatic Discharge Association) www.esda.org	(315) 339-6937
ETL SEMCO	Intertek ETL SEMCO (Formerly: ITS - Intertek Testing Service NA) www.intertek-etlsemko.com	(800) 967-5352
FIBA	Federation Internationale de Basketball (The International Basketball Federation) www.fiba.com	41 22 545 00 00
FIVB	Federation Internationale de Volleyball (The International Volleyball Federation) www.fivb.ch	41 21 345 35 35
FM Approvals	FM Approvals LLC www.fmglobal.com	(781) 762-4300
FM Global	FM Global (Formerly: FMG - FM Global) www.fmglobal.com	(401) 275-3000
FRSA	Florida Roofing, Sheet Metal & Air Conditioning Contractors Association, Inc. www.floridaroof.com	(407) 671-3772
FSA	Fluid Sealing Association www.fluidsealing.com	(610) 971-4850
FSC	Forest Stewardship Council www.fsc.org	49 228 367 66 0

GA	Gypsum Association www.gypsum.org	(301) 277-8686
GANA	Glass Association of North America www.glasswebsite.com	(785) 271-0208
GRI	(Part of GSI)	
GS	Green Seal www.greenseal.org	(202) 872-6400
GSI	Geosynthetic Institute www.geosynthetic-institute.org	(610) 522-8440
HI	Hydronics Institute www.gamanet.org	(908) 464-8200
HI/GAMA	Hydronics Institute/Gas Appliance Manufacturers Association Division of Air-Conditioning, Heating, and Refrigeration Institute (AHRI) www.ahrinet.org	(908) 464-8200
HMMA	Hollow Metal Manufacturers Association (Part of NAAMM)	
HPVA	Hardwood Plywood & Veneer Association www.hpva.org	(703) 435-2900
HPW	H. P. White Laboratory, Inc. www.hpwhite.com	(410) 838-6550
IAPSC	International Association of Professional Security Consultants www.iapsc.org	(515) 282-8192
ICBO	International Conference of Building Officials www.iccsafe.org	(888) 422-7233
ICEA	Insulated Cable Engineers Association, Inc. www.icea.net	(770) 830-0369
ICRI	International Concrete Repair Institute, Inc. www.icri.org	(847) 827-0830
ICPA	International Cast Polymer Association www.icpa-hq.org	(703) 525-0320
IEC	International Electrotechnical Commission www.iec.ch	41 22 919 02 11
IEEE	Institute of Electrical and Electronics Engineers, Inc. (The) www.ieee.org	(212) 419-7900
IES	Illuminating Engineering Society of North America www.iesna.org	(703) 525-0320
IEST	Institute of Environmental Sciences and Technology	(847) 255-1561

	www.iest.org	
IGMA	Insulating Glass Manufacturers Alliance www.igmaonline.org	(613) 233-1510
ILI	Indiana Limestone Institute of America, Inc. www.iliai.com	(812) 275-4426
ISA	Instrumentation, Systems, and Automation Society, The www.isa.org	(919) 549-8411
ISO	International Organization for Standardization www.iso.ch	41 22 749 01 11
ISSFA	International Solid Surface Fabricators Association www.issfa.net	(877) 464-7732 (801) 341-7360
ITS	Intertek Testing Service NA (Now ETL SEMCO)	
ITU	International Telecommunication Union www.itu.int/home	41 22 730 51 11
KCMA	Kitchen Cabinet Manufacturers Association www.kcma.org	(703) 264-1690
LGSEA	Light Gauge Steel Engineers Association www.arcat.com	(202) 263-4488
LMA	Laminating Materials Association (Now part of CPA)	
LPI	Lightning Protection Institute www.lightning.org	(800) 488-6864
MBMA	Metal Building Manufacturers Association www.mbma.com	(216) 241-7333
MCA	Metal Construction Association www.metalconstruction.org	(847) 375-4718
MFMA	Maple Flooring Manufacturers Association, Inc. www.maplefloor.org	(888) 480-9138
MFMA	Metal Framing Manufacturers Association, Inc. www.metalframingmfg.org	(312) 644-6610
MH	Material Handling (Now MHIA)	
MHIA	Material Handling Industry of America www.mhia.org	(800) 345-1815 (704) 676-1190
MIA	Marble Institute of America www.marble-institute.com	(440) 250-9222

MPI	Master Painters Institute www.paintinfo.com	(888) 674-8937 (604) 298-7578
MSS	Manufacturers Standardization Society of The Valve and Fittings Industry Inc. www.mss-hq.com	(703) 281-6613
NAAMM	National Association of Architectural Metal Manufacturers www.naamm.org	(630) 942-6591
NACE	NACE International (National Association of Corrosion Engineers International) www.nace.org	(800) 797-6223 (281) 228-6200
NADCA	National Air Duct Cleaners Association www.nadca.com	(202) 737-2926
NAGWS	National Association for Girls and Women in Sport www.aahperd.org/nagws/	(800) 213-7193, ext. 453
NAIMA	North American Insulation Manufacturers Association www.naima.org	(703) 684-0084
NBGQA	National Building Granite Quarries Association, Inc. www.nbgqa.com	(800) 557-2848
NCAA	National Collegiate Athletic Association (The) www.ncaa.org	(317) 917-6222
NCMA	National Concrete Masonry Association www.ncma.org	(703) 713-1900
NCTA	National Cable & Telecommunications Association www.ncta.com	(202) 222-2300
NEBB	National Environmental Balancing Bureau www.nebb.org	(301) 977-3698
NECA	National Electrical Contractors Association www.necanet.org	(301) 657-3110
NeLMA	Northeastern Lumber Manufacturers' Association www.nelma.org	(207) 829-6901
NEMA	National Electrical Manufacturers Association www.nema.org	(703) 841-3200
NETA	InterNational Electrical Testing Association www.netaworld.org	(888) 300-6382 (269) 488-6382
NFHS	National Federation of State High School Associations www.nfhs.org	(317) 972-6900
NFPA	NFPA (National Fire Protection Association)	(800) 344-3555 (617) 770-3000

	www.nfpa.org	
NFRC	National Fenestration Rating Council www.nfrc.org	(301) 589-1776
NGA	National Glass Association www.glass.org	(866) 342-5642 (703) 442-4890
NHLA	National Hardwood Lumber Association www.natlhardwood.org	(800) 933-0318 (901) 377-1818
NLGA	National Lumber Grades Authority www.nlga.org	(604) 524-2393
NOFMA	NOFMA: The Wood Flooring Manufacturers Association (Formerly: National Oak Flooring Manufacturers Association) www.nofma.org	(901) 526-5016
NOMMA	National Ornamental & Miscellaneous Metals Association www.nomma.org	(888) 516-8585
NRCA	National Roofing Contractors Association www.nrca.net	(800) 323-9545 (847) 299-9070
NRMCA	National Ready Mixed Concrete Association www.nrmca.org	(888) 846-7622 (301) 587-1400
NSF	NSF International (National Sanitation Foundation International) www.nsf.org	(800) 673-6275 (734) 769-8010
NSSGA	National Stone, Sand & Gravel Association www.nssga.org	(800) 342-1415 (703) 525-8788
NTMA	National Terrazzo & Mosaic Association, Inc. (The) www.ntma.com	(800) 323-9736 (540) 751-0930
NWFA	National Wood Flooring Association www.nwfa.org	(800) 422-4556 (636) 519-9663
PCI	Precast/Prestressed Concrete Institute www.pci.org	(312) 786-0300
PDI	Plumbing & Drainage Institute www.pdionline.org	(800) 589-8956 (978) 557-0720
PGI	PVC Geomembrane Institute http://pgi-tp.cee.uiuc.edu	(217) 333-3929
PTI	Post-Tensioning Institute www.post-tensioning.org	(248) 848-3180
RCSC	Research Council on Structural Connections www.boltcouncil.org	
RFCI	Resilient Floor Covering Institute	

	www.rfci.com	(706) 882-3833
RIS	Redwood Inspection Service www.redwoodinspection.com	(925) 935-1499
SAE	SAE International www.sae.org	(877) 606-7323 (724) 776-4841
SCAQMD	South Coast Air Quality Management District www.aqmd.com	(909) 396-2000
SCTE	Society of Cable Telecommunications Engineers www.scte.org	(800) 542-5040 (610) 363-6888
SDI	Steel Deck Institute www.sdi.org	(847) 458-4647
SDI	Steel Door Institute www.steeldoor.org	(440) 899-0010
SEFA	Scientific Equipment and Furniture Association www.sefalabs.com	(877) 294-5424 (516) 294-5424
SEI/ASCE	Structural Engineering Institute/American Society of Civil Engineers (See ASCE)	
SIA	Security Industry Association www.siaonline.org	(866) 817-8888 (703) 683-2075
SJI	Steel Joist Institute www.steeljoist.org	(843) 626-1995
SMA	Screen Manufacturers Association www.smacentral.org	(561) 533-0991
SMACNA	Sheet Metal and Air Conditioning Contractors' National Association www.smacna.org	(703) 803-2980
SMPTE	Society of Motion Picture and Television Engineers www.smpte.org	(914) 761-1100
SPFA	Spray Polyurethane Foam Alliance (Formerly: SPI/SPFD - The Society of the Plastics Industry, Inc.; Spray Polyurethane Foam Division) www.sprayfoam.org	(800) 523-6154
SPIB	Southern Pine Inspection Bureau (The) www.spib.org	(850) 434-2611
SPRI	Single Ply Roofing Industry www.spri.org	(781) 647-7026
SSINA	Specialty Steel Industry of North America www.ssina.com	(800) 982-0355 (202) 342-8630

SSPC	SSPC: The Society for Protective Coatings www.sspc.org	(877) 281-7772 (412) 281-2331
STI	Steel Tank Institute www.steeltank.com	(847) 438-8265
SWI	Steel Window Institute www.steelwindows.com	(216) 241-7333
SWPA	Submersible Wastewater Pump Association www.swpa.org	(847) 681-1868
TCA	Tilt-Up Concrete Association www.tilt-up.org	(319) 895-6911
TCNA	Tile Council of North America, Inc. www.tileusa.com	(864) 646-8453
TEMA	Tubular Exchanger Manufacturers Association www.tema.org	(914) 332-0040
TIA/EIA	Telecommunications Industry Association/Electronic Industries Alliance www.tiaonline.org	(703) 907-7700
TMS	The Masonry Society www.masonrysociety.org	(303) 939-9700
TPI	Truss Plate Institute, Inc. www.tpinst.org	(703) 683-1010
TPI	Turfgrass Producers International www.turfgrasssod.org	(800) 405-8873 (847) 649-5555
TRI	Tile Roofing Institute www.tileroofing.org	(312) 670-4177
UL	Underwriters Laboratories Inc. www.ul.com	(877) 854-3577 (847) 272-8800
UNI	Uni-Bell PVC Pipe Association www.uni-bell.org	(972) 243-3902
USAV	USA Volleyball www.usavolleyball.org	(888) 786-5539 (719) 228-6800
USGBC	U.S. Green Building Council www.usgbc.org	(800) 795-1747
USITT	United States Institute for Theatre Technology, Inc. www.usitt.org	(800) 938-7488 (315) 463-6463
WASTEC	Waste Equipment Technology Association www.wastec.org	(800) 424-2869 (202) 244-4700

WCLIB	West Coast Lumber Inspection Bureau www.wclib.org	(800) 283-1486 (503) 639-0651
WCMA	Window Covering Manufacturers Association www.wcmanet.org	(212) 297-2122
WDMA	Window & Door Manufacturers Association (Formerly: NWWDA - National Wood Window and Door Association) www.wdma.com	(800) 223-2301 (312) 321-6802
WI	Woodwork Institute (Formerly: WIC - Woodwork Institute of California) www.wicnet.org	(916) 372-9943
WMMPA	Wood Moulding & Millwork Producers Association www.wmmpa.com	(800) 550-7889 (530) 661-9591
WSRCA	Western States Roofing Contractors Association www.wsrca.com	(800) 725-0333 (650) 570-5441
WWPA	Western Wood Products Association www.wwpa.org	(503) 224-3930

C. Code Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Names, telephone numbers, and Web sites are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

DIN	Deutsches Institut fur Normung e.V. www.din.de	49 30 2601-0
IAPMO	International Association of Plumbing and Mechanical Officials www.iapmo.org	(909) 472-4100
ICC	International Code Council www.iccsafe.org	(888) 422-7233
ICC-ES	ICC Evaluation Service, Inc. www.icc-es.org	(800) 423-6587 (562) 699-0543

D. Federal Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Names, telephone numbers, and Web sites are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

COE	Army Corps of Engineers www.usace.army.mil	(202) 761-0011
CPSC	Consumer Product Safety Commission www.cpsc.gov	(800) 638-2772 (301) 504-7923
DOC	Department of Commerce www.commerce.gov	(202) 482-2000

DOD	Department of Defense http://dodssp.daps.dla.mil	(215) 697-6257
DOE	Department of Energy www.energy.gov	(202) 586-9220
EPA	Environmental Protection Agency www.epa.gov	(202) 272-0167
FAA	Federal Aviation Administration www.faa.gov	(866) 835-5322
FCC	Federal Communications Commission www.fcc.gov	(888) 225-5322
FDA	Food and Drug Administration www.fda.gov	(888) 463-6332
GSA	General Services Administration www.gsa.gov	(800) 488-3111
HUD	Department of Housing and Urban Development www.hud.gov	(202) 708-1112
LBL	Lawrence Berkeley National Laboratory www.lbl.gov	(510) 486-4000
NCHRP	National Cooperative Highway Research Program (See TRB)	
NIST	National Institute of Standards and Technology www.nist.gov	(301) 975-6478
OSHA	Occupational Safety & Health Administration www.osha.gov	(800) 321-6742 (202) 693-1999
PBS	Public Buildings Service (See GSA)	
PHS	Office of Public Health and Science http://www.hhs.gov/ophs/	(202) 690-7694
RUS	Rural Utilities Service (See USDA)	(202) 720-9540
SD	State Department www.state.gov	(202) 647-4000
TRB	Transportation Research Board http://gulliver.trb.org	(202) 334-2934
USDA	Department of Agriculture www.usda.gov	(202) 720-2791
USP	U.S. Pharmacopeia www.usp.org	(800) 227-8772

USPS	Postal Service www.usps.com	(202) 268-2000

E. Standards and Regulations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the standards and regulations in the following list. Names, telephone numbers, and Web sites are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

ADAAG	Americans with Disabilities Act (ADA)	(800) 872-2253
	Architectural Barriers Act (ABA)	(202) 272-0080
	Accessibility Guidelines for Buildings and Facilities Available from U.S. Access Board www.access-board.gov	
CFR	Code of Federal Regulations	(866) 512-1800
	Available from Government Printing Office	(202) 512-1800
	www.gpoaccess.gov/cfr/index.html	
DOD	Department of Defense Military Specifications and Standards	(215) 697-2664
	Available from Department of Defense Single Stock Point http://dodssp.daps.dla.mil	
DSCC	Defense Supply Center Columbus (See FS)	
FED-STD	Federal Standard (See FS)	
FS	Federal Specification	(215) 697-2664
	Available from Department of Defense Single Stock Point http://dodssp.daps.dla.mil/	
	Available from Defense Standardization Program www.dsp.dla.mil	
	Available from General Services Administration	(202) 619-8925
	www.gsa.gov	
	Available from National Institute of Building Sciences	(202) 289-7800
	www.wbdg.org/ccb	
FTMS	Federal Test Method Standard (See FS)	
MIL	(See MILSPEC)	

MIL-STD	(See MILSPEC)	
MILSPEC	Military Specification and Standards Available from Department of Defense Single Stock Point http://dodssp.daps.dla.mil	(215) 697-2664
UFAS	Uniform Federal Accessibility Standards Available from Access Board www.access-board.gov	(800) 872-2253 (202) 272-0080

F. State Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Names, telephone numbers, and Web sites are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

CBHF	State of California, Department of Consumer Affairs Bureau of Home Furnishings and Thermal Insulation www.dca.ca.gov/bhfti	(800) 952-5210 (916) 574-2041
CCR	California Code of Regulations www.calregs.com	(916) 323-6815
CDHS	California Department of Health Services www.dhcs.ca.gov	(916) 445-4171
CDPH	California Department of Public Health, Indoor Air Quality Section www.cal-iaq.org	
CPUC	California Public Utilities Commission www.cpuc.ca.gov	(415) 703-2782
TFS	Texas Forest Service Forest Resource Development http://txforestservice.tamu.edu	(979) 458-6606

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01420

SECTION 01500 - TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes requirements for temporary utilities, support facilities, and security and protection facilities.

B. Related Requirements:

1. Section 01100 "Summary" for limitations on work restrictions and utility interruptions.
2. Section 02751 "Cement Concrete Pavement" for construction and maintenance of cement concrete pavement for temporary roads and paved areas.

1.3 USE CHARGES

A. General: Installation and removal of and use charges for temporary facilities shall be included in the Contract Sum unless otherwise indicated. Allow other entities to use temporary services and facilities without cost, including, but not limited to, Owner's construction forces, Architect, testing agencies, and authorities having jurisdiction.

B. Sewer Service: Pay sewer-service use charges for sewer usage by all entities for construction operations.

C. Water Service: Pay water-service use charges for water used by all entities for construction operations.

D. Electric Power Service: Pay electric-power-service use charges for electricity used by all entities for construction operations.

1.4 INFORMATIONAL SUBMITTALS

A. Site Plan: Show temporary facilities, utility hookups, staging areas, and parking areas for construction personnel.

B. Fire-Safety Program: Show compliance with requirements of NFPA 241 and authorities having jurisdiction. Indicate Contractor personnel responsible for management of fire-prevention program.

C. Moisture-Protection Plan: Describe procedures and controls for protecting materials and construction from water absorption and damage.

1. Describe delivery, handling, and storage provisions for materials subject to water absorption or water damage.
2. Indicate procedures for discarding water-damaged materials, protocols for mitigating water intrusion into completed Work, and replacing water-damaged Work.
3. Indicate sequencing of work that requires water, such as sprayed fire-resistive materials, plastering, and terrazzo grinding, and describe plans for dealing with water from these operations. Show procedures for verifying that wet construction has dried sufficiently to permit installation of finish materials.

1.5 QUALITY ASSURANCE

A. Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.

B. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.

C. Accessible Temporary Egress: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines and ICC/ANSI A117.1.

1.6 PROJECT CONDITIONS

A. Temporary Use of Permanent Facilities: Engage Installer of each permanent service to assume responsibility for operation, maintenance, and protection of each permanent service during its use as a construction facility before Owner's acceptance, regardless of previously assigned responsibilities.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Chain-Link Fencing: Minimum 2-inch (50-mm), 0.148-inch- (3.8-mm-) thick, galvanized-steel, chain-link fabric fencing; minimum 6 feet (1.8 m) high with galvanized-steel pipe posts; minimum 2-3/8-inch- (60-mm-) OD line posts and 2-7/8-inch- (73-mm-) OD corner and pull posts, with 1-5/8-inch- (42-mm-) OD top rails .

2.2 TEMPORARY FACILITIES

A. Field Offices, General: Prefabricated or mobile units with serviceable finishes, temperature controls, and foundations adequate for normal loading.

B. Common-Use Field Office: Of sufficient size to accommodate needs of Owner, Architectand construction personnel office activities and to accommodate Project meetings specified in other Division 01 Sections. Keep office clean and orderly. Furnish and equip offices as follows:

1. Furniture required for Project-site documents including file cabinets, plan tables, plan racks, and bookcases.
2. Conference room of sufficient size to accommodate meetings of 10 individuals. Provide electrical power service and 120-V ac duplex receptacles, with no fewer than one receptacle on each wall. Furnish room with conference table, chairs, and 4-foot- (1.2-m-) square tack and marker boards.
3. Drinking water and private toilet.
4. Coffee machine and supplies.
5. Heating and cooling equipment necessary to maintain a uniform indoor temperature of 68 to 72 deg F (20 to 22 deg C).
6. Lighting fixtures capable of maintaining average illumination of 20 fc (215 lx) at desk height.

C. Storage and Fabrication Sheds: Provide sheds sized, furnished, and equipped to accommodate materials and equipment for construction operations.

1. Store combustible materials apart from building.

2.3 EQUIPMENT

A. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.

B. HVAC Equipment: Unless Owner authorizes use of permanent HVAC system, provide vented, self-contained, liquid-propane-gas or fuel-oil heaters with individual space thermostatic control.

1. Use of gasoline-burning space heaters, open-flame heaters, or salamander-type heating units is prohibited.
2. Heating Units: Listed and labeled for type of fuel being consumed, by a qualified testing agency acceptable to authorities having jurisdiction, and marked for intended location and application.
3. Permanent HVAC System: If Owner authorizes use of permanent HVAC system for temporary use during construction, provide filter with MERV of 8 at each return-air grille in system and remove at end of construction and clean HVAC system as required in Section 01770 "Closeout Procedures".

C. Air-Filtration Units: Primary and secondary HEPA-filter-equipped portable units with four-stage filtration. Provide single switch for emergency shutoff. Configure to run continuously.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required by progress of the Work.

1. Locate facilities to limit site disturbance as specified in Section 01100 "Summary."

B. Provide each facility ready for use when needed to avoid delay. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

3.2 TEMPORARY UTILITY INSTALLATION

A. General: Install temporary service or connect to existing service.

1. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.

B. Sewers and Drainage: Provide temporary utilities to remove effluent lawfully.

1. Connect temporary sewers to municipal system as directed by authorities having jurisdiction.

C. Water Service: Install water service and distribution piping in sizes and pressures adequate for construction.

D. Sanitary Facilities: Provide temporary toilets, wash facilities, and drinking water for use of construction personnel. Comply with requirements of authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities.

E. Heating and Cooling: Provide temporary heating and cooling required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of low temperatures or high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed.

F. Ventilation and Humidity Control: Provide temporary ventilation required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of high humidity. Select equipment that will

not have a harmful effect on completed installations or elements being installed. Coordinate ventilation requirements to produce ambient condition required and minimize energy consumption.

1. Provide dehumidification systems when required to reduce substrate moisture levels to level required to allow installation or application of finishes.

G. Electric Power Service: Provide electric power service and distribution system of sufficient size, capacity, and power characteristics required for construction operations.

1. Install electric power service underground unless otherwise indicated.

H. Lighting: Provide temporary lighting with local switching that provides adequate illumination for construction operations, observations, inspections, and traffic conditions.

1. Install and operate temporary lighting that fulfills security and protection requirements without operating entire system.
2. Install lighting for Project identification sign.

I. Telephone Service: Provide temporary telephone service in common-use facilities for use by all construction personnel. Install one telephone line(s) for each field office.

1. Provide additional telephone lines for the following:

    a. Provide a dedicated telephone line for each facsimile machine in each field office.

2. At each telephone, post a list of important telephone numbers.

    a. Police and fire departments.
    b. Ambulance service.
    c. Contractor's home office.
    d. Contractor's emergency after-hours telephone number.
    e. Architect's office.
    f. Engineers' offices.
    g. Owner's office.
    h. Principal subcontractors' field and home offices.

3. Provide superintendent with cellular telephone or portable two-way radio for use when away from field office.

J. Electronic Communication Service: Provide a desktop computer in the primary field office adequate for use by Architect and Owner to access Project electronic documents and maintain electronic communications. Equip computer with not less than the following:

1. Processor: Intel Pentium D or Intel CoreDuo, 3.0 GHz processing speed.
2. Memory: 4 gigabyte.

3. Disk Storage: 300 gigabyte hard-disk drive and combination DVD-RW/CD-RW drive.
4. Display: 22-inch (560-mm) LCD monitor with 256-Mb dedicated video RAM.
5. Full-size keyboard and mouse.
6. Network Connectivity: 10/100BaseT Ethernet.
7. Operating System: Microsoft Windows XP Professional or Microsoft Windows Vista Business.
8. Productivity Software:

    a. Microsoft Office Professional, XP or higher, including Word, Excel, and Outlook.
    b. Adobe Reader 7.0 or higher.
    c. WinZip 7.0 or higher.

9. Printer: "All-in-one" unit equipped with printer server, combining color printing, photocopying, scanning, and faxing, or separate units for each of these three functions.
10. Internet Service: Broadband modem, router and ISP, equipped with hardware firewall, providing minimum 384 Kbps upload and 1 Mbps download speeds at each computer.
11. Internet Security: Integrated software, providing software firewall, virus, spyware, phishing, and spam protection in a combined application.
12. Backup: External hard drive, minimum 40 gigabyte, with automated backup software providing daily backups.

3.3 SUPPORT FACILITIES INSTALLATION

A. General: Comply with the following:

1. Provide construction for temporary offices, shops, and sheds located within construction area or within 30 feet (9 m) of building lines that is noncombustible according to ASTM E 136. Comply with NFPA 241.
2. Maintain support facilities until Architect schedules Substantial Completion inspection. Remove before Substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to Owner.

B. Temporary Roads and Paved Areas: Construct and maintain temporary roads and paved areas adequate for construction operations. Locate temporary roads and paved areas within construction limits indicated on Drawings.

1. Provide dust-control treatment that is nonpolluting and nontracking. Reapply treatment as required to minimize dust.

C. Temporary Use of Permanent Roads and Paved Areas: Locate temporary roads and paved areas in same location as permanent roads and paved areas. Construct and maintain temporary roads and paved areas adequate for construction operations. Extend temporary roads and paved areas, within construction limits indicated, as necessary for construction operations.

1. Coordinate elevations of temporary roads and paved areas with permanent roads and paved areas.
2. Prepare subgrade and install subbase and base for temporary roads and paved areas according to Section 02300 "Earthwork."
3. Recondition base after temporary use, including removing contaminated material, regrading, proofrolling, compacting, and testing.

D. Traffic Controls: Comply with requirements of authorities having jurisdiction.

1. Protect existing site improvements to remain including curbs, pavement, and utilities.
2. Maintain access for fire-fighting equipment and access to fire hydrants.

E. Parking: Provide temporary parking areas for construction personnel.

F. Project Signs: Provide Project signs as indicated. Unauthorized signs are not permitted.

1. Identification Signs: Provide Project identification signs as indicated on Drawings.
2. Temporary Signs: Provide other signs as indicated and as required to inform public and individuals seeking entrance to Project.

    a. Provide temporary, directional signs for construction personnel and visitors.

3. Maintain and touchup signs so they are legible at all times.

G. Waste Disposal Facilities: Provide waste-collection containers in sizes adequate to handle waste from construction operations. Comply with requirements of authorities having jurisdiction. Comply with progress cleaning requirements in Section 01700 "Execution Requirements."

H. Lifts and Hoists: Provide facilities necessary for hoisting materials and personnel.

1. Truck cranes and similar devices used for hoisting materials are considered "tools and equipment" and not temporary facilities.

I. Temporary Stairs: Until permanent stairs are available, provide temporary stairs where ladders are not adequate.

1.

J. Temporary Use of Permanent Stairs: Use of new stairs for construction traffic will be permitted, provided stairs are protected and finishes restored to new condition at time of Substantial Completion.

3.4 SECURITY AND PROTECTION FACILITIES INSTALLATION

A. Protection of Existing Facilities: Protect existing vegetation, equipment, structures, utilities, and other improvements at Project site and on adjacent properties, except those indicated to be removed or altered. Repair damage to existing facilities.

B. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction as required to comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.

1. Comply with work restrictions specified in Section 01100 "Summary."

C. Temporary Erosion and Sedimentation Control: Provide measures to prevent soil erosion and discharge of soil-bearing water runoff and airborne dust to undisturbed areas and to adjacent properties and walkways, according to requirements of 2003 EPA Construction General Permit or authorities having jurisdiction, whichever is more stringent.

1. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross tree- or plant- protection zones.
2. Inspect, repair, and maintain erosion- and sedimentation-control measures during construction until permanent vegetation has been established.
3. Clean, repair, and restore adjoining properties and roads affected by erosion and sedimentation from Project site during the course of Project.
4. Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

D. Stormwater Control: Comply with requirements of authorities having jurisdiction. Provide barriers in and around excavations and subgrade construction to prevent flooding by runoff of stormwater from heavy rains.

E. Tree and Plant Protection: Comply with requirements specified in Section 02480 "Landscape Protection During Construction."

3.5 Tree and Plant Protection: Install temporary fencing located as indicated or outside the drip line of trees to protect vegetation from damage from construction operations. Protect tree root systems from damage, flooding, and erosion.

A. Pest Control: Engage pest-control service to recommend practices to minimize attraction and harboring of rodents, roaches, and other pests and to perform extermination and control procedures at regular intervals so Project will be free of pests and their residues at Substantial Completion. Perform control operations lawfully, using environmentally safe materials.

B. Site Enclosure Fence: Before construction operations begin , furnish and install site enclosure fence in a manner that will prevent people and animals from easily entering site except by entrance gates.

1. Extent of Fence:] As indicated on Drawings.
2. Maintain security by limiting number of keys and restricting distribution to authorized personnel. Furnish one set of keys to Owner.

C. Security Enclosure and Lockup: Install temporary enclosure around partially completed areas of construction. Provide lockable entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security. Lock entrances at end of each work day.

D. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.

E. Temporary Egress: Maintain temporary egress from existing occupied facilities as indicated and as required by authorities having jurisdiction.

F. Temporary Enclosures: Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities. Provide temporary weathertight enclosure for building exterior.

1. Where heating or cooling is needed and permanent enclosure is incomplete, insulate temporary enclosures.

G. Temporary Fire Protection: Install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241; manage fire-prevention program.

1. Prohibit smoking in construction areas.
2. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition according to requirements of authorities having jurisdiction.
3. Develop and supervise an overall fire-prevention and -protection program for personnel at Project site. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.
4. Provide temporary standpipes and hoses for fire protection. Hang hoses with a warning sign stating that hoses are for fire-protection purposes only and are not to be removed. Match hose size with outlet size and equip with suitable nozzles.

3.6 MOISTURE AND MOLD CONTROL

A. Contractor's Moisture-Protection Plan: Avoid trapping water in finished work. Document visible signs of mold that may appear during construction.

B. Exposed Construction Phase: Before installation of weather barriers, when materials are subject to wetting and exposure and to airborne mold spores, protect as follows:

1. Protect porous materials from water damage.
2. Protect stored and installed material from flowing or standing water.

3. Keep porous and organic materials from coming into prolonged contact with concrete.
4. Remove standing water from decks.
5. Keep deck openings covered or dammed.

C. Partially Enclosed Construction Phase: After installation of weather barriers but before full enclosure and conditioning of building, when installed materials are still subject to infiltration of moisture and ambient mold spores, protect as follows:

1. Do not load or install drywall or other porous materials or components, or items with high organic content, into partially enclosed building.
2. Keep interior spaces reasonably clean and protected from water damage.
3. Periodically collect and remove waste containing cellulose or other organic matter.
4. Discard or replace water-damaged material.
5. Do not install material that is wet.
6. Discard, replace, or clean stored or installed material that begins to grow mold.
7. Perform work in a sequence that allows any wet materials adequate time to dry before enclosing the material in drywall or other interior finishes.

D. Controlled Construction Phase of Construction: After completing and sealing of the building enclosure but prior to the full operation of permanent HVAC systems, maintain as follows:

1. Control moisture and humidity inside building by maintaining effective dry-in conditions.
2. Use permanent HVAC system to control humidity.
3. Comply with manufacturer's written instructions for temperature, relative humidity, and exposure to water limits.

    a. Hygroscopic materials that may support mold growth, including wood and gypsum-based products, that become wet during the course of construction and remain wet for 48 hours are considered defective.
    b. Measure moisture content of materials that have been exposed to moisture during construction operations or after installation. Record readings beginning at time of exposure and continuing daily for 48 hours. Identify materials containing moisture levels higher than allowed. Report findings in writing to Architect.
    c. Remove materials that can not be completely restored to their manufactured moisture level within 48 hours.

3.7 OPERATION, TERMINATION, AND REMOVAL

A. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.

B. Maintenance: Maintain facilities in good operating condition until removal.

1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.

C. Operate Project-identification-sign lighting daily from dusk until 12:00 midnight.

D. Temporary Facility Changeover: Do not change over from using temporary security and protection facilities to permanent facilities until Substantial Completion.

E. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.

1. Materials and facilities that constitute temporary facilities are property of Contractor. Owner reserves right to take possession of Project identification signs.
2. Remove temporary roads and paved areas not intended for or acceptable for integration into permanent construction. Where area is intended for landscape development, remove soil and aggregate fill that do not comply with requirements for fill or subsoil. Remove materials contaminated with road oil, asphalt and other petrochemical compounds, and other substances that might impair growth of plant materials or lawns. Repair or replace street paving, curbs, and sidewalks at temporary entrances, as required by authorities having jurisdiction.
3. At Substantial Completion, repair, renovate, and clean permanent facilities used during construction period. Comply with final cleaning requirements specified in Section 01770 "Closeout Procedures."

END OF SECTION 01500

SECTION 01505 - MOBILIZATION

PART 1 -- GENERAL

1.1 GENERAL

A. Mobilization shall include the obtaining of all permits; moving onto the site and equipment, and other construction facilities; and implementing security requirements; all as required for the proper performance and completion of the WORK. Mobilization shall include the following principal items:

1. Moving on to the site of all CONTRACTOR's equipment required for first month operations.

2. Installing temporary construction power, wiring, and lighting facilities.

3. Establishing fire protection system.

4. Developing construction water supply.

5. Providing on-site sanitary facilities and potable water facilities.

6. Arranging for and erection of CONTRACTOR's work and storage yard.

7. Constructing and implementing security features

8. Obtaining all required permits.

9. Having all OSHA required notices and establishment of safety programs.

10. Having the CONTRACTOR's superintendent at the job site full time.

11. Submitting initial submittals.

1.2 PAYMENT FOR MOBILIZATION

A. The CONTRACTOR's attention is directed to the condition that 3 percent of the total Contract Price will be deducted from any money due the CONTRACTOR as progress payments until all mobilization items listed above have been completed as specified. The aforementioned amount will be retained by the OWNER as the agreed, estimated value of completing all of the mobilization items listed. Any such retention of money for failure to complete all such mobilization items as a lump-sum item shall be in addition to the retention of any payments due to the CONTRACTOR as specified in Article 9 of the General Conditions of the Contract.

PART 2 -- PRODUCTS (Not Used)

PART 3 -- EXECUTION (Not Used)

- END OF SECTION -

SECTION 01530 - PROTECTION OF EXISTING FACILITIES

PART 1 -- GENERAL

1.1 GENERAL

A. The CONTRACTOR shall protect all existing utilities and improvements not designated for removal and shall restore damaged or temporarily relocated utilities and improvements to a condition equal to or better than prior to such damage or temporary relocation, all in accordance with the Contract Documents.

1.2 RIGHTS-OF-WAY

A. The CONTRACTOR shall not do any WORK that would affect any oil, gas, sewer, or water pipeline; any telephone, telegraph, or electric transmission line; any fence; or any other structure, nor shall the CONTRACTOR enter upon the rights-of-way involved until notified that the OWNER has secured authority therefore from the proper party. Copies of encroachment agreements, if any, for work in existing rights of way are included at the end of Section 01313 - Construction and Schedule Constraints. The CONTRACTOR shall implement actions required by those agreements.

B. After authority has been obtained, the CONTRACTOR shall give said party due notice of its intention to begin work, if required by said party, and shall remove, shore, support, or otherwise protect such pipeline, transmission line, ditch, fence, or structure, or replace the same.

1.3 PROTECTION OF STREET OR ROADWAY MARKERS

A. The CONTRACTOR shall not destroy, remove, or otherwise disturb any existing survey markers or other existing street or roadway markers without proper authorization. No pavement breaking or excavation shall be started until all survey or other permanent marker points that will be disturbed by the construction operations have been properly referenced. Survey markers or points disturbed by the CONTRACTOR shall be accurately restored after street or roadway resurfacing has been completed.

1.4 RESTORATION OF PAVEMENT

A. General: All paved areas including asphaltic concrete berms cut or damaged during construction shall be replaced with similar materials of equal thickness to match the existing adjacent undisturbed areas, except where specific resurfacing requirements have been called for in the Contract Documents or in the requirements of the agency issuing the permit. The pavement restoration requirement to match existing sections shall apply to all components of existing sections, including sub-base, base, and pavement. Temporary and permanent pavement shall conform to the requirements of the affected pavement owner. Pavements which are subject to partial removal shall be neatly saw cut in straight lines.

B. Temporary Resurfacing: Wherever required by the public authorities having jurisdiction, the CONTRACTOR shall place temporary surfacing promptly after backfilling and shall maintain such surfacing for the period of time fixed by said authorities before proceeding with the final restoration of improvements.

C. Permanent Resurfacing: In order to obtain a satisfactory junction with adjacent surfaces, the CONTRACTOR shall saw cut back and trim the edge so as to provide a clean, sound, vertical joint

before permanent replacement of an excavated or damaged portion of pavement. Damaged edges of pavement along excavations and elsewhere shall be trimmed back by saw cutting in straight lines. All pavement restoration and other facilities restoration shall be constructed to finish grades compatible with adjacent undisturbed pavement.

D. Restoration of Sidewalks or Private Driveways: Wherever sidewalks or private roads have been removed for purposes of construction, the CONTRACTOR shall place suitable temporary sidewalks or roadways promptly after backfilling and shall maintain them in satisfactory condition for the period of time fixed by the authorities having jurisdiction over the affected portions. If no such period of time is so fixed, the CONTRACTOR shall maintain said temporary sidewalks or roadways until the final restoration thereof has been made.

1.5 EXISTING UTILITIES AND IMPROVEMENTS

A. General: The CONTRACTOR shall protect underground Utilities and other improvements which may be impaired during construction operations, regardless of whether or not the Utilities are indicated on the Drawings. The CONTRACTOR shall take all possible precautions for the protection of unforeseen Utility lines to provide for uninterrupted service and to provide such special protection as may be necessary.

B. Except where the Drawings indicate Utilities have been field located during design or certain Utility locations shall be exposed as part of the WORK, the CONTRACTOR shall be responsible for exploratory excavations as it deems necessary to determine the exact locations and depths of Utilities which may interfere with its work. All such exploratory excavations shall be performed as soon as practicable after Notice to Proceed and, in any event, a sufficient time in advance of construction to avoid possible delays to the CONTRACTOR's progress. When such exploratory excavations show the Utility location as shown on the Drawings to be in error, the CONTRACTOR shall so notify the ENGINEER.

C. The number of exploratory excavations required shall be that number which is sufficient to determine the alignment and grade of the Utility.

D. Utilities to be Moved: In case it shall be necessary to move the property of any public utility or franchise holder, such utility company or franchise holder will, upon request of the CONTRACTOR, be notified by the OWNER to move such property within a specified reasonable time. When utility lines that are to be removed are encountered within the area of operations, the CONTRACTOR shall notify the ENGINEER a sufficient time in advance for the necessary measures to be taken to prevent interruption of service.

E. Utilities to be Removed: Where the proper completion of the WORK requires the temporary or permanent removal and/or relocation of an existing Utility or other improvement which is indicated, the CONTRACTOR shall remove and, without unnecessary delay, temporarily replace or relocate such Utility or improvement in a manner satisfactory to the ENGINEER and the owner of the facility. In all cases of such temporary removal or relocation, restoration to the former location shall be accomplished by the CONTRACTOR in a manner that will restore or replace the Utility or improvement as nearly as possible to its former locations and to as good or better condition than found prior to removal.

F. OWNER's Right of Access: The right is reserved to the OWNER and to the owners of public utilities and franchises to enter at any time upon any public street, alley, right-of-way, or easement for the purpose of making changes in their property made necessary by the WORK of this Contract.

G. Underground Utilities Indicated: Existing Utility lines that are indicated or the locations of which are made known to the CONTRACTOR prior to excavation and that are to be retained, and all Utility lines that are constructed during excavation operations shall be protected from damage during excavation and backfilling and, if damaged, shall be immediately repaired or replaced by the CONTRACTOR, unless otherwise repaired by the owner of the damaged Utility. If the owner of the damaged facility performs its own repairs, the CONTRACTOR shall reimburse said owner for the costs of repair.

H. Underground Utilities Not Indicated: In the event that the CONTRACTOR damages existing Utility lines that are not indicated or the locations of which are not made known to the CONTRACTOR prior to excavation, a verbal report of such damage shall be made immediately to the ENGINEER and a written report thereof shall be made promptly thereafter. The ENGINEER will immediately notify the owner of the damaged Utility. If the ENGINEER is not immediately available, the CONTRACTOR shall notify the Utility owner of the damage. If directed by the ENGINEER, repairs shall be made by the CONTRACTOR under the provisions for changes and extra work contained in the General Conditions.

I. Costs of locating and repairing damage not due to failure of the CONTRACTOR to exercise reasonable care, and removing or relocating such Utility facilities not indicated in the Contract Documents with reasonable accuracy, and for equipment on the project which was actually working on that portion of the WORK which was interrupted or idled by removal or relocation of such Utility facilities, and which was necessarily idled during such work will be paid for as extra work in accordance with the provisions of the General Conditions.

J. Approval of Repairs: All repairs to a damaged Utility or improvement are subject to inspection and approval by an authorized representative of the Utility or improvement owner before being concealed by backfill or other work.

K. Maintaining in Service: Unless indicated otherwise, oil and gasoline pipelines, power, and telephone or the communication cable ducts, gas and water mains, irrigation lines, sewer lines, storm drain lines, poles, and overhead power and communication wires and cables encountered along the line of the WORK shall remain continuously in service during all the operations under the Contract, unless other arrangements satisfactory to the ENGINEER are made with the owner of said pipelines, duct, main, irrigation line, sewer, storm drain, pole, or wire or cable. The CONTRACTOR shall be responsible for and shall repair all damage due to its operations, and the provisions of this Section shall not be abated even in the event such damage occurs after backfilling or is not discovered until after completion of the backfilling.

1.6 TREES OR SHRUBS WITHIN STREET RIGHTS-OF-WAY AND PROJECT LIMITS

A. General: Except where trees or shrubs are indicated to be removed, the CONTRACTOR shall exercise all necessary precautions so as not to damage or destroy any trees or shrubs, including those lying within street rights-of-way and project limits, and shall not trim or remove any trees unless such trees have been approved for trimming or removal by the jurisdictional agency or OWNER. Existing trees and shrubs which are damaged during construction shall be trimmed or replaced by the CONTRACTOR or a certified tree company under permit from the jurisdictional agency and/or the OWNER. Tree trimming and replacement shall be accomplished in accordance with the following paragraphs.

B. Trimming: Symmetry of the tree shall be preserved; no stubs or splits or torn branches left; clean cuts shall be made close to the trunk or large branch. Spikes shall not be used for climbing live trees. Cuts over 1-1/2 inches in diameter shall be coated with a tree paint product that is

waterproof, adhesive, and elastic, and free from kerosenes, coal tar, creosote, or other material injurious to the life of the tree.

C. Replacement: The CONTRACTOR shall immediately notify the jurisdictional agency and/or the OWNER if any tree or shrub is damaged by the CONTRACTOR's operations. If, in the opinion of said agency or the OWNER, the damage is such that replacement is necessary, the CONTRACTOR shall replace the tree or shrub at its own expense. The tree or shrub shall be of a like size and variety as the one damaged, or, if of a smaller size, the CONTRACTOR shall pay to the owner of said tree a compensatory payment acceptable to the tree or shrub owner, subject to the approval of the jurisdictional agency or OWNER. The size of the tree or shrub shall be not less than 1-inch diameter nor less than 6 feet in height. Planting of replacement trees and shrubs shall be in accordance with Section 02900 - Landscaping. Unless otherwise indicated, the CONTRACTOR shall water and maintain the replacement trees and shrubs for 6 months after planting.

1.7 LAWN AREAS

A. Lawn or landscaped areas damaged during construction shall be repaired to match the pre-construction condition to the satisfaction of the land owner and the OWNER.

1.8 NOTIFICATION BY THE CONTRACTOR

A. Prior to any excavation in the vicinity of any existing underground facilities, including all water, sewer, storm drain, gas, petroleum products, or other pipelines; all buried electric power, communications, or television cables; all traffic signal and street lighting facilities; and all roadway and state highway rights-of-way, the CONTRACTOR shall notify the respective authorities representing the owners or agencies responsible for such facilities not less than 3 days nor more than 7 days prior to excavation so that a representative of said owners or agencies can be present during such work if they so desire. The CONTRACTOR shall also notify Louisiana One Call at 1-800-272-3020 at least 2 days, but no more than 14 days, prior to such excavation.

1.9 Repair within an Existing Building

A. The CONTRACTOR shall protect all existing utilities, ~~fixtures~~ fixtures and improvements not designated for removal and shall restore damaged or temporarily relocated utilities, ~~fixtures~~ fixtures and improvements to a condition equal to or better than prior to such damage or temporary relocation, all in accordance with the Contract Documents.

PART 2 -- PRODUCTS (Not Used)

PART 3 -- EXECUTION (Not Used)

- END OF SECTION -

SECTION 01563 – LANDSCAPE PROTECTION DURING CONSTRUCTION

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes general protection and pruning of existing trees and plants that are affected by execution of the Work, whether temporary or permanent construction.

1.2 DEFINITIONS

A. Tree-Protection Zone: Area surrounding individual trees or groups of trees to be protected during construction and indicated on Drawings and defined by a circle concentric with each tree with a radius 1.5 times the diameter of the drip line unless otherwise indicated.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings:

1. Include plans, elevations, sections, and locations of protection-zone fencing and signage, showing relation of equipment-movement routes and material storage locations with protection zones.

C. Samples: For each type of the following:

1. Organic Mulch: Sealed plastic bags labeled with composition of materials by percentage of weight and source of mulch.
2. Protection-Zone Fencing: Assembled Samples.

D. Tree Pruning Schedule: Written schedule detailing scope and extent of pruning of trees to remain that interfere with or are affected by construction.

1.5 INFORMATIONAL SUBMITTALS

A. Certification: From arborist, certifying that trees indicated to remain have been protected during construction according to recognized standards and that trees were promptly and properly treated and repaired when damaged.

B. Maintenance Recommendations: From arborist, for care and protection of trees affected by construction during and after completing the Work.

C. Existing Conditions: Documentation of existing trees and plantings indicated to remain, which establishes preconstruction conditions that might be misconstrued as damage caused by construction activities.

1.6 QUALITY ASSURANCE

A. Arborist Qualifications: Certified Arborist as certified by ISA, licensed arborist in Louisiana, current member of ASCA, or registered Consulting Arborist as designated by ASCA.

1.7 FIELD CONDITIONS

A. The following practices are prohibited within protection zones:

1. Storage of construction materials, debris, or excavated material.
2. Moving or parking vehicles or equipment.
3. Foot traffic.
4. Erection of sheds or structures.
5. Impoundment of water.
6. Excavation or other digging unless otherwise indicated.
7. Attachment of signs to or wrapping materials around trees or plants unless otherwise indicated.

B. Do not direct vehicle or equipment exhaust toward protection zones.

C. Prohibit heat sources, flames, ignition sources, and smoking within or near protection zones and organic mulch.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Backfill Soil: Planting soil of suitable moisture content and granular texture for placing around tree; free of stones, roots, plants, sod, clods, clay lumps, pockets of coarse sand, concrete slurry, concrete layers or chunks, cement, plaster, building debris, and other extraneous materials harmful to plant growth.

B. Organic Mulch: Free from deleterious materials and suitable as a top dressing for trees and shrubs, consisting of one of the following:

1. Type: Pine needle mulch.

C. Protection-Zone Fencing: Fencing fixed in position and meeting the following requirements:

1. Plastic Protection-Zone Fencing: Plastic construction fencing constructed of high-density extruded and stretched polyethylene fabric with 2-inch (50-mm) maximum opening in pattern and supported by tubular or T-shape galvanized-steel posts spaced not more than 96 inches (2400 mm) apart. High-visibility orange color.

a. Height: 60 inches (1200 mm).

b. Manufacturer: Sentry Diamond Mesh Safety Fence by TENAX, or approved equal.

2. Gates: Swing access gates matching material and appearance of fencing, to allow for maintenance activities within protection zones.

D. Protection-Zone Signage: Shop-fabricated, rigid plastic or metal sheet with attachment holes prepunched and reinforced; legibly printed with nonfading lettering.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Erosion and Sedimentation Control: Examine the site to verify that temporary erosion- and sedimentation-control measures are in place. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross protection zones.

3.2 PREPARATION

A. Protect tree root systems from damage caused by runoff or spillage of noxious materials while mixing, placing, or storing construction materials. Protect root systems from ponding, eroding, or excessive wetting caused by dewatering operations.

3.3 PROTECTION ZONES

A. Protection-Zone Fencing: Install protection-zone fencing along edges of protection zones in a manner that will prevent people from easily entering protected areas except by entrance gates.
1. Posts: Set or drive posts into ground one-third the total height of the fence without concrete footings. Where a post is located on existing paving or concrete to remain, provide appropriate means of post support acceptable to Architect.

B. Protection-Zone Signage: Install protection-zone signage in visibly prominent locations in a manner approved by Architect.

C. Maintain protection zones free of weeds and trash.

D. Maintain protection-zone fencing and signage in good condition as acceptable to Architect and remove when construction operations are complete and equipment has been removed from the site.

3.4 EXCAVATION

A. General: Excavate at edge of protection zones and for trenches indicated within protection zones according to requirements in Section 312000 "Earth Moving" unless otherwise indicated.

B. Trenching within Protection Zones: Where utility trenches are required within protection zones, excavate under or around tree roots by hand or with air spade, or tunnel under the roots by drilling, auger boring, or pipe jacking. Do not cut main lateral tree roots or taproots; cut only smaller roots that interfere with installation of utilities. Cut roots as required for root pruning.

C. Do not allow exposed roots to dry out before placing permanent backfill.

3.5 ROOT PRUNING

A. Prune tree roots that are affected by temporary and permanent construction. Prune roots as follows:

1. The roots shall be pruned in accordance with generally accepted arboricultural practices.
2. The Contractor shall notify the Landscape Architect whenever trees or roots need to be pruned prior to beginning construction. All pruning is to be done under the supervision of a licensed Louisiana arborist.

B. Root Pruning at Edge of Protection Zone: Prune tree roots by cleanly cutting all roots to the depth of the required excavation.

C. Root Pruning within Protection Zone: Clear and excavate by hand or with air spade to the depth of the required excavation to minimize damage to tree root systems. If excavating by hand, use narrow-tine spading forks to comb soil to expose roots. Cleanly cut roots as close to excavation as possible.

3.6 CROWN PRUNING

A. Prune branches that are affected by temporary and permanent construction. Prune branches as directed by a licensed Louisiana arborist.

1. Prune to remove only broken, dying, or dead branches unless otherwise indicated. Do not prune for shape unless otherwise indicated.
2. Pruning Standards: Prune trees according to the National Arborist's Association "Pruning Standards for Shade Trees" and ANSI A300 (Part 1).

B. Cut branches with sharp pruning instruments; do not break or chop.

C. Do not paint or apply sealants to wounds.

3.7 REGRADING

A. Lowering Grade: Where new finish grade is indicated below existing grade around trees, slope grade beyond the protection zone. Maintain existing grades within the protection zone.

B. Raising Grade: Where new finish grade is indicated above existing grade around trees, slope grade beyond the protection zone. Maintain existing grades within the protection zone.

C. Minor Fill within Protection Zone: Where existing grade is 2 inches (50 mm) or less below elevation of finish grade, fill with backfill soil. Place backfill soil in a single uncompacted layer and hand grade to required finish elevations.

3.8 FIELD QUALITY CONTROL

A. Inspections: Engage a qualified arborist to direct plant-protection measures in the vicinity of trees, shrubs, and other vegetation indicated to remain and to prepare inspection reports.

3.9 REPAIR AND REPLACEMENT

A. General: Repair or replace trees, shrubs, and other vegetation indicated to remain or to be relocated that are damaged by construction operations, in a manner approved by Architect.

1. Perform repairs of damaged trunks, branches, and roots within 24 hours according to arborist's written instructions.
2. Replace trees and other plants that cannot be repaired and restored to full-growth status, as determined by Architect.
3. If trees outside of the property line are damaged, they shall be replaced or repaired according to the City of New Orleans requirements.
4. If trees are damaged beyond repair, they shall be replaced with a similar tree of equivalent type.

B. Excess Mulch: Rake mulched area within protection zones, being careful not to injure roots. Rake to loosen and remove mulch that exceeds a 2-inch (50-mm) uniform thickness to remain.

3.10 DISPOSAL OF SURPLUS AND WASTE MATERIALS

A. Disposal: Remove excess excavated material, displaced trees, trash, and debris and legally dispose of them off Owner's property.

END OF SECTION 015639

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SECTION 01566 - SOURCE CONTROLS FOR EROSION AND SEDIMENTATION

PART 1 -- GENERAL

1.1 SECTION INCLUDES

A. The CONTRACTOR shall perform the services and procedures defined herein for the duration of the project. All Contractors shall abide by the requirements listed herein.

B. Description of erosion and sediment control and other control-related practices which shall be utilized during construction activities.

PART 2 -- PRODUCTS - NOT USED

PART 3 -- EXECUTION

3.1 PREPARATION AND INSTALLATION

A. No clearing and grubbing or rough cutting shall be permitted until erosion and sediment control systems are in place, other than site work specifically directed by the ENGINEER to allow soil testing and surveying.

B. Equipment and vehicles shall be prohibited by the CONTRACTOR from maneuvering on areas outside of dedicated rights-of-way and easements for construction. Damage caused by construction traffic to erosion and sediment control systems shall be repaired immediately by the CONTRACTOR at no additional cost to the CITY.

C. The CONTRACTOR shall be responsible for collecting, storing, hauling, and disposing of spoil, silt, and waste materials as specified in this or other Specifications and in compliance with applicable federal, state, and local rules and regulations.

D.

E. CONTRACTOR shall conduct all construction operations under this Contract in conformance with the erosion control practices described in the Drawings and this Specification.

F. The CONTRACTOR shall install, maintain, and inspect erosion and sediment control measures and practices as specified in the Drawings and in this or other Specifications.

3.2 TOPSOIL PLACEMENT FOR EROSION AND SEDIMENT CONTROL SYSTEMS

A. When topsoil is specified as a component of another Specification, the CONTRACTOR shall conduct erosion control practices described in this Specification during topsoil placement operations.

1. When placing topsoil, maintain erosion and sediment control systems, such as swales, grade stabilization structures, berms, dikes, waterways, and sediment basins.

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2. Maintain grades which have been previously established on areas to receive topsoil.

3. After the areas to receive topsoil have been brought to grade, and immediately prior to dumping and spreading the topsoil, loosen the subgrade by discing or by scarifying to a depth of at least 2 inches to permit bonding of the topsoil to the subsoil.

4. No sod or seed shall be placed on soil which has been treated with soil sterilants until sufficient time has elapsed to permit dissipation of toxic materials.

3.3 DUST CONTROL

A. Implement dust control methods to control dust creation and movement on construction sites and roads and to prevent airborne sediment from reaching receiving streams or storm water conveyance systems, to reduce on-site and off-site damage, to prevent health hazards, and to improve traffic safety.

B. Control blowing dust by using one or more of the following methods:

1. Mulches bound with chemical binders.

2. Temporary vegetative cover.

3. Spray-on adhesives on mineral soils when not used by traffic.

4. Tillage to roughen surface and bring clods to the surface.

5. Irrigation by water sprinkling.

6. Barriers using solid board fences, snow fences, burlap fences, crate walls, bales of hay, or similar materials.

C. Implement dust control methods immediately whenever dust can be observed blowing on the project site.

3.4 KEEPING STREETS CLEAN

A. Keep streets clean of construction debris and mud carried by construction vehicles and equipment. If necessary to keep the streets clean, install stabilized construction exits at construction, staging, storage, and disposal areas. A vehicle/equipment wash area (stabilized with coarse aggregate) may be installed adjacent to the stabilized construction exit, as needed. Release wash water into a drainage swale or inlet protected by erosion and sediment control measures.

B. In lieu of or in addition to stabilized construction exits, shovel or sweep the pavement to the extent necessary to keep the street clean. Waterhosing or sweeping of debris and mud off of the street into adjacent areas is not allowed.

3.5 EQUIPMENT MAINTENANCE AND REPAIR

A. Confine maintenance and repair of construction machinery and equipment to areas specifically designated for that purpose. Locate such areas so that oils, gasoline, grease, solvents, and other potential pollutants cannot be washed directly into receiving streams or storm water conveyance

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systems. Provide these areas with adequate waste disposal receptacles for liquid as well as solid waste. Clean and inspect maintenance areas daily.

B. On a construction site where designated equipment maintenance areas are not feasible, take precautions during each individual repair or maintenance operation to prevent potential pollutants from washing into streams or conveyance systems. Provide temporary waste disposal receptacles.

3.6 WASTE COLLECTION AND DISPOSAL

A. CONTRACTOR shall formulate and implement a plan for the collection and disposal of waste materials on the construction site. In plan, designate locations for trash and waste receptacles and establish a collection schedule. Methods for ultimate disposal of waste shall be specified and carried out in accordance with applicable local, state, and federal health and safety regulations. Make special provisions for the collection and disposal of liquid wastes and toxic or hazardous materials.

B. Keep receptacles and waste collection areas neat and orderly to the extent possible. Waste shall not be allowed to overflow its container or accumulate from day-to-day. Locate trash collection points where they will least likely be affected by concentrated storm water runoff.

3.7 WASHING AREAS

A. Vehicles such as concrete delivery trucks or dump trucks and other construction equipment shall not be washed at locations where the runoff will flow directly into a watercourse or storm water conveyance system. Designate special areas for washing vehicles. Locate these areas where the wash water will spread out and evaporate or infiltrate directly into the ground, or where the runoff can be collected in a temporary holding or seepage basin. Beneath wash areas construct a gravel or rock base to minimize mud production.

3.8 STORAGE OF CONSTRUCTION MATERIALS AND CHEMICALS

A. Isolate sites where chemicals, cements, solvents, paints, or other potential water pollutants are stored in areas where they will not cause runoff pollution.

B. Store toxic chemicals and materials, such as pesticides, paints, and acids in accordance with manufacturers' guidelines. Protect groundwater resources from leaching by placing a plastic mat, packed clay, tar paper, or other impervious materials on any areas where toxic liquids are to be opened and stored.

3.9 DEMOLITION AREAS

A. Demolition activities which create large amounts of dust with significant concentrations of heavy metals or other toxic pollutants shall use dust control techniques to limit transport of airborne pollutants. However, water or slurry used to control dust contaminated with heavy metals or toxic pollutants shall be retained on the site and shall not be allowed to run directly into watercourses or storm water conveyance systems. Methods of ultimate disposal of these materials shall be carried out in accordance with applicable local, state, and federal health and safety regulations.

- END OF SECTION -

SECTION 01600 - PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for selection of products for use in Project; product delivery, storage, and handling; manufacturers' standard warranties on products; special warranties; and comparable products.

B. Related Requirements:
   1. Section 01635 "Substitution Procedures" for requests for substitutions.
   2. Section 01420 "References" for applicable industry standards for products specified.

1.3 DEFINITIONS

A. Products: Items obtained for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.

   1. Named Products: Items identified by manufacturer's product name, including make or model number or other designation shown or listed in manufacturer's published product literature, that is current as of date of the Contract Documents.
   2. New Products: Items that have not previously been incorporated into another project or facility. Products salvaged or recycled from other projects are not considered new products.
   3. Comparable Product: Product that is demonstrated and approved through submittal process to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.

B. Basis-of-Design Product Specification: A specification in which a specific manufacturer's product is named and accompanied by the words "basis-of-design product," including make or model number or other designation, to establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of additional manufacturers named in the specification.

1.4 ACTION SUBMITTALS

A. Comparable Product Requests: Submit request for consideration of each comparable product. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.

1. Include data to indicate compliance with the requirements specified in "Comparable Products" Article.
2. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within one week of receipt of a comparable product request. Architect will notify Contractor[**through Construction Manager** of approval or rejection of proposed comparable product request within 15 days of receipt of request, or seven days of receipt of additional information or documentation, whichever is later.

    a. Form of Approval: As specified in Section 01330 "Submittal Procedures."
    b. Use product specified if Architect does not issue a decision on use of a comparable product request within time allocated.

B. Basis-of-Design Product Specification Submittal: Comply with requirements in Section 01330 "Submittal Procedures." Show compliance with requirements.

1.5 QUALITY ASSURANCE

A. Compatibility of Options: If Contractor is given option of selecting between two or more products for use on Project, select product compatible with products previously selected, even if previously selected products were also options.

1. Each contractor is responsible for providing products and construction methods compatible with products and construction methods of other contractors.
2. If a dispute arises between contractors over concurrently selectable but incompatible products, Architect will determine which products shall be used.

1.6 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft and vandalism. Comply with manufacturer's written instructions.

B. Delivery and Handling:

1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.
2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
3. Deliver products to Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
4. Inspect products on delivery to determine compliance with the Contract Documents and to determine that products are undamaged and properly protected.

C. Storage:

1. Store products to allow for inspection and measurement of quantity or counting of units.
2. Store materials in a manner that will not endanger Project structure.
3. Store products that are subject to damage by the elements, under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation.

4. Protect foam plastic from exposure to sunlight, except to extent necessary for period of installation and concealment.
5. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
6. Protect stored products from damage and liquids from freezing.
7. Provide a secure location and enclosure at Project site for storage of materials and equipment by Owner's construction forces. Coordinate location with Owner.

1.7 PRODUCT WARRANTIES

A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.

1. Manufacturer's Warranty: Written warranty furnished by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.
2. Special Warranty: Written warranty required by the Contract Documents to provide specific rights for Owner.

B. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution.

1. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.
2. Specified Form: When specified forms are included with the Specifications, prepare a written document using indicated form properly executed.
3. See other Sections for specific content requirements and particular requirements for submitting special warranties.

C. Submittal Time: Comply with requirements in Section 01770 "Closeout Procedures."

PART 2 - PRODUCTS

2.1 PRODUCT SELECTION PROCEDURES

A. General Product Requirements: Provide products that comply with the Contract Documents, are undamaged and, unless otherwise indicated, are new at time of installation.

1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.
2. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.
3. Owner reserves the right to limit selection to products with warranties not in conflict with requirements of the Contract Documents.
4. Where products are accompanied by the term "as selected," Architect will make selection.
5. Descriptive, performance, and reference standard requirements in the Specifications establish salient characteristics of products.

6. Or Equal: For products specified by name and accompanied by the term "or equal," or "or approved equal," or "or approved," comply with requirements in "Comparable Products" Article to obtain approval for use of an unnamed product.

B. Product Selection Procedures:

1. Product: Where Specifications name a single manufacturer and product, provide the named product that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
2. Manufacturer/Source: Where Specifications name a single manufacturer or source, provide a product by the named manufacturer or source that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
3. Products:

    a. Restricted List: Where Specifications include a list of names of both manufacturers and products, provide one of the products listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
    b. Nonrestricted List: Where Specifications include a list of names of both available manufacturers and products, provide one of the products listed, or an unnamed product, that complies with requirements. Comply with requirements in "Comparable Products" Article for consideration of an unnamed product.

4. Manufacturers:

    a. Restricted List: Where Specifications include a list of manufacturers' names, provide a product by one of the manufacturers listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
    b. Nonrestricted List: Where Specifications include a list of available manufacturers, provide a product by one of the manufacturers listed, or a product by an unnamed manufacturer, that complies with requirements. Comply with requirements in "Comparable Products" Article for consideration of an unnamed manufacturer's product.

5. Basis-of-Design Product: Where Specifications name a product, or refer to a product indicated on Drawings, and include a list of manufacturers, provide the specified or indicated product or a comparable product by one of the other named manufacturers. Drawings and Specifications indicate sizes, profiles, dimensions, and other characteristics that are based on the product named. Comply with requirements in "Comparable Products" Article for consideration of an unnamed product by one of the other named manufacturers.

C. Visual Matching Specification: Where Specifications require "match Architect's sample", provide a product that complies with requirements and matches Architect's sample. Architect's decision will be final on whether a proposed product matches.

1. If no product available within specified category matches and complies with other specified requirements, comply with requirements in Section 01635 "Substitution Procedures" for proposal of product.

D. Visual Selection Specification: Where Specifications include the phrase "as selected by Architect from manufacturer's full range" or similar phrase, select a product that complies with

requirements. Architect will select color, gloss, pattern, density, or texture from manufacturer's product line that includes both standard and premium items.

2.2 COMPARABLE PRODUCTS

A. Conditions for Consideration: Architect will consider Contractor's request for comparable product when the following conditions are satisfied. If the following conditions are not satisfied, Architect may return requests without action, except to record noncompliance with these requirements:

1. Evidence that the proposed product does not require revisions to the Contract Documents, that it is consistent with the Contract Documents and will produce the indicated results, and that it is compatible with other portions of the Work.
2. Detailed comparison of significant qualities of proposed product with those named in the Specifications. Significant qualities include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
3. Evidence that proposed product provides specified warranty.
4. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners, if requested.
5. Samples, if requested.

PART 3 - EXECUTION (Not Used)

END OF SECTION 01600

SECTION 01635 - SUBSTITUTION PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for substitutions.

B. Related Requirements:
   1. Section 01230 "Alternates" for products selected under an alternate.
   2. Section 01600 "Product Requirements" for requirements for submitting comparable product submittals for products by listed manufacturers.

1.3 DEFINITIONS

A. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor.

   1. Substitutions for Cause: Changes proposed by Contractor that are required due to changed Project conditions, such as unavailability of product, regulatory changes, or unavailability of required warranty terms.
   2. Substitutions for Convenience: Changes proposed by Contractor or Owner that are not required in order to meet other Project requirements but may offer advantage to Contractor or Owner.

1.4 ACTION SUBMITTALS

A. Substitution Requests: Submit three copies of each request for consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.

   1. Substitution Request Form: Use CSI Form 1.5 C (During the Bidding Process) .
   2. Documentation: Show compliance with requirements for substitutions and the following, as applicable:

      a. Statement indicating why specified product or fabrication or installation cannot be provided, if applicable.
      b. Coordination information, including a list of changes or revisions needed to other parts of the Work and to construction performed by Owner and separate contractors, that will be necessary to accommodate proposed substitution.
      c. Detailed comparison of significant qualities of proposed substitution with those of the Work specified. Include annotated copy of applicable Specification Section. Significant qualities may include attributes such as performance, weight, size,

durability, visual effect, sustainable design characteristics, warranties, and specific features and requirements indicated. Indicate deviations, if any, from the Work specified.

d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
e. Samples, where applicable or requested.
f. Certificates and qualification data, where applicable or requested.
g. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners.
h. Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.
i. Detailed comparison of Contractor's construction schedule using proposed substitution with products specified for the Work, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on manufacturer's letterhead, stating date of receipt of purchase order, lack of availability, or delays in delivery.
j. Cost information, including a proposal of change, if any, in the Contract Sum.
k. Contractor's certification that proposed substitution complies with requirements in the Contract Documents except as indicated in substitution request, is compatible with related materials, and is appropriate for applications indicated.
l. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.

3. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within seven days of receipt of a request for substitution. Architect will notify Contractorof acceptance or rejection of proposed substitution within 15 days of receipt of request, or seven days of receipt of additional information or documentation, whichever is later.

   a. Forms of Acceptance: Change Order, Construction Change Directive, or Architect's Supplemental Instructions for minor changes in the Work.
   b. Use product specified if Architect does not issue a decision on use of a proposed substitution within time allocated.

1.5 QUALITY ASSURANCE

A. Compatibility of Substitutions: Investigate and document compatibility of proposed substitution with related products and materials. Engage a qualified testing agency to perform compatibility tests recommended by manufacturers.

1.6 PROCEDURES

A. Coordination: Revise or adjust affected work as necessary to integrate work of the approved substitutions.

PART 2 - PRODUCTS

2.1 SUBSTITUTIONS

A. Substitutions for Cause: Submit requests for substitution immediately on discovery of need for change, but not later than 15 days prior to time required for preparation and review of related submittals.

1. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:

a. Requested substitution is consistent with the Contract Documents and will produce indicated results.
b. Requested substitution provides sustainable design characteristics that specified product provided.
c. Substitution request is fully documented and properly submitted.
d. Requested substitution will not adversely affect Contractor's construction schedule.
e. Requested substitution has received necessary approvals of authorities having jurisdiction.
f. Requested substitution is compatible with other portions of the Work.
g. Requested substitution has been coordinated with other portions of the Work.
h. Requested substitution provides specified warranty.
i. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.

B. Substitutions for Convenience: Not allowed unless otherwise indicated.

PART 3 - EXECUTION (Not Used)

END OF SECTION 01635

SECTION 01700 - EXECUTION REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes general administrative and procedural requirements governing execution of the Work including, but not limited to, the following:

1. Construction layout.
2. Field engineering and surveying.
3. Installation of the Work.
4. Cutting and patching.
5. Coordination of Owner-installed products.
6. Progress cleaning.
7. Starting and adjusting.
8. Protection of installed construction.
9. Correction of the Work.

B. Related Requirements:

1. Section 01100 "Summary" for limits on use of Project site.
2. Section 01330 "Submittal Procedures" for submitting surveys.
3. Section 02060 "Site Demolition" for demolition and removal of selected portions remaining sitework and building components.
4. Section 01770 "Closeout Procedures" for submitting final property survey with Project Record Documents, recording of Owner-accepted deviations from indicated lines and levels, and final cleaning.
5. Section 07841 "Through-Penetration Firestop Systems" for patching penetrations in fire-rated construction.

1.3 DEFINITIONS

A. Cutting: Removal of in-place construction necessary to permit installation or performance of other work.

B. Patching: Fitting and repair work required to restore construction to original conditions after installation of other work.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For professional engineer.

B. Certificates: Submit certificate signed by professional engineer certifying that location and elevation of improvements comply with requirements.

C. Cutting and Patching Plan: Submit plan describing procedures at least 10 days prior to the time cutting and patching will be performed. Include the following information:

1. Extent: Describe reason for and extent of each occurrence of cutting and patching.
2. Changes to In-Place Construction: Describe anticipated results. Include changes to structural elements and operating components as well as changes in building appearance and other significant visual elements.
3. Products: List products to be used for patching and firms or entities that will perform patching work.
4. Dates: Indicate when cutting and patching will be performed.
5. Utilities and Mechanical and Electrical Systems: List services and systems that cutting and patching procedures will disturb or affect. List services and systems that will be relocated and those that will be temporarily out of service. Indicate length of time permanent services and systems will be disrupted.

    a. Include description of provisions for temporary services and systems during interruption of permanent services and systems.

D. Certified Surveys: Submit two copies signed by professional engineer.

E. Final Property Survey: Submit 10 copies showing the Work performed and record survey data.

1.5 QUALITY ASSURANCE

A. Land Surveyor Qualifications: A professional land surveyor who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing land-surveying services of the kind indicated.

B. Cutting and Patching: Comply with requirements for and limitations on cutting and patching of construction elements.

1. Structural Elements: When cutting and patching structural elements, notify Architect of locations and details of cutting and await directions from Architect before proceeding. Shore, brace, and support structural elements during cutting and patching. Do not cut and patch structural elements in a manner that could change their load-carrying capacity or increase deflection

2. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety. Operational elements include the following:

    a. Primary operational systems and equipment.
    b. Fire separation assemblies.
    c. Air or smoke barriers.
    d. Fire-suppression systems.
    e. Mechanical systems piping and ducts.
    f. Control systems.
    g. Communication systems.
    h. Fire-detection and -alarm systems.

i. Conveying systems.
j. Electrical wiring systems.
k. Operating systems of special construction.

3. Other Construction Elements: Do not cut and patch other construction elements or components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety. Other construction elements include but are not limited to the following:

a. Water, moisture, or vapor barriers.
b. Membranes and flashings.
c. Exterior curtain-wall construction.
d. Sprayed fire-resistive material.
e. Equipment supports.
f. Piping, ductwork, vessels, and equipment.
g. Noise- and vibration-control elements and systems.

4. Visual Elements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch exposed construction in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.

C. Cutting and Patching Conference: Before proceeding, meet at Project site with parties involved in cutting and patching, including mechanical and electrical trades. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.

D. Manufacturer's Installation Instructions: Obtain and maintain on-site manufacturer's written recommendations and instructions for installation of products and equipment.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General: Comply with requirements specified in other Sections.

B. In-Place Materials: Use materials for patching identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible.

1. If identical materials are unavailable or cannot be used, use materials that, when installed, will provide a match acceptable to Architect for the visual and functional performance of in-place materials.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Existing Conditions: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning sitework, investigate and verify the existence and location of underground utilities, mechanical and electrical systems, and other construction affecting the Work.

1. Before construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer, and water-service piping; underground electrical services, and other utilities.
2. Furnish location data for work related to Project that must be performed by public utilities serving Project site.

B. Examination and Acceptance of Conditions: Before proceeding with each component of the Work, examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.

1. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
2. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
3. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.

C. Written Report: Where a written report listing conditions detrimental to performance of the Work is required by other Sections, include the following:

1. Description of the Work.
2. List of detrimental conditions, including substrates.
3. List of unacceptable installation tolerances.
4. Recommended corrections.

D. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Existing Utility Information: Furnish information to local utility that is necessary to adjust, move, or relocate existing utility structures, utility poles, lines, services, or other utility appurtenances located in or affected by construction. Coordinate with authorities having jurisdiction.

B. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

C. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.

D. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents caused by differing field conditions outside the control of Contractor, submit a request for information to Architect according to requirements in Section 01310 "Project Management and Coordination."

E. Surface and Substrate Preparation: Comply with manufacturer's written recommendations for preparation of substrates to receive subsequent work.

3.3 CONSTRUCTION LAYOUT

A. Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation to the property survey and existing benchmarks. If discrepancies are discovered, notify Architect promptly.

B. General: Engage a land surveyor to lay out the Work using accepted surveying practices.

1. Establish benchmarks and control points to set lines and levels at each story of construction and elsewhere as needed to locate each element of Project.
2. Establish limits on use of Project site.
3. Establish dimensions within tolerances indicated. Do not scale Drawings to obtain required dimensions.
4. Inform installers of lines and levels to which they must comply.
5. Check the location, level and plumb, of every major element as the Work progresses.
6. Notify Architectwhen deviations from required lines and levels exceed allowable tolerances.
7. Close site surveys with an error of closure equal to or less than the standard established by authorities having jurisdiction.

C. Site Improvements: Locate and lay out site improvements, including pavements, grading, fill and topsoil placement, utility slopes, and rim and invert elevations.

D. Building Lines and Levels: Locate and lay out control lines and levels for structures, building foundations, column grids, and floor levels, including those required for mechanical and electrical work. Transfer survey markings and elevations for use with control lines and levels. Level foundations and piers from two or more locations.

E. Record Log: Maintain a log of layout control work. Record deviations from required lines and levels. Include beginning and ending dates and times of surveys, weather conditions, name and duty of each survey party member, and types of instruments and tapes used. Make the log available for reference by Architect.

3.4 FIELD ENGINEERING

A. Identification: Owner will identify existing benchmarks, control points, and property corners.

B. Reference Points: Locate existing permanent benchmarks, control points, and similar reference points before beginning the Work. Preserve and protect permanent benchmarks and control points during construction operations.

1. Do not change or relocate existing benchmarks or control points without prior written approval of Architect. Report lost or destroyed permanent benchmarks or control points

promptly. Report the need to relocate permanent benchmarks or control points to Architectbefore proceeding.

2. Replace lost or destroyed permanent benchmarks and control points promptly. Base replacements on the original survey control points.

C. Benchmarks: Establish and maintain a minimum of two permanent benchmarks on Project site, referenced to data established by survey control points. Comply with authorities having jurisdiction for type and size of benchmark.

1. Record benchmark locations, with horizontal and vertical data, on Project Record Documents.
2. Where the actual location or elevation of layout points cannot be marked, provide temporary reference points sufficient to locate the Work.
3. Remove temporary reference points when no longer needed. Restore marked construction to its original condition.

D. Certified Survey: On completion of foundation walls, major site improvements, and other work requiring field-engineering services, prepare a certified survey showing dimensions, locations, angles, and elevations of construction and sitework.

3.5 INSTALLATION

A. General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.

1. Make vertical work plumb and make horizontal work level.
2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
3. Conceal pipes, ducts, and wiring in finished areas unless otherwise indicated.
4. Maintain minimum headroom clearance of 96 inches (2440 mm) in occupied spaces and 90 inches (2300 mm) in unoccupied spaces.

B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.

C. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Substantial Completion.

D. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.

E. Sequence the Work and allow adequate clearances to accommodate movement of construction items on site and placement in permanent locations.

F. Tools and Equipment: Do not use tools or equipment that produce harmful noise levels.

G. Templates: Obtain and distribute to the parties involved templates for work specified to be factory prepared and field installed. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.

H. Attachment: Provide blocking and attachment plates and anchors and fasteners of adequate size and number to securely anchor each component in place, accurately located and aligned

with other portions of the Work. Where size and type of attachments are not indicated, verify size and type required for load conditions.

1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Architect.
2. Allow for building movement, including thermal expansion and contraction.
3. Coordinate installation of anchorages. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

I. Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.

J. Hazardous Materials: Use products, cleaners, and installation materials that are not considered hazardous.

3.6 CUTTING AND PATCHING

A. Cutting and Patching, General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.

1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.

B. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during installation or cutting and patching operations, by methods and with materials so as not to void existing warranties.

C. Temporary Support: Provide temporary support of work to be cut.

D. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.

E. Adjacent Occupied Areas: Where interference with use of adjoining areas or interruption of free passage to adjoining areas is unavoidable, coordinate cutting and patching according to requirements in Section 01100 "Summary."

F. Existing Utility Services and Mechanical/Electrical Systems: Where existing services/systems are required to be removed, relocated, or abandoned, bypass such services/systems before cutting to prevent interruption to occupied areas.

G. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.

1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots neatly to minimum size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.

3. Concrete and Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
4. Excavating and Backfilling: Comply with requirements in applicable Sections where required by cutting and patching operations.
5. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
6. Proceed with patching after construction operations requiring cutting are complete.

H. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other work. Patch with durable seams that are as invisible as practicable. Provide materials and comply with installation requirements specified in other Sections, where applicable.

1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate physical integrity of installation.
2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will minimize evidence of patching and refinishing.

    a. Clean piping, conduit, and similar features before applying paint or other finishing materials.
    b. Restore damaged pipe covering to its original condition.

3. Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove in-place floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.

    a. Where patching occurs in a painted surface, prepare substrate and apply primer and intermediate paint coats appropriate for substrate over the patch, and apply final paint coat over entire unbroken surface containing the patch. Provide additional coats until patch blends with adjacent surfaces.

4. Ceilings: Patch, repair, or rehang in-place ceilings as necessary to provide an even-plane surface of uniform appearance.
5. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weathertight condition and ensures thermal and moisture integrity of building enclosure.

I. Cleaning: Clean areas and spaces where cutting and patching are performed. Remove paint, mortar, oils, putty, and similar materials from adjacent finished surfaces.

3.7 OWNER-INSTALLED PRODUCTS

A. Site Access: Provide access to Project site for Owner's construction personnel.

B. Coordination: Coordinate construction and operations of the Work with work performed by Owner's construction personnel.

1. Construction Schedule: Inform Owner of Contractor's preferred construction schedule for Owner's portion of the Work. Adjust construction schedule based on a mutually

agreeable timetable. Notify Owner if changes to schedule are required due to differences in actual construction progress.

2. Preinstallation Conferences: Include Owner's construction personnel at preinstallation conferences covering portions of the Work that are to receive Owner's work. Attend preinstallation conferences conducted by Owner's construction personnel if portions of the Work depend on Owner's construction.

3.8 PROGRESS CLEANING

A. General: Clean Project site and work areas daily, including common areas. Enforce requirements strictly. Dispose of materials lawfully.

1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
2. Do not hold waste materials more than seven days during normal weather or three days if the temperature is expected to rise above 80 deg F (27 deg C).
3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.

    a. Use containers intended for holding waste materials of type to be stored.

4. Coordinate progress cleaning for joint-use areas where Contractor and other contractors are working concurrently.

B. Site: Maintain Project site free of waste materials and debris.

C. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.

1. Remove liquid spills promptly.
2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.

D. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.

E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.

F. Exposed Surfaces in Finished Areas: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.

G. Waste Disposal: Do not bury or burn waste materials on-site. Do not wash waste materials down sewers or into waterways. Comply with waste disposal requirements in Section 01500 "Temporary Facilities and Controls."

H. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.

I. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.

J. Limiting Exposures: Supervise construction operations to assure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

3.9 STARTING AND ADJUSTING

A. Coordinate startup and adjusting of equipment and operating components with requirements in Section 01810 "General Commissioning Requirements."

B. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.

C. Adjust equipment for proper operation. Adjust operating components for proper operation without binding.

D. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

E. Manufacturer's Field Service: Comply with qualification requirements in Section 01400 "Quality Requirements."

3.10 PROTECTION OF INSTALLED CONSTRUCTION

A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.

B. Comply with manufacturer's written instructions for temperature and relative humidity.

END OF SECTION 01700

SECTION 01710 - CLEANING

PART 1 -- GENERAL

1.1 DESCRIPTION

A. WORK included: Throughout the construction period, maintain all areas of new and existing buildings and site constructed or affected by the WORK OF THE Contract in a standard of cleanliness as described in this Section. Each CONTRACTOR is responsible to meet all requirements defined herein as necessitated by their work.

B. Related WORK described elsewhere: In addition to Standards described in this Section, comply with all requirements for cleaning up as described in various other Sections of these Specifications.

1.2 QUALITY ASSURANCE

A. Inspection: Conduct daily inspection, and more often if necessary, to verify that requirements of cleanliness are being met.

B. Codes and Standards: In addition to the Standards described in this Section, comply with all pertinent requirements of governmental agencies having jurisdiction and comply with OSHA Housekeeping Standards, Subpart C, Section 1926.25.

1.3 PAYMENT

A. No separate payment shall be made for the WORK described in this Section, and all costs in connection therewith shall be included in the cost of the items to which the WORK PERTAINS.

PART 2 -- PRODUCTS

2.1 Cleaning Materials and Equipment: Provide all required personnel, equipment, and materials needed to maintain the specified standard of cleanliness.

2.2 Compatibility: Use only the cleaning materials and equipment which are compatible with the surface being cleaned, as recommended by the manufacture of the material or as reviewed by the Design Engineer.

PART 3 -- EXECUTION

3.1 PROCESS CLEANING

A. General: Retain all stored items in an orderly arrangement allowing maximum access, not impeding drainage or traffic, and providing the required protection of materials. Do not allow the accumulation of scrap, debris, waste material, and other items not required for construction of the WORK. At least twice each month, and more often if necessary, completely remove all scrap, debris, and waste material from the job site. Comply with OSHA'S Section 1926-252 of Subpart H of Part 1926 Disposal of Waste Materials. Provide adequate storage for all items awaiting removal from job site, observing all requirements for fire protection and protection of the environment.

B. Site: Daily, and more often if necessary, inspect the site and pick up all scrap, debris, and waste material. Removal all such items from the site. Weekly, and more often if necessary, inspect all arrangements of materials stored on the site, restack, tidy, or otherwise service all arrangements to meet the requirements of Paragraph 3.01.A, of this Section. Maintain the site in a neat and orderly condition at all times and comply with OSHA Housekeeping Standards, Subpart C, Section 1926.25.

C. Structures: Comply with OSHA's Section 1926-252 of Subpart H of Part 1926 Disposal of Waste Materials.

1. Daily, and more often if necessary, inspect the structures, pick-up all scrap, debris, and waste material and removal all such items from the site.

2. Daily, and more often if necessary, sweep all interior spaces clean. "Clean", for the purpose of this subparagraph l shall be interpreted as meaning free from dust and other material capable of being removed by use of reasonable effort and hand held broom, except that vacuum cleaning shall also be employed if dust accumulates on surfaces above floor.

3. As required preparatory to installation of succeeding materials, clean the structures or pertinent portions thereof to the degree of cleanliness recommended by the manufacturer of the succeeding material, using all equipment and materials required to achieve the required cleanliness.

3.2 FINAL CLEANING

A. Definition: Except as otherwise specifically provided, "Clean" (for the purpose of this paragraph) shall be interpreted as meaning the level of cleanliness generally provided by skilled cleaners using commercial quality building maintenance materials.

B. General: Prior to completion of the WORK, remove from the job site all tools, surplus materials, equipment, scrap, debris, and waste.

C. Site: Unless otherwise specifically directed by the OWNER, broom clean all paved areas on the site and all public paved areas directly adjacent to the site. Completely remove all resultant debris. The Contractor shall clean the two closest catch basins including a water test to insure the storm sewer is operational and not clogged with construction debris and/or sediment.

D. Structures

1. Interior: Visually inspect all interior surfaces and remove all traces of soil, waste material, smudges, and other foreign matter. Remove all traces of splashed materials from adjacent surfaces. Remove all paint droppings, spots, stains, and dirt from finished surfaces. Use only the specified cleaning materials and equipment. Sweep, vacuum, and hand dust <u>all</u> areas, including concealed surfaces and overhead spaces, to remove all dust.

2. Glass: Clean all glass inside and outside.

3. Polished surfaces: To all surfaces requiring the routine application of buffed polish, apply the polish recommended by the manufacturer of the material being polished.

E. Timing: A coordinated schedule for final cleaning shall be agreed upon by all parties to enable the City to accept a completely clean Project.

- END OF SECTION -

SECTION 01770 - CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:

1. Substantial Completion procedures.
2. Final completion procedures.
3. Warranties.
4. Final cleaning.
5. Repair of the Work.

B. Related Requirements:
1. Section 01700 "Execution Requirements" for progress cleaning of Project site.
2. Section 01781 "Project Record Documents" for submitting record Drawings, record Specifications, and record Product Data.

1.3 ACTION SUBMITTALS

A. Product Data: For cleaning agents.

B. Contractor's List of Incomplete Items: Initial submittal at Substantial Completion.

C. Certified List of Incomplete Items: Final submittal at Final Completion.

1.4 CLOSEOUT SUBMITTALS

A. Certificates of Release: From authorities having jurisdiction.

B. Certificate of Insurance: For continuing coverage.

C. Field Report: For pest control inspection.

1.5 MAINTENANCE MATERIAL SUBMITTALS

A. Schedule of Maintenance Material Items: For maintenance material submittal items specified in other Sections.

1.6 SUBSTANTIAL COMPLETION PROCEDURES

A. Contractor's List of Incomplete Items: Prepare and submit a list of items to be completed and corrected (Contractor's punch list), indicating the value of each item on the list and reasons why the Work is incomplete.

B. Submittals Prior to Substantial Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.

1. Certificates of Release: Obtain and submit releases from authorities having jurisdiction permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
2. Submit closeout submittals specified in other Division 01 Sections, including project record documents, operation and maintenance manuals, final completion construction photographic documentation, damage or settlement surveys, property surveys, and similar final record information.
3. Submit closeout submittals specified in individual Sections, including specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
4. Submit maintenance material submittals specified in individual Sections, including tools, spare parts, extra materials, and similar items, and deliver to location designated by Architect. Label with manufacturer's name and model number where applicable.

    a. Schedule of Maintenance Material Items: Prepare and submit schedule of maintenance material submittal items, including name and quantity of each item and name and number of related Specification Section. Obtain Architect's signature for receipt of submittals.

5. Submit test/adjust/balance records.

C. Procedures Prior to Substantial Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.

1. Advise Owner of pending insurance changeover requirements.
2. Make final changeover of permanent locks and deliver keys to Owner. Advise Owner's personnel of changeover in security provisions.
3. Complete startup and testing of systems and equipment.
4. Perform preventive maintenance on equipment used prior to Substantial Completion.
5. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems. Submit demonstration and training video recordings specified in Section 01820 "Demonstration and Training."
6. Advise Owner of changeover in heat and other utilities.
7. Participate with Owner in conducting inspection and walkthrough with local emergency responders.
8. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
9. Complete final cleaning requirements, including touchup painting.
10. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.

D. Inspection: Submit a written request for inspection to determine Substantial Completion a minimum of 10 days prior to date the work will be completed and ready for final inspection and

tests. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare the Certificate of Substantial Completion after inspection or will notify Contractor of items, either on Contractor's list or additional items identified by Architect, that must be completed or corrected before certificate will be issued.

1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.
2. Results of completed inspection will form the basis of requirements for final completion.

1.7 FINAL COMPLETION PROCEDURES

A. Submittals Prior to Final Completion: Before requesting final inspection for determining final completion, complete the following:

1. Submit a final Application for Payment according to Section 01290 "Payment Procedures."
2. Certified List of Incomplete Items: Submit certified copy of Architect's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Architect. Certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
3. Certificate of Insurance: Submit evidence of final, continuing insurance coverage complying with insurance requirements.
4. Submit pest-control final inspection report.

B. Inspection: Submit a written request for final inspection to determine acceptance a minimum of 10 days prior to date the work will be completed and ready for final inspection and tests. On receipt of request, Architectwill either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare a final Certificate for Payment after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.

1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.

1.8 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

A. Organization of List: Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction. Use CSI Form 14.1A.

1. Organize list of spaces in sequential order, starting with exterior areas first .
2. Organize items applying to each space by major element, including categories for ceiling, individual walls, floors, equipment, and building systems.
3. Include the following information at the top of each page:

    a. Project name.
    b. Date.
    c. Name of Architect.
    d. Name of Contractor.
    e. Page number.

4. Submit list of incomplete items in the following format:

a. PDF electronic file. Architect will return annotated file.
b. Three paper copies. Architectwill return two copies.

1.9 SUBMITTAL OF PROJECT WARRANTIES

A. Time of Submittal: Submit written warranties on request of Architect for designated portions of the Work where commencement of warranties other than date of Substantial Completion is indicated, or when delay in submittal of warranties might limit Owner's rights under warranty.

B. Partial Occupancy: Submit properly executed warranties within 15 days of completion of designated portions of the Work that are completed and occupied or used by Owner during construction period by separate agreement with Contractor.

C. Organize warranty documents into an orderly sequence based on the table of contents of Project Manual.

1. Bind warranties and bonds in heavy-duty, three-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch (215-by-280-mm) paper.
2. Provide heavy paper dividers with plastic-covered tabs for each separate warranty. Mark tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product and the name, address, and telephone number of Installer.
3. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project name, and name of Contractor.

D.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.

1. Use cleaning products that comply with Green Seal's GS-37, or if GS-37 is not applicable, use products that comply with the California Code of Regulations maximum allowable VOC levels.

PART 3 - EXECUTION

3.1 FINAL CLEANING

A. General: Perform final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.

B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.

1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a designated portion of Project:

a. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.
b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
c. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.
d. Remove tools, construction equipment, machinery, and surplus material from Project site.
e. Remove snow and ice to provide safe access to building.
f. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
g. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
h. Sweep concrete floors broom clean in unoccupied spaces.
i. Vacuum carpet and similar soft surfaces, removing debris and excess nap; clean according to manufacturer's recommendations if visible soil or stains remain.
j. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Polish mirrors and glass, taking care not to scratch surfaces.
k. Remove labels that are not permanent.
l. Wipe surfaces of mechanical and electrical equipment **, elevator equipment,** and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
m. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
n. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
o. Clean ducts, blowers, and coils if units were operated without filters during construction or that display contamination with particulate matter on inspection.

1) Clean HVAC system in compliance with NADCA Standard 1992-01. Provide written report on completion of cleaning.

p. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency.
q. Leave Project clean and ready for occupancy.

C. Pest Control: Comply with pest control requirements in Section 01500 "Temporary Facilities and Controls." Prepare written report.

D. Construction Waste Disposal: Comply with waste disposal requirements in Section 01500 "Temporary Facilities and Controls."

3.2 REPAIR OF THE WORK

A. Complete repair and restoration operations before requesting inspection for determination of Substantial Completion.

B. Repair or remove and replace defective construction. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment. Where damaged or worn items cannot be repaired or restored, provide replacements. Remove and replace operating components that cannot be repaired. Restore damaged construction and permanent facilities used during construction to specified condition.

1. Remove and replace chipped, scratched, and broken glass, reflective surfaces, and other damaged transparent materials.
2. Touch up and otherwise repair and restore marred or exposed finishes and surfaces. Replace finishes and surfaces that that already show evidence of repair or restoration.

    a. Do not paint over "UL" and other required labels and identification, including mechanical and electrical nameplates. Remove paint applied to required labels and identification.

3. Replace parts subject to operating conditions during construction that may impede operation or reduce longevity.
4. Replace burned-out bulbs, bulbs noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.

END OF SECTION 01770

SECTION 01781 - PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for project record documents, including the following:

1. Record Drawings.
2. Record Specifications.
3. Record Product Data.

B. Related Requirements:
1. Section 01700 "Execution Requirements" for final property survey.
2. Section 01770 "Closeout Procedures" for general closeout procedures.

1.3 CLOSEOUT SUBMITTALS

A. Record Drawings: Comply with the following:

1. Number of Copies: Submit [] two set(s) of marked-up record prints.
2.

B. Record Specifications: Submit two paper copies and annotated PDF electronic files of Project's Specifications, including addenda and contract modifications.

C. Record Product Data: Submit two paper copies and annotated PDF electronic files and directories of each submittal.

PART 2 - PRODUCTS

2.1 RECORD DRAWINGS

A. Record Prints: Maintain one set of marked-up paper copies of the Contract Drawings and Shop Drawings, incorporating new and revised drawings as modifications are issued.

1. Preparation: Mark record prints to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to provide information for preparation of corresponding marked-up record prints.

a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
b. Accurately record information in an acceptable drawing technique.
c. Record data as soon as possible after obtaining it.
d. Record and check the markup before enclosing concealed installations.
e. Cross-reference record prints to corresponding archive photographic documentation.

2. Content: Types of items requiring marking include, but are not limited to, the following:

a. Dimensional changes to Drawings.
b. Revisions to details shown on Drawings.
c. Depths of foundations below first floor.
d. Locations and depths of underground utilities.
e. Revisions to routing of piping and conduits.
f. Revisions to electrical circuitry.
g. Actual equipment locations.
h. Duct size and routing.
i. Locations of concealed internal utilities.
j.
k. Changes made following Architect's written orders.
l. Details not on the original Contract Drawings.
m. Field records for variable and concealed conditions.
n. Record information on the Work that is shown only schematically.

3. Mark the Contract Drawings and Shop Drawings completely and accurately. Use personnel proficient at recording graphic information in production of marked-up record prints.
4. Mark record sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at same location.
5. Mark important additional information that was either shown schematically or omitted from original Drawings.
6. Note Construction Change Directive numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.

B. Newly Prepared Record Drawings: Prepare new Drawings instead of preparing record Drawings where Architect determines that neither the original Contract Drawings nor Shop Drawings are suitable to show actual installation.

1. New Drawings may be required when a Change Order is issued as a result of accepting an alternate, substitution, or other modification.
2. Consult Architect for proper scale and scope of detailing and notations required to record the actual physical installation and its relation to other construction. Integrate newly prepared record Drawings into record Drawing sets; comply with procedures for formatting, organizing, copying, binding, and submitting.

C. Format: Identify and date each record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location.

1. Record Prints: Organize record prints and newly prepared record Drawings into manageable sets. Bind each set with durable paper cover sheets. Include identification on cover sheets.

2. Record Digital Data Files: Organize digital data information into separate electronic files that correspond to each sheet of the Contract Drawings. Name each file with the sheet identification. Include identification in each digital data file.
3. Identification: As follows:

    a. Project name.
    b. Date.
    c. Designation "PROJECT RECORD DRAWINGS."
    d. Name of Architect.
    e. Name of Contractor.

2.2 RECORD SPECIFICATIONS

A. Preparation: Mark Specifications to indicate the actual product installation where installation varies from that indicated in Specifications, addenda, and contract modifications.

1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
2. Mark copy with the proprietary name and model number of products, materials, and equipment furnished, including substitutions and product options selected.
3. Record the name of manufacturer, supplier, Installer, and other information necessary to provide a record of selections made.
4. For each principal product, indicate whether record Product Data has been submitted in operation and maintenance manuals instead of submitted as record Product Data.
5. Note related Change Orders and record Drawings where applicable.

B. Format: Submit record Specifications as paper copy and scanned PDF electronic file(s) of marked-up paper copy of Specifications.

2.3 RECORD PRODUCT DATA

A. Preparation: Mark Product Data to indicate the actual product installation where installation varies substantially from that indicated in Product Data submittal.

1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
2. Include significant changes in the product delivered to Project site and changes in manufacturer's written instructions for installation.
3. Note related Change Orders, record Specifications, and record Drawings where applicable.

B. Format: Submit record Product Data as paper copy and scanned PDF electronic file(s) of marked-up paper copy of Product Data.

1. Include record Product Data directory organized by Specification Section number and title, electronically linked to each item of record Product Data.

2.4 MISCELLANEOUS RECORD SUBMITTALS

A. Assemble miscellaneous records required by other Specification Sections for miscellaneous record keeping and submittal in connection with actual performance of the Work. Bind or file miscellaneous records and identify each, ready for continued use and reference.

B. Format: Submit miscellaneous record submittals as paper copy and scanned PDF electronic file(s) of marked-up miscellaneous record submittals.

1. Include miscellaneous record submittals directory organized by Specification Section number and title, electronically linked to each item of miscellaneous record submittals.

PART 3 - EXECUTION

3.1 RECORDING AND MAINTENANCE

A. Recording: Maintain one copy of each submittal during the construction period for project record document purposes. Post changes and revisions to project record documents as they occur; do not wait until end of Project.

B. Maintenance of Record Documents and Samples: Store record documents and Samples in the field office apart from the Contract Documents used for construction. Do not use project record documents for construction purposes. Maintain record documents in good order and in a clean, dry, legible condition, protected from deterioration and loss. Provide access to project record documents for Architect's reference during normal working hours.

END OF SECTION 01781

DIVISION 02

SECTION 02060- SITE DEMOLITION

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A Drawings, General Conditions, Division 1 Specifications sections, and Appendix of the Specifications to apply to work of this section.

1.2 DESCRIPTION OF WORK

A The Contractor shall examine all Drawings and read all contract documents and specifications to avoid omissions and duplications and to insure complete execution of all work in the Section. The Contractor shall provide all labor, materials, tools, equipment, apparatus, shoring, scaffolding, vehicles and transportation, incidentals, etc., required to perform the Demolition Work indicated on the Drawings and specified herein. The Work shall include, but is not limited to:

1. The complete demolition of existing perimeter retaining wall, continuous foundation walls and footings of the demolished building. Demolition of associated walkway/driveway pavement (including common alley), water meter, and storm drain lines, inlets and valves. Disconnect and cap all utilities serving building at the property line in accordance with the Sewer & Water Board of New Orleans City of New Orleans requirements. Completion of all other related work as required in the contract documents.

1.3 OUTLINE OF THE WORK

A The work to be performed under this Section shall include, but is not limited to, the following:

1. Temporary removal of construction fencing.

2. The complete removal of all miscellaneous debris and trash from the site prior to demolition.

3. Expose existing cistern and privy, hiring and paying for services of a registered land surveyor to locate on a survey with dim-relation to property lines.

4. Exposing existing footings, hiring and paying for the services of a registered land surveyor to locate each footing and indicate on a survey with dimensional relationship to property lines. Exact location and estimated depths shall be submitted to structural engineer via architect.

5. The disconnection and capping of all existing utility lines remaining intact and to the demoed buildings at the property line including water, gas, sewer, storm drainage, telephone, etc. unless otherwise indicated. All electric lines are to be terminated at poles or transformers. Coordinate with all utility companies.

6. Removal of adjacent neighbor sewer line.

7. The demolition and removal of damaged sidewalks, paving, etc. as indicated within the drawings. Concrete is to be handled per item 2 above.

8. The complete removal of all demolished materials, rubble, rubbish, or other debris created by the demolition from the site including existing material other than earth - thus the final product will be earth.

9. Installation of silt fencing coordination re-installation of construction fencing to accommodate erosion control measures and erosion control measures indicated on the drawings.

1.4 SUBMITTALS

A Within ten (10) days of the signing of the Contract, the Contractor shall submit to the Architect and Project Manager, in writing, a schedule and timetable for the Demolition and Removal Work to be performed. This schedule shall be organized into daily segments, and shall indicate areas to be demolished, removed, etc. for each segment, and their approximate dollar value given for all the segments shall total the contract price for demolition.

B Schedule: Submit, at the same time, 2 copies of proposed methods and operations of building demolition to Architect and Project Manager for review prior to start of work. Include in schedule coordination of work. Include in schedule coordination for shut-off, capping and/or continuation of utility services as required.

C Provide a detailed sequence of demolition and removal work.

D Contractor is to submit a log of the names, locations and types, etc. of dumping sites used and the types of materials disposed of at each site during the execution of the contract work.

1.5 JOB CONDITIONS

B Condition of Structures: Owner assumes no responsibility for actual condition of structures to be demolished.

1. Conditions existing at time of inspection for bidding purposes will be maintained by Owner in so far as practicable. However, variations on site may occur by Owner’s removal and salvage operations prior to start of demolition work.

C Explosives: Use of explosives will not be permitted.

D Traffic: Conduct demolition operations and removal of debris to ensure minimum interference with roads, streets, walks, and other adjacent occupied or used facilities.

1. Do not close or obstruct streets, walks or other occupied or used facilities without permission from authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by governing regulations.

E Protections: Ensure safe passage of persons around area of demolition. Conduct operations to prevent injury to persons and damage to adjacent buildings, structures and other facilities.

1. Maintain temporary fencing with gates to prevent unauthorized access to the site.

2. Contractor will be held responsible for consequences resulting in any security breach occurring at the site.

F Damages: Promptly repair damages caused to adjacent facilities by demolition operations at no cost to Owner.

1. If the contractor causes any damage to existing utility lines or valves, they shall repair or replace as required.

G Peak particle vibrations shall not exceed 0.25 in/sec. outside adjacent buildings. Monitoring shall be provided by a testing service employed by the Contractor. All test reports shall be forwarded to the Owner and copied to the Architect, Project Manager and Engineer. If vibrations exceed the limits stated, the Owner reserves the right to cease all work due to non-compliance.

H Utility Services:

1. Disconnect all existing utilities to the site that remain active. Protect all utilities to remain at nearest valve, manhole and power pole unless otherwise indicated on the drawings.

2. Do not interrupt existing utilities serving occupied or adjacent properties, except when authorized in writing by authorities having jurisdiction and neighboring property where work will be performed. Provide temporary services during interruptions to existing utilities, as acceptable to Owner, adjacent neighbor and with notification to other adjacent properties.

3. Clean all areas and backfill per general description of this Section, and Division 32. - Verify / coordinate sections

4. Mark on a copy of the site survey as a record print, kept on the job site, all known locations of utilities and their abandoned piping conduit, foundation piles, etc. This record print shall be submitted to the Owner through the Engineer upon completion of the Work.

I Asbestos Containing Materials are not known to be present at the site.

J Contractor shall take all precautions necessary to protect the safety of its employees.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.1 DEMOLITION

A Pollution Controls: Use water sprinkling, temporary enclosures, and other suitable methods to limit dust and dirt rising and scattering in air to lowest practical level. Comply with governing regulations pertaining to environmental protection.

1. Do not use water when it may create hazardous or objectionable conditions such as ice, flooding, and pollution.

2. Clean adjacent structures and improvements of dust, dirt, and debris caused by demolition operations, as directed by Engineer or governing authorities. Return adjacent areas to condition existing prior to start of work.

B Demolition: Demolish retaining walls/foundation and paving completely and remove from site as directed. Use such methods as required to complete work within limitations of governing regulations. Small carriable items, such as bricks, may be removed intact when acceptable to Engineer and approved by authorities having jurisdiction. Proceed with demolition in a systematic manner, from top of structure to ground.

C Filling Depressions, Pits and Voids: Completely fill depressions, pits, and below-grade areas and voids resulting from demolition of structures, footings and paving.

1. Use soil materials as specified by Civil Engineer for depressions due to footings, privy and as noted on drawings.

2. Use satisfactory soil materials consisting of sand, free from debris, trash, frozen materials roots and other organic matter. Reference Eustis GeoTech Report for satisfactory soil and requirements.

3. Prior to placement of fill materials, ensure that areas to be filled are free of standing water, frost, frozen material, trash and debris.

4. Place fill materials in horizontal layers not exceeding 6” in loose depth. Compact each layer to 95% Standard Proctor Density and Optimum Moisture Content.

5. After fill placement and compaction, grade surface to meet adjacent contours and to provide flow to surface drainage structures.

3.2 DISPOSAL OF DEMOLISHED MATERIALS

A General: Upon completion of the work, Contractor shall leave the site “clean”. Remove from site debris, rubbish, broken glass, rubble, litter or other materials resulting from demolition operations, and any existing materials other than earth.

1. Storage or sale of removed materials will not be permitted on the site.

2. Burning of removed materials from demolished structures will not be permitted on site.

B Removal: Transport materials removed from demolished structures and disposed of offsite legally.

END OF SECTION

SECTION 02200 - EARTHWORK

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. Preparing subgrades for slabs-on-grade, walks, pavements, turf and grasses and plants.
2. Excavating and backfilling for buildings and structures.
3. Drainage course for concrete slabs-on-grade.
4. Subbase course for concrete walks and pavements.
5. Subbase course and base course for asphalt paving.
6. Excavating and backfilling for utility trenches.

1.2 DEFINITIONS

A. Backfill: Soil material used to fill an excavation as per Eustis Geotechnical Report
1. Initial Backfill: Backfill placed beside and over pipe in a trench, including haunches to support sides of pipe.
2. Final Backfill: Backfill placed over initial backfill to fill a trench.

B. Base Course: Aggregate layer placed between the subbase course and hot-mix asphalt paving.

C. Bedding Course: Aggregate layer placed over the excavated subgrade in a trench before laying pipe.

D. Borrow Soil: Satisfactory soil imported from off-site for use as fill or backfill.

E. Drainage Course: Aggregate layer supporting the slab-on-grade that also minimizes upward capillary flow of pore water.

F. Excavation: Removal of material encountered above subgrade elevations and to lines and dimensions indicated.
1. Authorized Additional Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions as directed by Architect. Authorized additional excavation and replacement material will be paid for according to Contract provisions for changes in the Work.
2. Unauthorized Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions without direction by Architect. Unauthorized excavation, as well as remedial work directed by Architect, shall be without additional compensation.

G. Fill: Soil materials used to raise existing grades as per Eustis Geotechnical Report.

H. Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below the ground surface.

I. Subbase Course: Aggregate layer placed between the subgrade and base course for hot-mix asphalt pavement, or aggregate layer placed between the subgrade and a cement concrete pavement or a cement concrete or hot-mix asphalt walk.

J. Subgrade: Uppermost surface of an excavation or the top surface of a fill or backfill immediately below subbase, drainage fill, drainage course, or topsoil materials.

K. Utilities: On-site underground pipes, conduits, ducts, and cables, as well as underground services within buildings.

1.3 QUALITY ASSURANCE

A. Pre-excavation Conference: Conduct conference at Project site at contractor's request.

1.4 PROJECT CONDITIONS

A. Utility Locator Service: Notify utility locator service for area where Project is located before beginning earth moving operations.

B. Do not commence earth moving operations until plant-protection measures specified are in place.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

A. General: Provide borrow soil materials when sufficient satisfactory soil materials are not available from excavations.

B. Satisfactory Soils: Shall be obtained from off-site and shall be locally available sand (AASHTO A-3) having a maximum of 10% of the material passing the #200 sieve; free of rock or gravel larger than 3 inches in any dimension, debris, waste, frozen materials, vegetation, and other deleterious matter with a maximum organic content of 5%.

C. Subbase Material: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; with at least 90 percent passing a 1-1/2-inch sieve and not more than 10 % passing a No. 200 sieve.

D. Base Course: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; with at least 95 percent passing a 1-1/2-inch sieve and not more than 8 percent passing a No. 200 sieve.

E. Drainage Course: Narrowly graded mixture of washed crushed stone, or crushed or uncrushed gravel; ASTM D 448; coarse-aggregate grading Size 57; with 100 percent passing a 1-1/2-inch sieve and 0 to 5 percent passing a No. 8 sieve.

2.2 ACCESSORIES

A. Warning Tape: Acid- and alkali-resistant, polyethylene film warning tape manufactured for marking and identifying underground utilities, 6 inches wide and 4 mils thick, continuously inscribed with a description of the utility; colored to comply with local practice or requirements of authorities having jurisdiction.

B. Detectable Warning Tape: Acid- and alkali-resistant, polyethylene film warning tape manufactured for marking and identifying underground utilities, a minimum of 6 inches wide and 4 mils thick, continuously inscribed with a description of the utility, with metallic core encased in a protective jacket for corrosion protection, detectable by metal detector when tape is buried up to 30 inches deep; colored to comply with local practice or requirements of authorities having jurisdiction.

PART 3 - EXECUTION

3.1 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earth moving operations.

B. Protect and maintain erosion and sedimentation controls during earth moving operations.

C. Protect subgrades and foundation soils from freezing temperatures and frost. Remove temporary protection before placing subsequent materials.

3.2 EXCAVATION, GENERAL

A. Unclassified Excavation: Excavate to subgrade elevations regardless of the character of surface and subsurface conditions encountered. Unclassified excavated materials may include rock, soil materials, and obstructions. No changes in the Contract Sum or the Contract Time will be authorized for rock excavation or removal of obstructions.

1. If excavated materials intended for fill and backfill include unsatisfactory soil materials and rock, replace with satisfactory soil materials.

3.3 EXCAVATION FOR STRUCTURES

A. Excavate to indicated elevations and dimensions within a tolerance of plus or minus 1 inch. If applicable, extend excavations a sufficient distance from structures for placing and removing concrete formwork, for installing services and other construction, and for inspections.
1. Excavations for Footings and Foundations: Do not disturb bottom of excavation. Excavate by hand to final grade just before placing concrete reinforcement. Trim bottoms to required lines and grades to leave solid base to receive other work.

B. Excavations at Edges of Tree- and Plant-Protection Zones:

1. Excavate by hand to indicated lines, cross sections, elevations, and subgrades. Use narrow-tine spading forks to comb soil and expose roots. Do not break, tear, or chop exposed roots. Do not use mechanical equipment that rips, tears, or pulls roots.
2. Cut and protect roots according to requirements in Division 2 Section "Tree Protection and Trimming."

3.4 EXCAVATION FOR WALKS AND PAVEMENTS

A. Excavate surfaces under walks and pavements to indicated lines, cross sections, elevations, and subgrades.

3.5 EXCAVATION FOR UTILITY TRENCHES

A. Excavate trenches to indicated gradients, lines, depths, and elevations.

B. Excavate trenches to uniform widths to provide the following clearance on each side of pipe or conduit. Excavate trench walls vertically from trench bottom to 12 inches higher than top of pipe or conduit unless otherwise indicated.

1. Clearance: 12 inches each side of pipe or conduit.

C. Trench Bottoms: Excavate and shape trench bottoms to provide uniform bearing and support of pipes and conduit. Shape subgrade to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits. Remove projecting stones and sharp objects along trench subgrade.

1. Excavate trenches 6 inches deeper than elevation required in rock or other unyielding bearing material, 4 inches deeper elsewhere, to allow for bedding course.

D. Trenches in Tree- and Plant-Protection Zones:

1. Hand-excavate to indicated lines, cross sections, elevations, and subgrades. Use narrow-tine spading forks to comb soil and expose roots. Do not break, tear, or chop exposed roots. Do not use mechanical equipment that rips, tears, or pulls roots.
2. Do not cut main lateral roots or taproots; cut only smaller roots that interfere with installation of utilities.
3. Cut and protect roots according to requirements of tree protection and trimming specifications.

3.6 SUBGRADE INSPECTION

A. Proof-roll subgrade below the building slabs and pavements with a pneumatic-tired dump truck to identify soft pockets and areas of excess yielding. Do not proof-roll wet or saturated subgrades.

B. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as directed by Architect, without additional compensation.

3.7 UNAUTHORIZED EXCAVATION

A. Fill unauthorized excavation under foundations or wall footings by extending bottom elevation of concrete foundation or footing to excavation bottom, without altering top elevation. Lean concrete fill, with 28-day compressive strength of 2500 psi, may be used when approved by Architect.

1. Fill unauthorized excavations under other construction, pipe, or conduit as directed by Architect.

3.8 STORAGE OF SOIL MATERIALS

A. Stockpile borrow soil materials and excavated satisfactory soil materials without intermixing. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.

1. Stockpile soil materials away from edge of excavations. Do not store within drip line of remaining trees.

3.9 UTILITY TRENCH BACKFILL

A. Place backfill on subgrades free of mud, frost, snow, or ice.

B. Place and compact bedding course on trench bottoms and where indicated. Shape bedding course to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits.

C. Trenches under Footings: Backfill trenches excavated under footings and within 18 inches of bottom of footings with satisfactory soil; fill with concrete to elevation of bottom of footings. Concrete is specified in Division 3 Section "Cast-in-Place Concrete."

D. Trenches under Roadways: Provide 4-inch-thick, concrete-base slab support for piping or conduit less than 30 inches below surface of roadways. After installing and testing, completely encase piping or conduit in a minimum of 4 inches of concrete before backfilling or placing roadway subbase course. Concrete is specified in Division 3 Section "Cast-in-Place Concrete."

E. Place and compact initial backfill of satisfactory soil], free of particles larger than 1 inch in any dimension, to a height of 12 inches over the pipe or conduit.
1. Carefully compact initial backfill under pipe haunches and compact evenly up on both sides and along the full length of piping or conduit to avoid damage or displacement of piping or conduit. Coordinate backfilling with utilities testing.

F. Place and compact final backfill of satisfactory soil to final subgrade elevation.

G. Install warning tape directly above utilities, 12 inches below finished grade, except 6 inches below subgrade under pavements and slabs.

3.10 SOIL FILL

A. Plow, scarify, bench, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so fill material will bond with existing material.

B. Place and compact fill material in layers to required elevations as follows:

1. Under grass and planted areas, use satisfactory soil material.
2. Under walks and pavements, use engineered fill.
3. Under steps and ramps, use engineered fill.

3.11 SOIL MOISTURE CONTROL

A. Uniformly moisten or aerate subgrade and each subsequent fill or backfill soil layer before compaction to within 2 percent of optimum moisture content.

1. Do not place backfill or fill soil material on surfaces that are muddy, frozen, or contain frost or ice.
2. Remove and replace, or scarify and air dry, otherwise satisfactory soil material that exceeds optimum moisture content by 2 percent and is too wet to compact to specified dry unit weight.

3.12 COMPACTION OF SOIL BACKFILLS AND FILLS

A. Place backfill and fill soil materials in layers not more than 8 inches in loose depth for material compacted by heavy compaction equipment, and not more than 4 inches in loose depth for material compacted by hand-operated tampers.

B. Place backfill and fill soil materials evenly on all sides of structures to required elevations, and uniformly along the full length of each structure.

C. Compact soil materials to not less than the following percentages of maximum dry unit weight according to ASTM D 698:

1. Under structures, building slabs, steps, and pavements, scarify and recompact top 12 inches of existing subgrade and each layer of backfill or fill soil material at 95 percent.

3.13 GRADING

A. General: Uniformly grade areas to a smooth surface, free of irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated.

B. Site Rough Grading: Slope grades to direct water away from buildings and to prevent ponding. Finish subgrades to required elevations within the following tolerances:

1. Turf or Unpaved Areas: Plus or minus 1 inch.
2. Walks: Plus or minus 1 inch.

3. Pavements: Plus or minus 1/2 inch.

C. Grading inside Building Lines: Finish subgrade to a tolerance of 1/2 inch when tested with a 10-foot (3-m) straightedge.

3.14 SUBBASE UNDER PAVEMENTS AND WALKS

A. Place subbase course on subgrades free of mud, frost, snow, or ice.

B. On prepared subgrade, place subbase course under pavements and walks as follows:

1. Shape subbase course to required crown elevations and cross-slope grades.
2. Place subbase course that exceeds 6 inches in compacted thickness in layers of equal thickness, with no compacted layer more than 6 inches thick or less than 3 inches thick.
3. Compact subbase course at optimum moisture content to required grades, lines, cross sections, and thickness to not less than 95 percent of maximum dry unit weight according ASTM D 698.

3.15 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified geotechnical engineering testing agency to perform tests and inspections.

B. Allow testing agency to inspect and test subgrades and each fill or backfill layer. Proceed with subsequent earth moving only after test results for previously completed work comply with requirements.

C. Footing Subgrade: At footing subgrades, at least one test of each soil stratum will be performed to verify design bearing capacities. Subsequent verification and approval of other footing subgrades may be based on a visual comparison of subgrade with tested subgrade when approved by Architect.

D. When testing agency reports that subgrades, fills, or backfills have not achieved degree of compaction specified, scarify and moisten or aerate, or remove and replace soil materials to depth required; re-compact and retest until specified compaction is obtained.

E. Report test results to the Architect and Structural Engineer.

F. The Contractor shall be responsible for notifying the Testing Laboratory and ensuring that compaction tests are made on each lift of fill or backfill and on any other compacted soil.

3.16 PROTECTION

A. Protecting Graded Areas: Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.

B. Repair and reestablish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction due to subsequent construction operations or weather conditions.

C. Where settling occurs before Project correction period elapses, remove finished surfacing, backfill with additional soil material, compact, and reconstruct surfacing.

1. Restore appearance, quality, and condition of finished surfacing to match adjacent work, and eliminate evidence of restoration to greatest extent possible.

3.17 DISPOSAL OF SURPLUS AND WASTE MATERIALS

A. Remove surplus satisfactory soil and waste materials, including unsatisfactory soil, trash, and debris, and legally dispose of them off Owner's property.

END OF SECTION 02200

SECTION 02361 - TERMITE CONTROL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Soil treatment with termiticide.

2. Wood treatment with termiticide at storage areas
3. Bait-station system.
4. Polymer barrier fittings with termiticide for installation around utility penetrations.

B. Related Sections:

1. Section 06100 "Rough Carpentry" for wood preservative treatment by pressure process.

1.3 SUBMITTALS

A. Product Data: For each type of termite control product.

1. Include the EPA-Registered Label for termiticide products.

B. Qualification Data: For qualified Installer.

C. Product Certificates: For termite control products, from manufacturer.

D. Soil Treatment Application Report: After application of termiticide is completed, submit report for Owner's records and include the following:

1. Date and time of application.
2. Moisture content of soil before application.
3. Termiticide brand name and manufacturer.
4. Quantity of undiluted termiticide used.
5. Dilutions, methods, volumes used, and rates of application.
6. Areas of application.

7. Water source for application.

E. Wood Treatment Application Report: After application of termiticide is completed, submit report for Owner's records and include the following:

1. Date and time of application.
2. Termiticide brand name and manufacturer.
3. Quantity of undiluted termiticide used.
4. Dilutions, methods, volumes used, and rates of application.
5. Areas of application.

F. Bait-Station System Application Report: After installation of bait-station system is completed, submit report for Owner's records and include the following:

1. Location of areas and sites conducive to termite feeding and activity.
2. Plan drawing showing number and locations of bait stations.
3. Dated report for each monitoring and inspection occurrence indicating level of termite activity, procedure, and treatment applied before time of Substantial Completion.
4. Termiticide brand name and manufacturer.
5. Quantities of [**termiticide**] [**and**] [**nontoxic termite bait**] used.

G. Schedule of inspections for one year from date of Substantial CompletionPolymer Barrier Fittings with Termiticide Application Report: After installation of polymer barrier fittings with termiticide is completed, submit report for Owner’s records and include the following:
1. Plan drawing showing number and locations of each type of polymer barrier fitting with termiticide.
2. Termiticide brand name and manufacturer
3. Schedule of inspections for one year from date of Substantial Completion

H. Warranties: Sample of special warranties.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: A specialist who is licensed according to regulations of authorities having jurisdiction to apply termite control treatment and products in jurisdiction where Project is located, and who employs workers trained and approved by manufacturer to install manufacturer's products.

B. Regulatory Requirements: Formulate and apply termiticides and termiticide devices according to the EPA-Registered Label.

C. Source Limitations: Obtain termite control products from single sourcefrom single manufacturer].

D. Preinstallation Conference: Conduct conference at Project site.

1.5 PROJECT CONDITIONS

A. Environmental Limitations: To ensure penetration, do not treat soil that is water saturated or frozen. Do not treat soil while precipitation is occurring. Comply with requirements of the EPA-Registered Label and requirements of authorities having jurisdiction.

B. Coordinate soil treatment application with excavating, filling, grading, and concreting operations. Treat soil under footings, grade beams, and ground-supported slabs before construction.

C. Apply wood treatment after framing, sheathing, and exterior weather protection is completed but before electrical and mechanical systems are installed.

D. Install bait-station system after construction, including landscaping, is completed.

E. Install polymer barrier fittings with termiticide around utility penetrations prior to pouring concrete and after installation and inspection of plumbing and electrical pipes and conduits, slab vapor barrier, and concrete slab reinforcement.

1.6 WARRANTY

A. Soil Treatment Special Warranty: Manufacturer's standard form, signed by Applicator and Contractor, certifying that termite control work, consisting of applied soil termiticide treatment, will prevent infestation of subterranean termites. If subterranean termite activity or damage is discovered during warranty period, re-treat soil and repair or replace damage caused by termite infestation.

1. Warranty Period: **Five**years from date of Substantial Completion.

B. Wood Treatment Special Warranty: Manufacturer's standard form, signed by Applicator and Contractor, certifying that termite control work, consisting of applied wood termiticide treatment, will prevent infestation of subterranean termites. If subterranean termite damage is discovered during warranty period, repair or replace damage caused by termite infestation and treat replacement wood.

1. Warranty Period: 12 years from date of Substantial Completion.

C. Polymer Barrier Fittings with Termiticide Special Warranty: Manufacturer's standard form, signed by Applicator and Contractor, certifying that termite control work, consisting of installation of polymer barrier fittings with termiticide, will prevent infestation of subterranean termites. If subterranean termite activity or damage is discovered during warranty period, re-treat and repair or replace damage caused by termite infestation.

1. Warranty Period: Five years from date of Substantial Completion.

1.7 MAINTENANCE SERVICE

A. Continuing Service: Beginning at Substantial Completion, provide 12 months' continuing service including monitoring, inspection, and re-treatment for occurrences of termite activity. Provide a standard continuing service agreement. State services, obligations, conditions, terms for agreement period, and terms for future renewal options.

PART 2 - PRODUCTS

2.1 SOIL TREATMENT

A. Termiticide: Provide an EPA-Registered termiticide, complying with requirements of authorities having jurisdiction, in an aqueous solution formulated to prevent termite infestation. Provide quantity required for application at the label volume and rate for the maximum termiticide concentration allowed for each specific use, according to product's EPA-Registered Label.

1. Products: Subject to compliance with requirements, provide one of the following:

a. BASF Corporation, Agricultural Products; Termidor.
b. FMC Corporation, Agricultural Products Group; Dragnet FT .

2. Service Life of Treatment: Soil treatment termiticide that is effective for not less than five years against infestation of subterranean termites.

2.2 WOOD TREATMENT

A. Borate: Provide an EPA-Registered borate temiticide, complying with requirements of authorities having jurisdiction, in an aqueous solution for spray application and a gel solution for pressure injection, formulated to prevent termite infestation in wood. Provide quantity required for application at the label volume and rate for the maximum diffusible borate concentration allowed for each specific use, according to product's EPA-Registered Label.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. Nisus Corp.; Bora-Care or Tim-Bor.

2.3 BAIT-STATION SYSTEM

A. Provide bait stations based on the dimensions of building perimeter indicated on Drawings, according to manufacturer's EPA-Registered Label for product, manufacturer's written instructions, and the following:

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

   a. BASF Corporation, Agricultural Products; Subterfuge.
   b. Dow AgroSciences LLC; Sentricon System.
   c. Ensystex, Inc.; Exterra System.
   d. FMC Corporation, Agricultural Products Group; First Line.
   e. Whitmire Micro-Gen Research Laboratories, Inc.; Advance TBS.

2. No fewer than one bait station per 8 linear feet <**Insert value**>.
3. No fewer than one cluster of bait stations per 20 linear feet (6.1 linear meters), consisting of no fewer than three bait stations per cluster.

2.4 POLYMER BARRIER FITTINGS

A. Products: Subject to compliance with requirements, [**provide the following**] [**provide one of the following**] [**available products that may be incorporated into the Work include, but are not limited to, the following**]:

   1. Syngenta; IMPASSE Termite Blockers.
   2. Termimesh LLC>.

B. Pipe/Conduit Fitting: Integral 2-1/2-inch- (65-mm-) long polymer sleeve and 1-inch- (25-mm-) wide circular flange with lambda-cyhalothrin termiticide sealed between two outer polymer layers; with fasteners.

C. Tub Trap Fitting: Integral polymer boot and 23-by-23-inch (585-by-585-mm) flange with lambda-cyhalothrin termiticide sealed between two outer polymer layers; with fasteners.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Applicator present, for compliance with requirements for moisture content of soil per termiticide label requirements, interfaces with earthwork, slab and foundation work, landscaping, utility installation, and other conditions affecting performance of termite control.

B. Proceed with application only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. General: Comply with the most stringent requirements of authorities having jurisdiction and with manufacturer's written instructions for preparation before beginning application of termite control treatment. Remove all extraneous sources of wood

cellulose and other edible materials such as wood debris, tree stumps and roots, stakes, formwork, and construction waste wood from soil within and around foundations.

B. Soil Treatment Preparation: Remove foreign matter and impermeable soil materials that could decrease treatment effectiveness on areas to be treated. Loosen, rake, and level soil to be treated except previously compacted areas under slabs and footings. Termiticides may be applied before placing compacted fill under slabs if recommended in writing by termiticide manufacturer.

1. Fit filling hose connected to water source at the site with a backflow preventer, complying with requirements of authorities having jurisdiction.

3.3 APPLICATION, GENERAL

A. General: Comply with the most stringent requirements of authorities having jurisdiction and with manufacturer's EPA-Registered Label for products.

3.4 APPLYING SOIL TREATMENT

A. Application: Mix soil treatment termiticide solution to a uniform consistency. Provide quantity required for application at the label volume and rate for the maximum specified concentration of termiticide, according to manufacturer's EPA-Registered Label, to the following so that a continuous horizontal and vertical termiticidal barrier or treated zone is established around and under building construction. Distribute treatment evenly.

1. Slabs-on-Grade and Basement Slabs: Under ground-supported slab construction, including footings, building slabs, and attached slabs as an overall treatment. Treat soil materials before concrete footings and slabs are placed.
2. Foundations: Adjacent soil, including soil along the entire inside perimeter of foundation walls; along both sides of interior partition walls; around plumbing pipes and electric conduit penetrating the slab; around interior column footers, piers, and chimney bases; and along the entire outside perimeter, from grade to bottom of footing. Avoid soil washout around footings.
3. Crawlspaces: Soil under and adjacent to foundations as previously indicated. Treat adjacent areas including around entrance platform, porches, and equipment bases. Apply overall treatment only where attached concrete platform and porches are on fill or ground.
4. Masonry: Treat voids.
5. Penetrations: At expansion joints, control joints, and areas where slabs will be penetrated.

B. Avoid disturbance of treated soil after application. Keep off treated areas until completely dry.

C. Protect termiticide solution, dispersed in treated soils and fills, from being diluted until ground-supported slabs are installed. Use waterproof barrier according to EPA-Registered Label instructions.

D. Post warning signs in areas of application.

E. Reapply soil treatment solution to areas disturbed by subsequent excavation, grading, landscaping, or other construction activities following application.

3.5 APPLYING WOOD TREATMENT

A. Application: Mix wood treatment solution to a uniform consistency. Provide quantity required for application at the label volume and rate for the maximum specified concentration of borate, according to manufacturer's EPA-Registered Label, so that wood framing, sheathing, siding, and structural members subject to infestation receive treatment.

1. Framing and Sheathing: Apply termiticide solution by spray to bare wood for complete coverage.

3.6 INSTALLING BAIT-STATION SYSTEM

A. Place bait stations according to the EPA-Registered Label for the product and manufacturer's written instructions, in the following areas that are conducive to termite feeding and activity:

1. Conducive sites and locations indicated on Drawings.
2. In and around infested trees and stumps.
3. In mulch beds.
4. Where wood directly contacts soil.
5. Areas of high soil moisture.
6. Near irrigation sprinkler heads.
7. Each area where roof drainage system, including downspouts and scuppers, drains to soil.
8. Along driplines of roof overhangs without gutters.
9. Where condensate lines from mechanical equipment drip or drain to soil.
10. At plumbing penetrations through ground-supported slabs.
11. Other sites and locations as determined by licensed Installer.

B. Inspect and service bait stations from time of their application until Substantial Completion unless extended by continuing service agreement, according to the EPA-Registered Label for product and manufacturer's written instructions for termite management system and bait products.

1. Service Frequency: Inspect bait stations not less than once every threemonth(s).

3.7 INSTALLING POLYMER BARRIER FITTINGS

A. Remove any pipe wrap material so that the polymer barrier fittings can be applied directly to the pipe or conduit. After installing the barrier, reapply pipe wrap material both below and above the blocker to protect the pipe from contact with concrete.

B. Install polymer barrier fittings around each utility pipe and conduit penetrating concrete **slab** and **foundation walls** according to the EPA-Registered Label for the product and manufacturer's written instructions.

END OF SECTION 02361

SECTION 02751 – PORTLAND CEMENT CONCRETE PAVEMENT

PART 1 - GENERAL

1.1 SUMMARY

A. All work performed under this section shall be in accordance with Sections 601, 706, 707, 901 and 1005 of the Louisiana Standard Specifications for Roads and Bridges 2016 Edition (and latest revisions) unless herein specified or indicated on the plans. This Section includes Portland Cement Concrete Pavement for the following applications:

1. Pavement, Curbs and Walkways.

2. Joints.

1.2 SUBMITTALS

A. Product Data: For each manufactured material and product indicated.

B. Design Mixes: For each concrete mix indicated.

C. Material certificates.

1.3 QUALITY ASSURANCE

A. Manufacturer Qualifications: Manufacturer of ready-mixed concrete products complying with ASTM C 94 requirements for production facilities and equipment.

B. ACI Publications: Comply with ACI 301, "Specification for Structural Concrete," unless modified by the requirements of the Contract Documents.

PART 2 - PRODUCTS

2.1 STEEL REINFORCEMENT

A. Steel reinforcement shall be in accordance with Sections 806 and 1009 of the Louisiana Standard Specifications for Roads and Bridges 2016 Edition (and latest revisions).

2.2 CONCRETE MATERIALS

A. Concrete Materials shall be in accordance with Sections 901 of the Louisiana Standard Specifications for Roads and Bridges 2016 Edition (and latest revisions).

2.3 TRAFFIC PAINT

A. Traffic paint shall be alkyd-resin ready-mixed complying with AASHTO M 248, Type S.

1. Color: White (Parking)

2. Color: Yellow (Traffic control)

3. Color: Blue (Handicapped)

4. Color: Red (Fire zone and no parking)

PART 3 - EXECUTION

3.1 CURBS

A. Curbs. If slip-formed, the concrete shall have not more than a 1-1/2" slump and an air entraining admixture in accordance with the Standard Specifications referred to above.

3.2 SIDEWALKS

A. The concrete shall be deposited on a moist sub-grade, struck off and compacted to the required thickness. The surface shall be finished with a wood float or steel trowel, provided that the surface is finally brushed in order to leave a slightly rough finish.

B. The sidewalk shall be divided into sections by control joints, spaced 5 no more than feet apart, which shall extend into the concrete for at least 1/4 of the depth and shall be approximately 1/8" wide. Construction joints of 1/4" pre-molded expansion joint shall be installed around all appurtenances; such as manholes, utility poles, etc., extending and through sidewalk. Expansion joints of ½" thick performed joint filler (non-extruding type) or redwood shall be installed every 20 feet or fraction thereof, between intersecting sidewalks, and any fixed structure such as building, bridge or curbing. This expansion joint material shall extend for the full depth of the walk.

C. Wire fabric where required shall conform to ASTM A-185.

3.3 CONCRETE PAVEMENT

A. The P.C.C. Pavement thickness shown on the plans are minimum thickness. There will be no tolerance for thickness deficiencies. The Owner reserves the right to require removal and replacement of all pavement that does not meet the minimum required thickness. There will be no adjustment of payment for pavement exceeding the minimum required thickness. Concrete surface shall be finished with a light to medium broom to leave a slightly rough finish.

3.4 JOINTS

A. All joints shall be installed in accordance with the details in the plans and using materials in accordance with Section 1005 of the Louisiana Standard Specifications for Roads and Bridges, 2016 Edition

3.5 TESTING

A. All testing and inspection shall be in accordance with Louisiana Standard Specifications for Roads and Bridges, 2016 Edition, and latest revisions.

3.6 REPAIRS AND PROTECTION

A. Remove and replace concrete pavement that is broken, damaged, or defective, or does not meet requirements in this Section.

B. Protect concrete from damage. Exclude traffic from pavement for at least 14 days after placement.

C. Maintain concrete pavement free of stains, discoloration, dirt, and other foreign material. Sweep concrete pavement not more than two days before date scheduled for Substantial Completion inspections.

3.7 TRAFFIC PAINT

A. Traffic Paint: Apply traffic paint for striping and other markings with mechanical equipment to produce uniform straight edges. Apply at manufacturer's recommended rates to provide a 15-mil minimum wet film thickness.

END OF SECTION 02751

SECTION 02764 – PAVEMENT JOINT SEALANTS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes hot applied pavement joint sealants in the following locations.

1. Portland cement concrete pavement expansion and contraction joints.

1.2 SUBMITTALS

A. Product Data: For each product indicated.

B. Samples: For each type and color of joint sealant indicated.

C. Product certificates.

D. Sealant compatibility and adhesion test reports.

1.3 QUALITY ASSURANCE

A. Sealant Compatibility and Adhesion Testing: Use sealant manufacturer's standard test methods to determine whether priming and other specific joint preparation techniques are required to obtain rapid, optimum adhesion of joint sealants to joint substrates.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where subparagraph titles below introduce lists, the following requirements apply for product selection:

1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the products specified.

2. Products: Subject to compliance with requirements, provide one of the products specified.

2.2 MATERIALS – GENERAL

A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.

1. Primers: Product recommended in writing by joint sealant manufacturer for adhesion of sealant to joint substrates indicated, as determined from sealant compatibility and adhesion tests and prior experience.

B. Colors of Exposed Joint Sealants: Match samples

C. Joint-Sealant Backer Materials: Non-staining; compatible with joint substrates, sealants, primers, and other joint fillers; and approved for applications indicated by joint sealant manufacturer based on field experience and laboratory testing.

1. Round Backer Rod for Cold- and Hot-Applied Sealants: ASTM D 5249, Type 1, of diameter and density required to control sealant depths and prevent bottom-side adhesion of sealant.

2. Backer Strips for Cold- and Hot-Applied Sealants: ASTM D 5249; Type 2; of thickness and width required to control sealant depths, prevent bottom-side adhesion of sealant, and fill remainder of joint opening under sealant.

3. Round Backer Rods for Cold-Applied Sealants: ASTM D 5249, Type 3, of diameter and density required to control sealant depths and prevent bottom-side adhesion of sealant.

2.3 HOT-APPLIED JOINT SEALANTS

A. Elastomeric Sealant for Concrete: ASTM D 3406.

1. Products:

a. Crafco, Inc.; Superseal 444/777.

b. Meadows, W. R., Inc.; POLY-JET 3406.

c. Or Equal

B. Sealant for Concrete and Asphalt: ASTM D 3405.

1. Products:

a. Crafco Inc.; ROADSAVER 221.

b. Koch Materials Company;

c. Meadows, W. R., Inc.; SEALTIGHT HI-SPEC.

d. Or Equal

PART 3 - EXECUTION

3.1 INSTALLATION

A. Clean out joints immediately before installing joint sealants.

B. Joint Priming: Prime joint substrates where indicated or recommended in writing by joint sealant manufacturer, based on sealant compatibility and adhesion tests and prior expe-

rience. Confine primers to areas of joint-sealant bond; do not spill primers or allow them to migrate onto adjoining surfaces.

C. Sealant Installation: Comply with applicable recommendations in ASTM C 1193.

D. Install backer materials to support sealants during application and at position required to produce optimum sealant movement capability

1. Do not leave gaps between ends of backer materials.

2. Do not stretch, twist, puncture, or tear backer materials.

3. Remove absorbent backer materials that have become wet before sealant application and replace them with dry materials.

E. Install sealants at same time backer materials are installed.

1. Place sealants so they directly contact and fully wet joint substrates.

2. Completely fill recesses provided for each joint configuration.

3. Produce uniform, cross-sectional shapes and depths optimize sealant movement capability.

F. Tooling of Non-sag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.

1. Remove excess sealants from surfaces adjacent to joint.

2. Use tooling agents that are approved in writing by joint sealant manufacturer and that do not discolor sealants or adjacent surfaces.

G. Clean excess sealants or sealant smears adjacent to joints as installation progresses by methods and with cleaning materials approved by manufacturers of joint sealants and of products in which joints occur.

END OF SECTION 02764

SECTION 02821 - CHAIN-LINK FENCES AND GATES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes chain-link fences, swing and horizontal gate.

1.2 PERFORMANCE REQUIREMENTS

A. Delegated Design: Design chain-link fences and gates, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

B. Structural Performance: Chain-link fence and gate framework shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated according to ASCE/SEI 7

1. Minimum Post Size: Determine according to ASTM F 1043 for framework up to 12 feet (3.66 m) high, and post spacing not to exceed 8 feet (3 m) for
2. Minimum Post Size and Maximum Spacing: Determine according to CLFMI WLG 2445, based on mesh size and pattern specified and on the following:

    a. Wind Loads: 130 mph
    b. Exposure Category: B
    c. Fence Height: 7 feet
    d. Material Group: IC, electric-resistance-welded round steel pipe.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated

B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.

C. Samples: For each polymer-coated product and for each color and texture specified, in 6-inch lengths for components and on full-sized units for accessories.

D. Delegated-Design Submittal: For chain-link fences and gate framework indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.4 INFORMATIONAL SUBMITTALS

A. Product Certificates: For each type of chain-link fence and gate, from manufacturer.

B. Product Test Reports: For framing strength according to ASTM F 1043.

C. Sample of special warranty.

1.5 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

1.6 WARRANTY

A. Special Warranty: Manufacturer's standard form in which Manufacturer or Installer agrees to repair or replace components of chain-link fences and gates that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, deterioration of metals, metal finishes, and other materials beyond normal weathering.
2. Warranty Period: **15** years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 CHAIN-LINK FENCE AND GATE FABRIC

A. General: Provide fabric in one-piece heights measured between top and bottom of outer edge of selvage knuckle or twist. Comply with CLFMI Product Manual and with requirements indicated below:

1. Fabric Height: As indicated on Drawings**.**
2. Steel Wire Fabric: Wire with a diameter of 0.148 inch (3.76 mm).

a. Mesh Size: 2 inches (50 mm)m)].
b. Zinc-Coated Fabric: ASTM A 392, Type II, Class 2, 2.0 oz./sq. ft. (610 g/sq. m) with zinc coating applied after weaving.
c. Polymer-Coated Fabric: ASTM F 668, Class 2a over zinc-coated steel wire.

1) Color: Dark As selected by Architect from manufacturer's full range, complying with ASTM F 934.

3. Aluminum Wire Fabric: ASTM F 1183, with mill finish, and wire diameter of 0.148 inch (3.76 mm).

a. Mesh Size: 2 inches (50 mm).

4. Selvage: Twisted top and knuckled bottom

2.2 FENCE FRAMING

A. Posts and Rails: Comply with ASTM F 1043 for framing, including rails, braces, and line; terminal; and corner posts. Provide members with minimum dimensions and wall thickness according to ASTM F 1043 or ASTM F 1083 based on the following:

1. Fence Height: As indicated on Drawings
2. Light Industrial Strength: Material Group IC-L, round steel pipe, electric-resistance-welded pipe

a. Line Post 2.375 inches (60 mm) in diameter min
b. End, Corner and Pull Post: 2.375 inches (60 mm) min

3. Horizontal Framework Members: [Intermediate, top and bottom rails complying with ASTM F 1043.
4. Brace Rails: Comply with ASTM F 1043.
5. Metallic Coating for Steel Framing:

a. Type A zinc coating.

6. Polymer coating over metallic coating.

a. Color: Match chain-link fabric [As selected by Architect from manufacturer's full range, complying with ASTM F 934.

2.3 TENSION WIRE

A. Polymer-Coated Steel Wire: 0.177-inch- (4.5-mm-) diameter, tension wire complying with ASTM F 1664, Class 2a over zinc-coated steel wire.

1. Color: Match chain-link fabric [] As selected by Architect from manufacturer's full range, complying with ASTM F 934.

2.4 SWING GATES

A. General: Comply with ASTM F 900 for gate posts and single double] swing gate types.

1. Gate Leaf Width: As indicated.
2. Gate Fabric Height: As indicated.

B. Pipe and Tubing:

1. Zinc-Coated Steel: Comply with ASTM F 1043 and ASTM F 1083; protective coating and finish to match fence framing.
2. Gate Posts: Round tubular steel
3. Gate Frames and Bracing: Round tubular steel

C. Frame Corner Construction: Welded.

D. Hardware:

1. Hinges: 180-degree
2. Latches permitting operation from both sides of gate with provision for padlocking accessible from both sides of gate.
3. Lock: Manufacturer's standard internal device.
4. Closer: Manufacturer's standard.
5. .

2.5 FITTINGS

A. General: Comply with ASTM F 626.

B. Finish:

1. Metallic Coating for Pressed Steel or Cast Iron: Not less than 1.2 oz. /sq. ft. (366 g /sq. m) zinc.

a. Polymer coating over metallic coating.

2. Aluminum: Mill finish.

2.6 GROUT AND ANCHORING CEMENT

A. Nonshrink, Nonmetallic Grout: Premixed, factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107. Provide grout, recommended in writing by manufacturer, for exterior applications.

B. Erosion-Resistant Anchoring Cement: Factory-packaged, nonshrink, nonstaining, hydraulic-controlled expansion cement formulation for mixing with potable water at Project site to create pourable anchoring, patching, and grouting compound. Provide formulation that is resistant to erosion from water exposure without needing protection by a sealer or waterproof coating and that is recommended in writing by manufacturer, for exterior applications.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Examine areas and conditions, with Installer present, for compliance with requirements for a verified survey of property lines and legal boundaries, site clearing, earthwork, pavement work, and other conditions affecting performance of the Work.

1. Do not begin installation before final grading is completed unless otherwise permitted by Architect.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

C. Stake locations of fence lines, gates, and terminal posts. Do not exceed intervals of 500 feet (152.5 m) or line of sight between stakes. Indicate locations of utilities, lawn sprinkler system, underground structures, benchmarks, and property monuments.

D. Install chain-link fencing to comply with ASTM F 567 and more stringent requirements indicated.

E. Post Excavation: Drill or hand-excavate holes for posts to diameters and spacings indicated, in firm, undisturbed soil.

F. Post Setting: Set posts in concrete at indicated spacing into firm, undisturbed soil.

1. Verify that posts are set plumb, aligned, and at correct height and spacing, and hold in position during setting with concrete or mechanical devices.
2. Concrete Fill: Place concrete around posts to dimensions indicated and vibrate or tamp for consolidation. Protect aboveground portion of posts from concrete splatter.

a. Exposed Concrete: Extend 2 inches (50 mm) above grade; shape and smooth to shed water.
b. Posts Set into Concrete in Sleeves: Use steel pipe sleeves preset and anchored into concrete for installing posts. After posts have been inserted into sleeves, fill annular space between post and sleeve with anchoring cement, mixed and placed to comply with anchoring material manufacturer's written instructions, and finished sloped to drain water away from post.

G. Terminal Posts: Locate terminal end, corner, and gate posts per ASTM F 567 and terminal pull posts at changes in horizontal or vertical alignment of 15 degrees or more.

H. Line Posts: Space line posts uniformly at 10 feet (3 m) o.c.

I. Tension Wire: Install according to ASTM F 567, maintaining plumb position and alignment of fencing. Provide horizontal tension wire at the following locations:

1. Extended along top and bottom of fence fabric.

J. Chain-Link Fabric: Apply fabric to outside of enclosing framework. Leave 2 inches (50 mm) between finish grade or surface and bottom selvage unless otherwise indicated.

K. Install gates according to manufacturer's written instructions, level, plumb, and secure for full opening without interference. Attach fabric as for fencing. Attach hardware using tamper-resistant or concealed means. Install ground-set items in concrete for anchorage. Adjust hardware for smooth operation and lubricate where necessary.

L. Gates: Adjust gates to operate smoothly, easily, and quietly, free of binding, warp, excessive deflection, distortion, nonalignment, misplacement, disruption, or malfunction, throughout entire operational range. Confirm that latches and locks engage accurately and securely without forcing or binding.

END OF SECTION 02821

DIVISION 03

PART 1 - GENERAL

1.1 SUMMARY

A. Scope: The work included in this section of the specifications includes all labor, materials, equipment and services necessary for cast-in-place concrete including formwork, reinforcing, mix design, placement and finishes as indicated on the drawings and herein specified.

1.2 CAST-IN-PLACE CONCRETE includes:

A. Foundations.

B. Ramps and Stairs

C. Slabs on grade.

D. Under slab vapor barrier

E. Equipment pads and bases.

1. Include all concrete pads and supports for mechanical and electrical equipment where indicated. Unless otherwise indicated, provide 500 lbs. of reinforcing per cubic yard of concrete placed to the size required to support the equipment purchased.

1.3 RELATED SECTIONS include the following:

A. Division 32 Section " Concrete Pavement" for concrete pavement and walks.
B. Division 03 Section “Architectural Concrete” for forming and finishing vertical concrete surfaces.
C. Division 09 Section “Exterior & Interior Painting” for painting of concrete surfaces and traffic coatings

1.4 SUBMITTALS

A. Product Data: For each type of manufactured material and product indicated.

B. Steel Reinforcement Shop Drawings: Details of fabrication, bending, and placement, prepared according to ACI 315, "Details and Detailing of Concrete Reinforcement." Include material, grade, bar schedules, stirrup spacing, bent bar diagrams, arrangement, and supports of concrete reinforcement. Include special reinforcement required for openings through concrete structures.

C. Laboratory Test Reports: From a qualified testing agency for concrete materials and mix design

D. Material Certificates: Signed by manufacturers and contractor certifying that each material item complies with or exceeds specified requirements. Provide certification from admixture manufacturer that chloride content complies with specifications.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who has completed concrete Work similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.

B. Codes and Standards: Comply with the provisions of the following codes, specifications, and standards, except where more stringent requirements are shown or specified.

1. American Concrete Institute (ACI) 301, “Specifications for Structural Concrete for Buildings”.
2. ACI 318-95, “Building Code Requirements for Reinforced Concrete”.
3. Concrete Reinforcing Steel Institute (CRSI), “Manual of Standard Practice”, current edition.
4. ACI 117 Standards

C. Concrete Testing Service: Employ an independent testing agency to perform material evaluation tests and to review and approve mix designs.

D. Materials and installed work may require testing and re-testing at any time during the progress of work. Re-testing and replacement of rejected materials shall be performed at the contractor’s expense.

E. Testing Agency Qualifications: An independent testing agency, acceptable to authorities having jurisdiction, qualified according to ASTM C 1077 and ASTM E 329 to conduct the testing indicated, as documented according to ASTM E 548.

1. Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-1 or an equivalent certification program.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle steel reinforcement to prevent bending and damage.

1.7 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site
   a. Require representative of each entity directly concerned with cast-in-place concrete to attend, including the following:
      i. Contractor’s superintendent
      ii. Cast-in-place concrete Subcontractor
      iii. Architect

PART 2 - PRODUCTS

2.1 FORM-FACING MATERIALS

A. Rough-Formed Finished Concrete: Plywood, lumber, metal, or another approved material. Provide lumber dressed on at least two edges and one side for tight fit.

B. Chamfer Strips: Wood, metal, PVC, or rubber strips, 3/4 by 3/4 inch (19 by 19 mm), minimum.

C. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.

D. Form Ties: Factory-fabricated, removable or snap-off metal or glass-fiber-reinforced plastic form ties designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on removal.

1. Furnish units that will leave no metal closer than 1.5 inches (25 mm) to the plane of the exposed concrete surface.

2.2 STEEL REINFORCEMENT

A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60, deformed.

B. Welded Wire Fabric: ASTM A 185, welded steel wire fabric.

C. Deformed-Steel Wire: ASTM A 496.

2.3 REINFORCEMENT ACCESSORIES

A. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire fabric in place. Manufacture bar supports according to CRSI's "Manual of Standard Practice" from steel wire, plastic, or precast concrete or fiber-reinforced concrete of greater compressive strength than concrete, and as follows:

1. For slabs on grade, use precast concrete blocks with the same compressive strength as specified for cast-in-place concrete.

B. Underslab Vapor Barrier: 15 mil Stego Wrap, or approved equal; maximum 0.012 perms; multi-layer, fabric-, cord-, grid-, or aluminum-reinforced polyethylene or equivalent, complying with ASTM E 1745, Class A; stated by manufacturer as suitable for installation in contact with soil or granular fill under concrete slabs. Single ply polyethylene is prohibited.

2.4 CONCRETE MATERIALS

A. Portland Cement: ASTM C 150, Type I.

1. Use one brand of cement throughout project unless otherwise acceptable to architect/engineer.

B. Fly Ash: ASTM C 618, Class F.

C. Normal-Weight Aggregate: ASTM C 33, uniformly graded, and as follows:

1. Class: Moderate weathering region, but not less than 5M.

D. Lightweight Aggregate: ASTM C 330.

E. Water: Potable and complying with ASTM C 94.

F. Admixtures: General: Admixtures certified by manufacturer to contain not more than 0.1 percent water-soluble chloride ions.

G. Air-Entraining Admixture: ASTM C 260, Certified by manufacturer to be compatible with other admixtures.

H. Water-Reducing Admixture: ASTM C 494, Type A.

I. High-Range, Water-Reducing Admixture: ASTM C 494, Type F.

J. Water-Reducing and Accelerating Admixture: ASTM C 494, Type E.

K. Water-Reducing and Retarding Admixture: ASTM C 494, Type D.

2.5 FIBER REINFORCEMENT

A. Synthetic Fiber: Fibrillated or monofilament polypropylene fibers engineered and designed for use in concrete, complying with ASTM C 1116, Type III, 1/2 to 1-1/2 inches (13 to 38 mm) long.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Fibrillated Fibers:
1) Fibermesh; Fibermesh, Div. of Synthetic Industries.
2) Grace Fibers; W. R. Grace & Co., Construction Products Div.

b. Monofilament Fibers:
1) Fiberstrand 100; Euclid Chemical Co.
2) Fibermix Stealth; Fibermesh, Div. of Synthetic Industries.
3) Grace MicroFiber; W. R. Grace & Co., Construction Products Div.

2.6 VAPOR RETARDERS

A. Vapor Retarder: 15 mil Stego Wrap, or approved; maximum 0.012 perms; multi-layer, fabric-, cord-, grid-, or aluminum-reinforced polyethylene or equivalent, complying with ASTM E 1745, Class A; stated by manufacturer as suitable for installation in contact with soil or granular fill under concrete slabs. Single ply polyethylene is prohibited.

2.7 CURING MATERIALS

A. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.

B. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. (305 g/sq. m) dry.

C. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.

D. Water: Potable.

E. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B.

F. Clear, Waterborne, Membrane-Forming Curing and Sealing Compound: ASTM C 1315, Type 1, Class A.

2.8 RELATED MATERIALS

A. Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber, or ASTM D 1752, cork or self-expanding cork.

B. Epoxy Joint Filler: Two-component, semirigid, 100 percent solids, epoxy resin with a Shore A hardness of 80 per ASTM D 2240.

C. Bonding Agent: ASTM C 1059, Type II, non-redispersible, acrylic emulsion or styrene butadiene.

D. Epoxy-Bonding Adhesive: ASTM C 881, two-component epoxy resin, capable of humid curing and bonding to damp surfaces, of class and grade to suit requirements, and as follows:

1. Type: Class II, non-load bearing, for bonding freshly mixed concrete to hardened concrete.
2. Type: Class I and II, non-load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.
3. Type: Class IV and V, load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.

2.9 CONCRETE MIXES

A. Prepare design mixes for each type and strength of concrete determined by either laboratory trial batch or field experience methods as specified in ACI 301. For trial batch method, use an independent testing agency acceptable to the Architect for preparing and reporting proposed mix designs.

B. Submit written reports to Architect of each proposed mix for each class of concrete at least 15 days prior to start of Work. Do not begin concrete production until proposed mix designs have been reviewed by Architect.

C. Design mixes to provide normal weight concrete with the 28-day compressive strength as indicated on drawings.

D. Slump Limits: Proportion and design mixes to result in concrete slump at point of placement as follows.

1. Not more than 4 inches.

E. Adjustment to Concrete Mixes: Mix design adjustments may be requested by Contractor when characteristics of materials, job conditions, weather, test results, or other circumstances warrant, as accepted by Architect. Laboratory test data for revised mix design and strength results must be submitted to and accepted by Architect before using in Work.

2.10 CONCRETE MIXING

A. Ready-Mixed Concrete: Comply with requirements of ASTM C 94, and as specified.

B. When air temperature is between 85 and 90 deg F (30 and 32 deg C), reduce mixing and delivery time from 1-1/2 hours to 75 minutes, and when air temperature is above 90 deg F (32 deg C), reduce mixing and delivery time to 60 minutes. Ice may be added to concrete so that delivery time can remain at 1-1/2 hours.

PART 3 - EXECUTION

3.1 FORMWORK

A. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until concrete structure can support such loads. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117. Provide concrete with surface irregularities, complying with the following ACI 34

1. Provide Class A, tolerances for concrete exposed to view.
2. Provide Class C, tolerances for other concrete surfaces.

B. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical. Kerf wood inserts for forming keyways, reglets, recesses, and the like, for easy removal.

C. Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and slopes in finished concrete surfaces. Provide and secure units to support screed strips; use strike-off templates or compacting-type screeds.

D. Provide temporary openings for cleanouts and inspection ports where interior area of formwork is inaccessible. Close openings with panels tightly fitted to forms and securely braced to prevent loss of concrete mortar. Locate temporary openings in forms at inconspicuous locations.

E. Chamfer exterior corners and edges as indicated using wood, metal, PVC or rubber chamfer strips fabricated to produce uniform smooth lines and tight edge joints.

F. Form openings, chases, offsets, sinkages, keyways, reglets, blocking, screeds, and bulkheads required in the Work. Determine sizes and locations from trades providing such items.

G. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.

3.2 EMBEDDED ITEMS

A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use Setting Drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.

1. Install anchor bolts, accurately located, to elevations required.

3.3 REMOVING AND REUSING FORMS

A. General: Formwork, for sides of beams, walls, columns, and similar parts of the Work, that does not support weight of concrete may be removed after cumulatively curing at not less than 50 deg F (10 deg C) for 24 hours after placing concrete provided concrete is hard enough to not be damaged by form-removal operations and provided curing and protection operations are maintained.

B. Leave formwork, for beam soffits, joists, slabs, and other structural elements, that supports weight of concrete in place until concrete has achieved the following:

1. At least 70 percent of 28-day design compressive strength.

C. Comply with ACI 301-89 for shoring requirements.

3.4 VAPOR RETARDERS

A. Vapor Retarder: Place, protect, and repair vapor-retarder sheets according to ASTM E 1643 and manufacturer's written instructions. Lap joints at minimum of 6 inches and seal watertight by taping edges and ends.

3.5 STEEL REINFORCEMENT

A. General: Comply with CRSI's "Manual of Standard Practice" for placing reinforcement.

1. Do not cut or puncture vapor retarder where occurs. Repair damage and reseal vapor retarder before placing concrete.

B. Clean reinforcement of loose rust and mill scale, earth, ice, and other materials that reduce or destroy bond with concrete.

C. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcement with bar supports to maintain minimum concrete cover. Do not tack weld crossing reinforcing bars.

D. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.

E. Install welded wire fabric in longest practicable lengths on bar supports spaced to minimize sagging. Lap edges and ends of adjoining sheets at least one mesh spacing. Offset laps of adjoining sheet widths to prevent continuous laps in either direction. Lace overlaps with wire.

3.6 JOINTS

A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.

B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect. Place joints perpendicular to main reinforcement. Continue reinforcement across construction joints, unless otherwise indicated.

C. Form from preformed galvanized steel, plastic keyway-section forms, or bulkhead forms with keys, unless otherwise indicated. Embed keys at least 1-1/2 inches (38 mm) into concrete.

D. Locate joints for beams, slabs, joists, and girders in the middle third of spans. Offset joints in girders a minimum distance of twice the beam width from a beam-girder intersection. Locate horizontal joints in walls and columns at underside of floors, slabs, beams, and girders and at the top of footings or floor slabs.

E. Use a bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.

3.7 CONCRETE PLACEMENT

A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections have been performed.

B. Comply with the provisions of ACI 304, “Guide for Measuring, Mixing, Transporting and Placing Concrete”, and as specified.

1. Deposit concrete continuously or in layers of such thickness that no new concrete will be placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as specified. Deposit concrete to avoid segregation.

C. Deposit concrete in forms in horizontal layers no deeper than 24 inches (600 mm) and in a manner to avoid inclined construction joints. Place each layer while preceding layer is still plastic, to avoid cold joints.

1. Consolidate placed concrete with mechanical vibrating equipment. Use equipment and procedures for consolidating concrete complying with by ACI 309R.

2. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations no farther than the visible effectiveness of the vibrator. Place vibrators to rapidly penetrate placed layer and at least 6 inches (150 mm) into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mix constituents to segregate.

D. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.

1. Consolidate concrete during placement operations so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
2. Maintain reinforcement in position on chairs during concrete placement.
3. Slope surfaces uniformly to drains where required.
4. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, free of humps or hollows, before excess moisture or bleedwater appears on the surface. Do not further disturb slab surfaces before starting finishing operations.

E. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.

F. Hot-Weather Placement: Place concrete according to recommendations in ACI 305R and as follows, when hot-weather conditions exist:

1. Use approved water reducing retarding admixture when required by high temperatures or other adverse paving conditions.

3.8 FINISHING FORMED SURFACES

A. Rough-Formed Finished: Provide a rough-formed finish on formed concrete surfaces not exposed to view in the finished Work or concealed by other construction. This is the concrete surface having texture imparted by form-facing material used, with tie holes and defective areas repaired and patched, and fins and other projections exceeding ¼ inch in height rubbed down or chipped off.

B. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar uniformed surfaces adjacent to formed surfaces, strike-off smoother and finish with a texture matching adjacent formed surfaces.

3.9 FINISHING FLOORS AND SLABS

A. General: Comply with ADA for acceptable finish tolerances and with recommendations in ACI 302.1R for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.

B. Scratch Finish: While still plastic, texture concrete surface that has been screeded and bull-floated or darbied. Use stiff brushes, brooms, or rakes. Apply scratch finish to surfaces indicated and to surfaces to receive concrete floor topping or mortar setting beds for ceramic or quarry tile, and other bonded cementitious floor finishes.

C. Float Finish: Consolidate surface with power-driven floats or by hand floating if area is small or inaccessible to power driven floats. Restraighten, cut down high spots, and fill low spots. Repeat float passes and restraightening until surface is left with a uniform, smooth, granular texture. Apply float finish to surfaces indicated, to surfaces to receive trowel finish, and to floor and slab surfaces to be covered with fluid-applied or sheet waterproofing, built-up or membrane roofing.

D. Trowel Finish: After applying float finish, apply first trowel finish and consolidate concrete by hand or power-driven trowel. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings. Apply a trowel finish to surfaces indicated and to floor and slab surfaces exposed to view or to be covered with resilient flooring, carpet, ceramic or quarry tile set over a cleavage membrane, paint, or another thin film-finish coating system.

1. Standard Concrete Floor Slabs: Finish surfaces to the following tolerances, according to ASTM E 1155, for a randomly trafficked floor surface:
    a. Specified overall values of flatness, F(F) 50; and of levelness, F(L) 25; with minimum local values of flatness, F(F) 35; and of levelness F(L)20.

E. Trowel and Fine-Broom Finish: Apply a partial trowel finish, stopping after second troweling, to surfaces indicated and to surfaces where ceramic or quarry tile is to be installed by either thickset or thin-set method. Immediately after second troweling, and when concrete is still plastic, slightly scarify surface with a fine broom.

F. Broom Finish: Apply a broom finish to exterior concrete platforms, steps, and ramps, and elsewhere as indicated.

1. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route. Coordinate required final finish with Architect before application.

3.10 MISCELLANEOUS CONCRETE ITEMS

A. Filling In: Fill in holes and openings left in concrete structures, unless otherwise indicated, after work of other trades is in place. Mix, place, and cure concrete, as specified, to blend with in-place construction. Provide other miscellaneous concrete filling indicated or required to complete Work.

B. Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and by steel-troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.

C. Equipment Bases and Foundations: Provide machine and equipment bases and foundations as shown on Drawings. Set anchor bolts for machines and equipment at correct elevations, complying with diagrams or templates of manufacturer furnishing machines and equipment.

3.11 CONCRETE PROTECTION AND CURING

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and with recommendations in ACI 305R for hot-weather protection during curing.

B. Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces. If forms remain during curing period, moist cure after loosening forms. If removing forms before end of curing period, continue curing by one or a combination of the following methods:

C. Unformed Surfaces: Begin curing immediately after finishing concrete. Cure unformed surfaces, including floors and slabs, concrete floor toppings, and other surfaces, by one or a combination of the following methods:
1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:

    a. Water.
    b. Continuous water-fog spray.
    c. Absorptive cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with 12-inch (300-mm) lap over adjacent absorptive covers.

2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least

12 inches (300 mm), and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period using cover material and waterproof tape.

a. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive floor coverings.
b. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive penetrating liquid floor treatments.
c. Cure concrete surfaces to receive floor coverings with either a moisture-retaining cover or a curing compound that the manufacturer recommends for use with floor coverings.
d. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.
e. Curing and Sealing Compound: Apply uniformly to floors and slabs indicated in a continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Repeat process 24 hours later and apply a second coat. Maintain continuity of coating and repair damage during curing period.

3.12 CONCRETE SURFACE REPAIRS

A. Defective Concrete: Repair and patch defective areas when approved by Architect. Remove and replace concrete that cannot be repaired and patched to Engineer’s approval.

B. Patching Mortar: Mix dry-pack patching mortar, consisting of one part portland cement to two and one-half parts fine aggregate passing a No. 16 (1.2-mm) sieve, using only enough water for handling and placing.

C. Repairing Formed Surfaces: Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycombs, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning.
1. Immediately after form removal, cut out honeycombs, rock pockets, and voids more than 1/2 inch (13 mm) in any dimension in solid concrete but not less than 1 inch (25 mm) in depth. Make edges of cuts perpendicular to concrete surface. Clean, dampen with water, and brush-coat holes and voids with bonding agent. Fill and compact with patching mortar before bonding agent has dried. Fill form-tie voids with patching mortar or cone plugs secured in place with bonding agent.
2. Repair defects on surfaces exposed to view by blending white portland cement and standard portland cement so that, when dry, patching mortar will match surrounding color. Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching. Compact mortar in place and strike off slightly higher than surrounding surface.
3. Repair defects on concealed formed surfaces that affect concrete's durability and structural performance as determined by Architect.

D. Repairing Unformed Surfaces: Test unformed surfaces, such as floors and slabs, for finish and verify surface tolerances specified for each surface. Correct low and high areas. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.

1. Repair finished surfaces containing defects. Surface defects include spalls, popouts, honeycombs, rock pockets, crazing and cracks in excess of 0.01 inch (0.25 mm) wide or that penetrate to reinforcement or completely through unreinforced sections regardless of width, and other objectionable conditions.
2. After concrete has cured at least 14 days, correct high areas by grinding.
3. Correct localized low areas during or immediately after completing surface finishing operations by cutting out low areas and replacing with patching mortar. Finish repaired

areas to blend into adjacent concrete. Proprietary underlayment compounds may be used when acceptable to Architect/Engineer.

4. Repair defective areas, except random cracks and single holes 1 inch (25 mm) or less in diameter, by cutting out and replacing with fresh concrete. Remove defective areas with clean, square cuts and expose steel reinforcement with at least 3/4 inch (19 mm) clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding agent. Mix patching concrete of same materials and mix as original concrete except without coarse aggregate. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.

3.13 QUALITY CONTROL TESTING DURING CONSTRUCTION

A. General: Employ a testing agency to perform tests and to submit test reports.

B. Sampling and testing for quality control during concrete placement shall include the following, as directed by Architect.

1. Sampling Fresh Concrete: ASTM C 172, except modified for slump to comply with ASTM C 94.
2. Slump: ASTM C 143; one test at point of discharge for each day's pour of each type of concrete, additional tests when concrete consistency seems to have changed.
3. Air Content: ASTM C 173, volumetric method for lightweight or normal weight concrete; ASTM C 231, pressure method for normal weight concrete; one for each day's pour of each type of air-entrained concrete.
4. Concrete Temperature: ASTM C 1064; one test hourly when air temperature is 40 deg F (4 deg C) and below, when 80 deg F (27 deg C) and above, and one test for each set of compressive-strength specimens.
5. Compression Test Specimen: ASTM C 31, one set of four standard cylinders for each compressive-strength test, unless otherwise directed. Mold and store cylinders for laboratory-cured test specimens except when field-cured test specimens are required.
6. Compressive-Strength Tests: ASTM C 39; one set for each day's pour exceeding 5 cu. yd. Plus additional sets for each 50 cu. yd more than the first 25 cu. yd. of each concrete class placed in any one day; one specimen tested 7 days, two specimens tested at 28 days, and one specimen retained in reserve for later testing if required.

C. When frequency of testing will provide fewer than five strength tests for a given class of concrete, conduct testing from at least five randomly selected batches or from each batch if fewer than five are used.

D. Test results will be reported in writing to Architect, Structural Engineer, ready-mix producer, and Contractor within 24 hours after tests. Reports of compressive strength tests shall contain the Project identification name and number, date of concrete placement, name of concrete testing service, concrete type and class, location of concrete batch in structure, design compressive strength at 28 days, concrete mix proportions and materials, compressive breaking strength, and type of break for both 7-day tests and 28-day test.

E. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by shall not be used as the sole basis for acceptance or rejection.

F. Additional Test: The testing agency will make additional tests of in-place concrete when test results indicate specified concrete strengths and other characteristics have not been attained in the structure, as directed by Architect. Testing agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42, or by other methods as directed.

END OF SECTION 03 30 0

SECTION 033300 - ARCHITECTURAL CONCRETE

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Cast-in-place architectural concrete, including form facings, reinforcement accessories, concrete materials, concrete mixtures, concrete placement, and concrete finishes for exposed foundations, stairs and ramps surfaces
2. Requirements in Section 03300 "Cast-in-Place Concrete" apply to this Section.
3. Requirements in Section 09911” Exterior Painting” for painting exposed concrete surfaces and traffic coatings.

1.2 DEFINITIONS

A. Aggregate Exposure: Projection of coarse aggregate from matrix or mortar after completion of exposure operations.

B. Cast-in-Place Architectural Concrete: Concrete that is exposed to view, is designated as architectural concrete, and that requires special concrete materials, formwork, placement, or finishes to obtain specified architectural appearance.

C. Cementitious Materials: Portland cement alone or in combination with one or more of the following: blended hydraulic cement, fly ash, slag cement, other pozzolans, and silica fume; materials subject to compliance with requirements.

D. Design Reference Sample: Sample designated by Architect in the Contract Documents that reflects acceptable surface quality and appearance of cast-in-place architectural concrete.

E. Water/Cement Ratio (w/cm): The ratio by weight of water to cementitious materials.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site
1. Require representatives of each entity directly concerned with cast-in-place architectural concrete to attend, including the following:
    a. Contractor’s superintendent
    b. Cast-in-place architectural concrete Subcontractor
2. Review concrete finishes and finishing, curing procedures, construction joints, forms and form removal limitations, reinforcement accessory installation, concrete repair procedures, and protection of cast-in-place architectural concrete.
3. Before submitting design mixtures, review concrete design mixture and examine procedures for ensuing quality of concrete materials.

1.4 ACTION SUBMITTALS

A. Product Data: For each of the following:

1. Form-facing panels.
2. Form joint tape.
3. Form joint sealant.
4. Wood sealer.
5. Form-release agent.
6. Surface retarder.
7. Form ties.
8. Bar supports.
9. Portland cement.
10. Fly ash.
11. Slag cement.
12. Blended hydraulic cement.
13. Aggregates.
14. Admixtures:

a. Include limitations of use, including restrictions on cementitious materials, supplementary cementitious materials, air entrainment, aggregates, temperature at time of concrete placement, relative humidity at time of concrete placement, curing conditions, and use of other admixtures.

B. Shop Drawings:

1. Formwork: Show formwork construction, including form-facing joints, construction and contraction joints, form joint-sealant details, form tie locations and patterns, inserts and embedments, cutout, cleanout panels, and other items that visually affect cast-in-place architectural concrete.

C. Samples: For each of the following materials:

1. Form-facing panels.
2. Form ties.
3. Chamfers.

D. Samples for Verification: Architectural concrete Sample, cast vertically, approximately 18 by 18 by 2 inches, of finished, colors, and textures to match design reference sample. Include Sample sets showing the full range of variations expected in these characteristics.

E. Placement Schedule: Submit before start of placement operations.

F. Minutes of preinstallation conference.

1.5 QUALITY ASSURANCE

A. Mockups: Before casting architectural concrete, build mockups, to verify selections made under Sample submittal and to demonstrate typical joints, surface finish, texture, tolerances, and

standard of workmanship. Build mockups to comply with the following requirements, using materials indicated for the completed Work:

1. Build mockups in the location and of the size indicated or, if not indicated, as directed by Architect.
2. Build mockups of typical wall of cast-in-place architectural concrete as shown on Drawings,
3. Construct mockups to include at least two lifts having heights equal to those anticipated for construction.
4. Demonstrate curing, cleaning, and protecting of cast-in-place architectural concrete, finishes, and contraction joints, as applicable.
5. In presence of Architect, damage part of the exposed-face surface for each finish, color, and texture, and demonstrate materials and techniques proposed for repair to match adjacent undamaged surfaces.
6. Obtain Architect's approval of mockups before casting architectural concrete.
7. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.6 FIELD CONDITIONS

A. Hot-Weather Placement: Comply with ACI 301 and as follows:

1. Maintain concrete temperature below 90 deg F at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor’s option.

2. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.

PART 2 - PRODUCTS

2.1 CONCRETE, GENERAL

A. ACI Publications: Comply with ACI 301 or ACI 303.1 unless modified by requirements in the Contract Documents.

2.2 FORM-FACING MATERIALS

A. Comply with Section 03100 "Concrete Forming and Accessories" for formwork and other form-facing material requirements, and as specified in this Section.

B. Source Limitations: Obtain each type of form-facing material from single source from single manufacturer.

C. Form-Facing Panels for As-Cast Finishes:

1. Exterior-grade plywood panels, nonabsorptive, that will provide continuous, true, and smooth architectural concrete surfaces, medium-density overlay, Class 1, or better, mill-applied release agent and edge sealed, complying with DOC PS 1, or Finnish phenolic overlaid birch plywood.

D. Chamfer Strips: Metal, rigid plastic, elastomeric rubber, or dressed wood, 3/4 by 3/4 inch, minimum; nonstaining; in longest practicable lengths.

E. Form Joint Tape: Compressible foam tape; pressure sensitive; AAMA 800; minimum 1/4 inch thick.

F. Form Joint Sealant: Elastomeric sealant complying with ASTM C920, Type M or Type S, Grade NS, that adheres to form joint substrates, does not stain, does not adversely affect concrete surfaces, and does not impair subsequent treatments and finishes of concrete surfaces.

G. Sealer: Penetrating, clear, polyurethane wood sealer formulated to reduce absorption of bleed water and prevent migration of set-retarding chemicals from wood and does not stain, does not adversely affect concrete surfaces, and does not impair subsequent treatments and finishes of concrete surfaces.

H. Form-Release Agent: Commercially formulated, colorless form-release agent that does not bond with, stain, or adversely affect architectural concrete surfaces and will not impair subsequent treatments and finishes of architectural concrete surfaces.

1. Formulate form-release agent with rust inhibitor for steel form-facing materials.

2. Furnish ties with tapered tie cone spreaders that, when removed, will leave holes no larger than 1 inch in diameter on architectural concrete surface.
3. Furnish internally disconnecting ties that will leave no metal closer than 1-1/2 inches from architectural concrete surface.

2.3 CURING MATERIALS

A. Comply with Section 033000 "Cast-in-Place Concrete."

B. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz/sq. yd. when dry.

C. Moisture-Retaining Cover: ASTM C171, polyethylene film or white burlap-polyethylene sheet.

2.4 REPAIR MATERIALS

A. Bonding Agent: ASTM C 1059/1059M, Type II, nonredisperible, acrylic emulsion or styrene butadiene.

B. Epoxy Bonding Adhesive: ASTM C 881/C881M two-component epoxy resin, capable of humid curing and bonding to damp surfaces, of class suitable for application temperature and of grade to suit requirements:

1. Types I and II, nonload bearing, for bonding hardened or freshly mixed concrete to harden concrete.

2.5 CONCRETE MIXTURES, GENERAL

A. Obtain each color, size, type, and variety of concrete mixture from single manufacturer with resources to provide cast-in-place architectural concrete of consistent quality in appearance and physical properties.

B. Prepare design mixtures for each type and strength of cast-in-place architectural concrete proportioned on basis of laboratory trial mixture or field test data, or both, in accordance with ACI 301.

PART 3 - EXECUTION

3.1 INSTALLATION OF FORMWORK

A. Comply with Section 03300 "Cast in Place Concrete" for formwork, embedded items, and shoring and reshoring, and as specified in this Section.

B. Limit deflection of form-facing panels to not exceed ACI 301 requirements.

C. In addition to ACI 303.1 limits on form-facing panel deflection, limit cast-in-place architectural concrete surface irregularities, designated by ACI 347 as abrupt or gradual, as follows:
1. Class A, 1/8 inch.

D. Construct forms to result in cast-in-place architectural concrete that complies with ACI 117 (ACI 117M).

E. Seal form joints, chamfers, rustication joints, and penetrations at form ties with form joint tape or form joint sealant to prevent cement paste leakage.

1. Provide closure backing materials if indented rustication is used over a ribbed form line, and seal joint between rustication strip and form with joint sealant.

F. Construct forms for easy removal without hammering or prying against concrete surfaces. Provide crush or wrecking plates where stripping may damage cast-in-place surfaces. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical.
1. Seal forms joints and penetrations at form ties with form joint tape or form joint sealant to prevent cement past leakage.
2. Do not use rust-stained steel form-facing material.

G. Provide temporary openings for cleanouts and inspection ports where interior area of formwork is inaccessible. Close openings with panels tightly fitted to forms and securely braced to prevent loss of concrete mortar. Locate temporary openings in forms at inconspicuous locations.

H. Chamfer exterior corners and edges of cast-in-place architectural concrete.

I. Coat contact surfaces of chamfer strips with wood sealer before placing reinforcement, anchoring devices, and embedded items.

J. Form openings, chases, offsets, sinkages, keyways, reglets, blocking, screeds, and bulkheads required in the Work. Determine sizes and locations from trades providing such items.

K. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.

L. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.

M. Coat contact surfaces of forms with form-release agent, in accordance with manufacturer's written instructions, before placing reinforcement, anchoring devices, and embedded items.

N. Coat contact surfaces of forms with surface retarder, in accordance with manufacturer's written instructions, before placing reinforcement, anchoring devices, and embedded items.

3.2 INSTALLATION OF REINFORCEMENT AND INSERT INSTALLATION

A. Comply with Section 03300 "Cast in Place Concrete" for fabricating and installing steel reinforcement and accessories. Securely fasten steel reinforcement and wire ties against shifting during concrete placement.

3.3 REMOVING AND REUSING FORMS

A. Formwork for sides of ramps, stairs and similar parts of the Work that does not support weight of concrete may be removed after cumulatively curing at not less than 50 deg F for 24 hours after placing concrete if concrete is hard enough to not be damaged by form-removal operations and curing and protection operations are maintained.
   1. Schedule form removal to maintain surface appearance that matches approved mockups.
   2. Cut off and grind glass fiber reinforced plastic form ties flush with surface of concrete.

B. Leave formwork for ramps, stairs and other structural elements that support weight of concrete in place until concrete has achieved at least 70 percent of 28-day design compressive strength. Remove forms only if shores have been arranged to permit removal of forms without loosening or disturbing shores.

C. Clean and repair surfaces of forms to be reused in the Work. Do not use split, frayed, delaminated, or otherwise damaged form-facing material. Apply new form-release agent.

D. When forms are reused, clean surfaces, remove fins and laitance, and tighten to close joints. Align and secure joints to avoid offsets. Do not use patched forms for cast-in-place architectural concrete surfaces.

3.4 JOINTS

A. Construction Joints: Install construction joints true to line, with faces perpendicular to surface plane of cast-in-place architectural concrete, so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.

1. Place joints perpendicular to main reinforcement. Continue reinforcement across construction joints unless otherwise indicated.
2. Form keyed joints as indicated. Embed keys at least 1-1/2 inches into concrete. Align construction joint within rustications attached to form-facing material.
3. Space vertical joints in walls as directed by Architect. Unless otherwise indicated on Drawings, locate joints beside piers integral with walls, near corners, and in concealed locations where possible.

B. Use epoxy-bonding adhesive at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.

C. Contraction Joints: Form weakened-plane contraction joints true to line, with faces perpendicular to surface plane of cast-in-place architectural concrete, so strength and appearance of concrete are not impaired, at locations indicated on Drawings or as approved by Architect.

3.5 CONCRETE PLACEMENT

A. Before placing concrete, verify that installation of formwork, form-release agent, reinforcement, and embedded items is complete and that required inspections have been performed.

B. Do not add water to concrete during delivery, at Project site, or during placement unless approved by Architect.

C. Before test sampling and placing concrete, water may be added at Project side, subject to limitations of ACI 301.

D. Deposit concrete continuously between construction joints. Deposit concrete to avoid segregation.
1. Deposit concrete in horizontal layers of depth to not exceed formwork design pressures and in a manner to avoid inclined construction joints.
2. Consolidate placed concrete with mechanical vibrating equipment according to ACI 303.1
3. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layout and at least 6 inches into proceeding layer. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity. Do not permit vibrators to contact forms.

3.6 FINISHING , GENERAL

A. Comply with Section 03300 "Cast-in-Place Concrete."

B. Architectural Concrete Finish: Match Architect's design reference sample, identified and described as indicated, to satisfaction of Architect.

C. Related to Unformed Surfaces: Horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces.
   1. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.

D. Maintain uniformity of special finishes over construction joints unless otherwise indicated.

3.7 AS-CAST FORMED FINISHES

A. Rubbed Finish: Apply the following to smooth-formed-finished as-cast concrete where indicated:
   1. Grout-Cleaned Finish: Wet concrete surfaces and apply grout of a consistency of thick paint to coat surfaces and fill small holes. Mix 1 part Portland cement to 1- ½ parts fine sand with a 1:1 mixture of bonding admixture and water. Add white Portland cement in amounts determined by trail patches, so color of dry grout matches adjacent surface. Scrub grout into voids and remove excess grout. When grout whitens, rub surface with clean burlap and keep surface damp by fog spray for at least 36 hours.

3.8 CONCRETE PROTECTING AND CURING

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 308.1, by one or a combination of the following methods that will not mottle, discolor, or stain concrete:
   1. Moisture curing: Keep surfaces continuously moist of not less than seen days with the following materials:
      a. Water
      b. Continuous water-fog spray
      c. Absorptive cover, water saturated and kept continuously wet. Cover concrete surfaces and edges with 12-inch lap over adjacent absorptive covers.
   2. Moisture Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period, using cover material and waterproof tape

3.9 REPAIR

A. Comply with ACI 301 (ACI 301M).

B. Repair damaged finished surfaces of cast-in-place architectural concrete when repairing is approved by Architect.

C. Match repairs to color, texture, and uniformity of surrounding surfaces and to repairs on approved mockups.

D. Remove and replace cast-in-place architectural concrete that cannot be repaired to Architect's approval.

3.10 FIELD QUALITY CONTROL

A. Comply with Section 03300 "Cast-in-Place Concrete."

3.11 CLEANING

A. Clean cast-in-place architectural concrete surfaces after finish treatment to remove stains, markings, dust, and debris.

B. Wash and rinse surfaces in accordance with concrete finish applicator's written instructions.

1. Protect other Work from staining or damage due to cleaning operations.
2. Do not use cleaning materials or processes that could change the appearance of cast-in-place architectural concrete finishes.

3.12 PROTECTION

A. Protect corners, edges, and surfaces of cast-in-place architectural concrete from damage; use guards and barricades.

B. Protect cast-in-place architectural concrete from staining, laitance, and contamination during remainder of construction period.

SECTION 03450 - ARCHITECTURAL PRECAST CONCRETE

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Architectural precast concrete panels.
2. Parapet Copings
3. Window Sills

1.2 DEFINITION

A. Design Reference Sample: Sample of approved architectural precast concrete color, finish and texture, preapproved by Architect.

1.3 PERFORMANCE REQUIREMENTS

A. Structural Performance: Provide architectural precast concrete units, copings and connections capable of withstanding the following design loads within limits and under conditions indicated:

1. Loads: As indicated
2. Coping: SPRI Wind Design Standard: install coping capable of resisting the following design pressures:
   a. Design Pressure: As indicated on Structural Drawings.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Design Mixtures: For each precast concrete mixture. Include compressive strength Shop Drawings: Design and Detail fabrication and installation of architectural precast concrete units and connections as per latest IBC code. Indicate locations, plans, elevations, dimensions, shapes, and cross sections of each unit. Indicate joints, reveals, and extent and location of each surface finish. Indicate details at building corners.

1. Comprehensive engineering analysis signed and sealed by the qualified professional engineer responsible for its preparation and who is registered in the State of Louisiana. The design shall include, but not limited to, stresses such as dead, live, wind, transportation, erection, etc. Show governing panel types, connections, and types of reinforcement, including special reinforcement. Indicate location, type, magnitude, and direction of loads imposed on the building structural frame from architectural precast concrete.

C. Samples: For each type of finish indicated on exposed surfaces of architectural precast concrete units, in sets of 3, illustrating full range of finish, color, and texture variations expected; approximately 12 by 12 by 2 inches (300 by 300 by 50 mm).

1.5 INFORMATIONAL SUBMITTALS

A. Welding certificates.

B. Material Certificates: Signed by manufacturers:

C. Material test reports: For aggregates.

D. Field quality-control test and special inspection reports.

1.6 QUALITY ASSURANCE

A. Fabricator Qualifications: A firm that assumes responsibility for engineering architectural precast concrete units to comply with performance requirements. This responsibility includes preparation of Shop Drawings and comprehensive engineering analysis by a qualified professional engineer, registered in the State of Louisiana.

1. Participates in PCI's plant certification program **at time of bidding** and is designated a PCI-certified plant for Group A, Category A1 - Architectural Cladding and Load Bearing Units **or participates in APA's "Plant Certification Program for Production of Architectural Precast Concrete Products" and is designated an APA-certified plant**.

B. Design Standards: Comply with ACI 318 (ACI 318M) and design recommendations of PCI MNL 120, "PCI Design Handbook - Precast and Prestressed Concrete," applicable to types of architectural precast concrete units indicated.

C. Quality-Control Standard: For manufacturing procedures and testing requirements, quality-control recommendations, and dimensional tolerances for types of units required, comply with PCI MNL 117, "Manual for Quality Control for Plants and Production of Architectural Precast Concrete Products."

D. Welding: Qualify procedures and personnel according to AWS D1.1/D.1.1M, "Structural Welding Code - Steel"; and AWS D1.4, "Structural Welding Code - Reinforcing Steel."

E. Sample Panels: After sample approval and before fabricating architectural precast concrete units, produce a minimum of**3** sample panels approximately [**24 sq. ft.** in area for review by Architect. Incorporate full-scale details of architectural features, finishes, textures, and transitions in sample panels.

PART 2 - PRODUCTS

2.1 REINFORCING MATERIALS

A. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than **60** percent.

B. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 (Grade 420), deformed.

C. Low-Alloy-Steel Reinforcing Bars: ASTM A 706/A 706M, deformed.

D. Plain-Steel Welded Wire Reinforcement: ASTM A 185, fabricated as drawn and stainless steel wire into flat sheets.

E. Deformed-Steel Welded Wire Reinforcement: ASTM A 497/A 497M, flat sheet.

F. Supports: Suspend reinforcement from back of mold or use bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire reinforcement in place according to PCI MNL 117.

2.2 CONCRETE MATERIALS

A. Portland Cement: ASTM C 150, Type I or Type III, gray, unless otherwise indicated.

1. For surfaces exposed to view in finished structure, mix gray with white cement, of same type, brand, and mill source.

B. Supplementary Cementitious Materials:

1. Fly Ash: ASTM C 618, Class C or F, with maximum loss on ignition of 3 percent.
2. Metakaolin Admixture: ASTM C 618, Class N.
3. Silica Fume Admixture: ASTM C 1240, with optional chemical and physical requirement.
4. Ground Granulated Blast-Furnace Slag: ASTM C 989, Grade 100 or 120.

C. Normal-Weight Aggregates: Except as modified by PCI MNL 117, ASTM C 33, with coarse aggregates complying with Class 5S. Stockpile fine and coarse aggregates for each type of exposed finish from a single source (pit or quarry) for Project.

1. Face-Mixture-Coarse Aggregates: Selected, hard, and durable; free of material that reacts with cement or causes staining; to match selected finish sample.

a. Gradation: Uniformly graded

2. Face-Mixture-Fine Aggregates: Selected, natural or manufactured sand of same material as coarse aggregate, unless otherwise approved by Architect.

D. Coloring Admixture: ASTM C 979, synthetic or natural mineral-oxide pigments or colored water-reducing admixtures, temperature stable, and nonfading.

E. Air-Entraining Admixture: ASTM C 260, certified by manufacturer to be compatible with other required admixtures.

F. Chemical Admixtures: Certified by manufacturer to be compatible with other admixtures and to not contain calcium chloride, or more than 0.15 percent chloride ions or other salts by weight of admixture.

2.3 STAINLESS-STEEL CONNECTION MATERIALS

A. Stainless-Steel Plate: ASTM A 666, Type 304, of grade suitable for application.

B. Stainless-Steel Bolts and Studs: ASTM F 593, Alloy 304 or 316, hex-head bolts and studs; stainless-steel nuts; and flat, stainless-steel washers.

1. Lubricate threaded parts of stainless-steel bolts with an antiseize thread lubricant during assembly.

C. Stainless-Steel-Headed Studs: ASTM A 276, with minimum mechanical properties of PCI MNL 117, Table 3.2.3.

2.4 GROUT MATERIALS

A. Sand-Cement Grout: Portland cement, ASTM C 150, Type I, and clean, natural sand, ASTM C 144 or ASTM C 404. Mix at ratio of 1 part cement to 2-1/2 parts sand, by volume, with minimum water required for placement and hydration.

B. Nonmetallic, Nonshrink Grout: Premixed, nonmetallic, noncorrosive, nonstaining grout containing selected silica sands, portland cement, shrinkage-compensating agents, plasticizing and water-reducing agents, complying with ASTM C 1107, Grade A for drypack and Grades B and C for flowable grout and of consistency suitable for application within a 30-minute working time.

C. Epoxy-Resin Grout: Two-component, mineral-filled epoxy resin; ASTM C 881/C 881M, of type, grade, and class to suit requirements.

2.5 CONCRETE MIXTURES

A. Prepare design mixtures for each type of precast concrete required.

1. Limit use of fly ash and silica fume to 20 percent of portland cement by weight; limit metakaolin and silica fume to 10 percent of portland cement by weight.

B. Design mixtures may be prepared by a qualified independent testing agency or by qualified precast plant personnel at architectural precast concrete fabricator's option.

C. Limit water-soluble chloride ions to maximum percentage by weight of cement permitted by ACI 318 (ACI 318M) or PCI MNL 117 when tested according to ASTM C 1218/C 1218M.

D. Normal-Weight Concrete Mixtures: Proportion mixtures by either laboratory trial batch or field test data methods according to ACI 211.1, with materials to be used on Project, to provide normal-weight concrete with the following properties:

1. Compressive Strength (28 Days): 5000 psi (34.5 MPa) minimum.

E. Water Absorption: 6 percent by weight or 14 percent by volume, tested according to PCI MNL 117.

F. Add air-entraining admixture at manufacturer's prescribed rate to result in concrete at point of placement having an air content complying with PCI MNL 117.

G. When included in design mixtures, add other admixtures to concrete mixtures according to manufacturer's written instructions.

2.6 FABRICATION

A. Cast-in Anchors, Inserts, Plates, Angles, and Other Anchorage Hardware: Fabricate anchorage hardware with sufficient anchorage and embedment to comply with design requirements. Accurately position for attachment of loose hardware, and secure in place during precasting operations. Locate anchorage hardware where it does not affect position of main reinforcement or concrete placement.

1. Weld headed studs and deformed bar anchors used for anchorage according to AWS D1.1/D1.1M and AWS C5.4, "Recommended Practices for Stud Welding."

B. Furnish loose hardware items including steel plates, clip angles, seat angles, anchors, dowels, cramps, hangers, and other hardware shapes for securing architectural precast concrete units to supporting and adjacent construction.

C. Cast-in reglets, slots, holes, and other accessories in architectural precast concrete units as indicated on the Contract Drawings.

D. Reinforcement: Comply with recommendations in PCI MNL 117 for fabricating, placing, and supporting reinforcement.

E. Reinforce architectural precast concrete units to resist handling, transportation, and erection stresses.

F. Prestress tendons for architectural precast concrete units by either pretensioning or post-tensioning methods. Comply with PCI MNL 117.

G. Comply with requirements in PCI MNL 117 and requirements in this Section for measuring, mixing, transporting, and placing concrete. After concrete batching, no additional water may be added.

H. Place face mixture to a minimum thickness after consolidation of the greater of 1 inch (25 mm) or 1.5 times the maximum aggregate size, but not less than the minimum reinforcing cover specified.

I. Place concrete in a continuous operation to prevent seams or planes of weakness from forming in precast concrete units.

1. Place backup concrete mixture to ensure bond with face-mixture concrete.

J. Thoroughly consolidate placed concrete by internal and external vibration without dislocating or damaging reinforcement and built-in items, and minimize pour lines, honeycombing, or entrapped air on surfaces. Use equipment and procedures complying with PCI MNL 117.

1. Place self-consolidating concrete without vibration according to PCI TR-6, "Interim Guidelines for the Use of Self-Consolidating Concrete in Precast/Prestressed Concrete Institute Member Plants."

K. Comply with PCI MNL 117 for hot- and cold-weather concrete placement.

L. Identify pickup points of architectural precast concrete units and orientation in structure with permanent markings, complying with markings indicated on Shop Drawings. Imprint or permanently mark casting date on each architectural precast concrete unit on a surface that will not show in finished structure.

M. Cure concrete, according to requirements in PCI MNL 117, by moisture retention without heat or by accelerated heat curing using low-pressure live steam or radiant heat and moisture. Cure units until compressive strength is high enough to ensure that stripping does not have an effect on performance or appearance of final product.

N. Discard and replace architectural precast concrete units that do not comply with requirements, including structural, manufacturing tolerance, and appearance, unless repairs meet requirements in PCI MNL 117 and Architect's approval.

2.7 FABRICATION TOLERANCES

A. Fabricate architectural precast concrete units straight and true to size and shape with exposed edges and corners precise and true so each finished panel complies with PCI MNL 117 product tolerances as well as position tolerances for cast-in items.

2.8 FINISHES

A. Panel faces shall be free of joint marks, grain, and other obvious defects. Corners, including false joints shall be uniform, straight, and sharp. Finish exposed-face surfaces of architectural precast concrete units to match approved sample panels and as follows:
   1. PCI's "Architectural Precast Concrete - Color and Texture Selection Guide," of plate numbers indicated.
   2. Abrasive-Blast Finish: Use abrasive grit, equipment, application techniques, and cleaning procedures to expose aggregate and surrounding matrix surfaces.
   3. Acid-Etched Finish: Use acid and hot-water solution, equipment, application techniques, and cleaning procedures to expose aggregate and surrounding matrix surfaces. Protect hardware, connections, and insulation from acid attach. Exposure to be light.

B. Finish exposed top, bottom and back surfaces of architectural precast concrete units to match face-surface finish.

C. Finish exposed top, bottom and back surfaces of architectural precast concrete units by smooth, steel-trowel finish.

D. Finish unexposed surfaces of architectural precast concrete units by float finish.

2.9 SOURCE QUALITY CONTROL

A. Quality-Control Testing: Test and inspect precast concrete according to PCI MNL 117 requirements. If using self-consolidating concrete, also test and inspect according to PCI TR-6, "Interim Guidelines for the Use of Self-Consolidating Concrete in Precast/Prestressed Concrete Institute Member Plants."

B. Owner will employ an independent testing agency to evaluate architectural precast concrete fabricator's quality-control and testing methods.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install clips, hangers, bearing pads, and other accessories required for connecting architectural precast concrete units to supporting members and backup materials.

B. Erect architectural precast concrete level, plumb, and square within specified allowable tolerances. Provide temporary supports and bracing as required to maintain position, stability, and alignment as units are being permanently connected.

1. Maintain horizontal and vertical joint alignment and uniform joint width as erection progresses.
2. Unless otherwise indicated, provide for uniform joint widths of 3/4 inch (19 mm).

C. Connect architectural precast concrete units in position by bolting, welding, grouting, or as otherwise indicated on Shop Drawings. Remove temporary shims, wedges, and spacers as soon as practical after connecting and grouting are completed.

D. Welding: Comply with applicable AWS D1.1/D1.1M and AWS D1.4 for welding, welding electrodes, appearance, quality of welds, and methods used in correcting welding work.

E. At bolted connections, use lock washers, tack welding, or other approved means to prevent loosening of nuts after final adjustment.

F. Grouting Connections: Grout connections where required or indicated. Retain grout in place until hard enough to support itself. Pack spaces with stiff grout material, tamping until voids are completely filled. Place grout to finish smooth, level, and plumb with adjacent concrete surfaces. Keep grouted joints damp for not less than 24 hours after initial set. Promptly remove grout material from exposed surfaces before it affects finishes or hardens.

G. Erect architectural precast concrete units level, plumb, square, true, and in alignment without exceeding the noncumulative erection tolerances of PCI MNL 117, Appendix I.

3.2 FIELD QUALITY CONTROL

A. Special Inspections: Engage a qualified special inspector to perform the following special inspections and prepare reports:

1. Erection of precast concrete members.

B. Testing Agency: Engage a qualified testing agency to perform tests and inspections and prepare test reports.

C. Field welds will be subject to visual inspections and nondestructive testing according to ASTM E 165 or ASTM E 709. High-strength bolted connections will be subject to inspections.

D. Testing agency will report test results promptly and in writing to Contractor and Architect.

E. Repair or remove and replace work where tests and inspections indicate that it does not comply with specified requirements.

F. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.3 REPAIRS

A. Repair damaged architectural precast concrete units if permitted by Architect. The Architect reserves the right to reject repaired units that do not comply with requirements.

B. Mix patching materials and repair units so cured patches blend with color, texture, and uniformity of adjacent exposed surfaces and show no apparent line of demarcation between original and repaired work, when viewed in typical daylight illumination from a distance of 20 feet (6 m).

C. Prepare and repair damaged galvanized coatings with galvanizing repair paint according to ASTM A 780.

D. Wire brush, clean, and paint damaged prime-painted components with same type of shop primer.

E. Remove and replace damaged architectural precast concrete units when repairs do not comply with requirements.

3.4 CLEANING

A. Clean surfaces of precast concrete units exposed to view.

B. Clean mortar, plaster, fireproofing, weld slag, and other deleterious material from concrete surfaces and adjacent materials immediately.

C. Clean exposed surfaces of precast concrete units after erection and completion of joint treatment to remove weld marks, other markings, dirt, and stains.

1. Perform cleaning procedures, if necessary, according to precast concrete fabricator's recommendations. Clean soiled precast concrete surfaces with detergent and water, using stiff fiber brushes and sponges, and rinse with clean water. Protect other work from staining or damage due to cleaning operations.
2. Do not use cleaning materials or processes that could change the appearance of exposed concrete finishes or damage adjacent materials.

END OF SECTION 03450

DIVISION 04

SECTION 04220 -CONCRETE UNIT MASONRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Concrete masonry units for ground floor walls, property line walls, elevator and stair walls.

2. Ground face concrete masonry units at property line and exposed CMU exterior walls
3. Mortar and grout.

4. Masonry joint reinforcement.
5. Embedded flashing
6. Ties and anchors.
7. Miscellaneous masonry accessories.
8. Grouting for elevator door frames and sills

B. Related Sections:

1. Division 3 “Cast-in place concrete” structural requirements and assemblies.
2. Division 7 "Sheet Metal Flashing and Trim" for exposed sheet metal flashing and for furnishing manufactured reglets installed in masonry joints.
3. Division 7 “Fluid Applied membrane air barriers
4. Division 7 “Non-Structural Steel Framing” for Z channels anchored to CMU walls
5. Division 9 “Interior Painting” for CMU Walls
6. Division 14 “ Electric Traction Elevators”

1.3 PERFORMANCE REQUIREMENTS

A. Provide structural unit masonry that develops indicated net-area compressive strengths at 28 days.

1. Determine net-area compressive strength of masonry from average net-area compressive strengths of masonry units and mortar types (unit-strength method) according to Tables 1 and 2 in ACI 530.1/ASCE 6/TMS 602.
2. Determine net-area compressive strength of masonry by testing masonry prisms according to ASTM C 1314.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

1.5 QUALITY ASSURANCE

A. Testing Agency Qualifications: Qualified according to ASTM C 1093 for testing indicated.

B. Preinstallation conference: Conduct conference at Project site.

1.6 PROJECT CONDITIONS

A. Protection of Masonry: During construction, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work. Cover partially completed masonry when construction is not in progress.

B. Stain Prevention: Prevent grout, mortar, and soil from staining the face of masonry to be left exposed or painted. Immediately remove grout, mortar, and soil that come in contact with such masonry.

C. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.

PART 2 - PRODUCTS

2.1 MANUFACTURERERS

A. Source Limitations for Masonry Units: Obtain exposed masonry units of a uniform texture and color, or a uniform blend within the ranges accepted for these characteristics, from a single source from single manufacturer for each product required.

B. Source Limitations for Mortar Materials: Obtain mortar ingredients of a uniform quality, including color for exposed masonry, from single manufacturer for each cementitious component and from single source or producer for each aggregate.

2.2 MASONRY UNITS, GENERAL

A. Defective Units: Referenced masonry unit standards may allow a certain percentage of units to contain chips, cracks, or other defects exceeding limits stated in the standard. Do not use units where such defects will be exposed in the completed Work.

B. Fire-Resistance Rating: Comply with the requirements for fire-resistance-rated assembly designs indicated.
   1. Where fire-resistance-rated construction is indicated, units shall be listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction.

2.3 CONCRETE MASONRY UNITS

A. Shapes: Provide shapes indicated and as follows, with exposed surfaces matching exposed faces of adjacent units unless otherwise indicated.

1. Provide special shapes for lintels, corners, jambs, sashes, movement joints, headers, bonding, and other special conditions.

B. Integral Water Repellent: Provide units made with integral water repellent for exposed units including property line walls and where indicated.

1. Integral Water Repellent: Liquid polymeric, integral water-repellent admixture that does not reduce flexural bond strength. Units made with integral water repellent, when tested according to ASTM E 514 as a wall assembly made with mortar containing integral water-repellent manufacturer's mortar additive, with test period extended to 24 hours, shall show no visible water or leaks on the back of test specimen.

a. Products: Subject to compliance with requirements, provide one, but are not limited to, the following:

1) ACM Chemistries, Inc.; RainBloc.
2) BASF Aktiengesellschaft; Rheopel Plus.
3) Grace Construction Products, W. R. Grace & Co. - Conn.; Dry-Block.

C. CMUs: ASTM C 90.

2.4 GROUND FACE CONCRETE MASONRY UNITS (EXTERIOR VENEER)

A. Shapes: Provide shales indicated and as follows, with exposed surfaces matching exposed faces of adjacent units unless otherwise indicated.
1. Provide special shapes for lintels, corners, jambs, sashes, movement joints, headers, bonding, and other special conditions.
2. Provide square edged units for outside corners unless otherwise indicated.

B. CMUs: ASTM C90

a. Products: Subject to compliance with requirements, provide one, but are not limited to, the following:

1) Treadstone, Northfield Block Company

2) Verastone Ground face units, Northfield Block Company
3) Ground Faced Polished Concrete, Genest
4) Premier Line Ground Face, E. Dillon & Company

2. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of 4000 psi
3. Initial Rate of Absorption: no more than 8 g/cu. Ft. when tested per ASTM C-140.
4. Density Classification: 130lbs/cu ft. minimum when tested per ASTM C-140
5. Shrinkage no ore than .30 when tested per ASTM C-426
6. Freeze/Thaw Durability: <1% when tested per ASTM C-1262
7. Size (Wx H x L): 8” x 8” x 16” nominal
8. Pattern and Texture:

a. Standard, polished-ground face finish (one side). Match Manufacturer's Standard.
b. Colors: As selected by Architect from manufacturer's full range.
c. Provide Manufacturer's standard sealer.

C. Portland Cement: ASTM C150, Type I or II. Provide natural color or white cement as required to produce mortar color indicated.

D. Hydrated Lime: ASTM C 207, Type S

E. Portland Cement-Lime Mix: Packaged blend of Portland cement and hydrated lie containing no other ingredients.

F. Aggregate for Mortar: ASTM C 144
1. For mortar that is exposed to view, use washed aggregate consisting of national sand or crushed stone.

G. For joints less than ¼ inch thick, use aggregate graded with 100 percent passing the No. 16 sieve Aggregate for Grout: ASTM C 404

H. Water-Repellant Admixture System:
1. Integral Liquid polymeric admixture added to ground face concrete masonry units during the production of units by ground face CMU manufacturer or equal approved by manufacturer.
2. Liquid-water repellent mortar admixture intended for use with CMUs, containing integral water repellant by same manufacturer of concrete unit masonry admixture or equal approved by Ground Face CMU manufacturer.
3. Water Repellent Sealer post applied to integrally water-repellant-treated CMU wall construction by same manufacturer of integral admixtures or equal approved by ground face CMU manufacturer.
4. Basis of Design: Subject to compliance to requirements, provide Grace Dry-Block system for Integral Water Repellant Admixtures for Block and Mortar and INFISEAL DB Sealer or approved equal.

I. Water: Potable

2.5 CONCRETE AND MASONRY LINTELS

A. General: Provide one of the following:

B. Concrete Lintels: Precast or formed-in-place concrete lintels complying with requirements in Section 03300 "Cast-in-Place Concrete," and with reinforcing bars indicated.

C. Masonry Lintels: Prefabricated or built-in-place masonry lintels made from bond beam CMUs matching adjacent CMUs in color, texture, and density classification, with reinforcing bars placed as indicated and filled with coarse grout. Cure precast lintels before handling and installing. Temporarily support built-in-place lintels until cured.

2.6 MORTAR AND GROUT MATERIALS

A. Portland Cement: ASTM C 150, Type I or II. Provide natural color or white cement as required to produce mortar color indicated.

B. Hydrated Lime: ASTM C 207, Type S.

C. Portland Cement-Lime Mix: Packaged blend of portland cement and hydrated lime containing no other ingredients.

D. Aggregate for Mortar: ASTM C 144.

1. For mortar that is exposed to view, use washed aggregate consisting of natural sand or crushed stone.
2. For joints less than 1/4 inch thick, use aggregate graded with 100 percent passing the No. 16 sieve.
3. White-Mortar Aggregates: Natural white sand or crushed white stone.
4. Colored-Mortar Aggregates: Natural sand or crushed stone of color necessary to produce required mortar color.

E. Aggregate for Grout: ASTM C 404.

F. Water-Repellent Admixture: Liquid water-repellent mortar admixture intended for use with CMUs at exposed exterior walls, containing integral water repellent by same manufacturer.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. ACM Chemistries, Inc.; RainBloc for Mortar.
b. BASF Aktiengesellschaft; Rheopel Mortar Admixture.
c. Grace Construction Products, W. R. Grace & Co. - Conn.; Dry-Block Mortar Admixture.

G. Water: Potable.

2.7 REINFORCEMENT

A. Uncoated Steel Reinforcing Bars: ASTM A 615or ASTM A 996, Grade 60 (Grade 420).

B. Masonry Joint Reinforcement, General: ASTM A 951/A 951M.

1. Interior Walls: Hot-dip galvanized, carbon steel.
2. Exterior Walls: Stainless steel.
3. Wire Size for Side Rods: 0.187-inch (4.76-mm) diameter.
4. Wire Size for Cross Rods: 0.187-inch (4.76-mm) diameter.
5. Wire Size for Veneer Ties 0.187-inch diameter.
6. Spacing of Cross Rods, Tabs, and Cross Ties: Not more than 16 inches o.c.
7. Provide in lengths of not less than 10 feet with prefabricated corner and tee units.

C. Masonry Joint Reinforcement for Single-Wythe Masonry: Either ladder or truss type with single pair of side rods.

2.8 EMBEDDED FLASHING MATERIALS

A. Metal Flashing: Provide metal flashing complying with SMACNA's "Architectural Sheet Metal Manual" and as follows:
   1. Stainless steel: ASTM A240/A240M or ASTM A666, Type 304, 0.016 inch
   2. Fabricate through-wall flashing with snaplock receiver on exterior face where indicated to receive counterflashing.
   3. Fabricate though-wall flashing with drip edge unless otherwise indicated. Fabricate by extending flashing 1/2" out from wall, with outer edge bent down 30 degrees.
   4. Fabricate though-wall flashing with sealant stop where indicated
   5. Fabricate metal drip edges from stainless steel.
   6. Solder metal items at corners

B. Application: Unless otherwise indicated, use the following:
   1. Where flashing in indicated to receive counterflashing, use metal flashing
   2. Where flashing is indicated to be turned down at or beyond the wall face, use metal flashing.

C. Solder and Sealants for Sheet Metal Flashings: As specified in Section 076200 "Sheet Metal Flashing and Trim"

D. Adhesives, Primers, and Seam Tapes for Flashings:
   1. Flashing manufacturer's standard products or products recommended by flashing manufacturer for bonding flashing sheets to each other and to substrates.
   2. Confirm compatibility of primers and adhesives with fluid applied waterproofing specified under Section 7 "Fluid Applied Membrane Air Barriers".

2.9 TIES AND ANCHORS

A. Materials: Provide ties and anchors specified in this article that are made from materials that comply with the following unless otherwise indicated.
   1. Stainless-Steel Wire: ASTM A 580/A 580M, **Type 304** or **Type 316**.
   2. Steel Sheet, Galvanized after Fabrication: ASTM A 1008/A 1008M, Commercial Steel, with ASTM A 153/A 153M, Class B coating.
   3. Stainless-Steel Sheet: ASTM A 666, **Type 304 or Type 316**.
   4. Stainless-Steel Bars: ASTM A 276 or ASTM A 666, Type 304.

B. Adjustable Anchors for Connecting to Structural Steel Framing: Provide anchors that allow vertical or horizontal adjustment but resist tension and compression forces perpendicular to plane of wall.
   1. Anchor Section for Welding to Steel Frame: Crimped 1/4-inch- diameter, stainless-steel wire Tie Section: Triangular-shaped wire tie, sized to extend within 1 inch of masonry face, made from 0.25-inch- diameter, stainless-steel wire

C. Adjustable Anchors for Connecting to Concrete: Provide anchors that allow vertical or horizontal adjustment but resist tension and compression forces perpendicular to plane of wall.

D. Partition Top anchors as detailed in drawings. Rigid Anchors: as detailed in drawings.
   a.

2.10 MISCELLANEOUS MASONRY ACCESSORIES

A. Compressible Filler: Premolded filler strips complying with ASTM D 1056, Grade 2A1; compressible up to 35 percent; of width and thickness indicated; formulated from neoprene urethane or PVC.

B. Preformed Control-Joint Gaskets: designed to fit standard sash block and to maintain lateral stability in masonry wall; size and configuration as indicated.

C. Bond-Breaker Strips: Asphalt-saturated, organic roofing felt complying with ASTM D 226, Type I (No. 15 asphalt felt).

D. Weeps: Stainless steel drainage strip with integrated drip edge, adhered horizontal mesh, rear water dam, and 90 percent open weave polyester vertical mesh elements.
   1. Provide weeps at exterior block walls at base of wall, floor intersections, joints and other changes in wall surfaces. Weeps are to be located every 10” max.

2.11 MORTAR AND GROUT MIXES

A. General: Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures unless otherwise indicated.

   1. Do not use calcium chloride in mortar or grout.
   2. Use portland cement-lime mortar cement mortar unless otherwise indicated.

B. Preblended, Dry Mortar Mix: Furnish dry mortar ingredients in form of a preblended mix. Measure quantities by weight to ensure accurate proportions, and thoroughly blend ingredients before delivering to Project site.

C. Mortar for Unit Masonry: Comply with ASTM C 270.Provide the following types of mortar for applications stated unless another type is indicated.

   1. For masonry below grade or in contact with earth, use Type S.
   2. For reinforced masonry, use Type N.
   3. For mortar parge coats, use Type N.
   4. For exterior, above-grade, load-bearing and non-load-bearing walls and parapet walls; for interior load-bearing walls; for interior non-load-bearing partitions; and for other applications where another type is not indicated, use Type N.
   5. For interior non-load-bearing partitions, Type N.

D. Grout for Elevator door frames and sills: Comply with ASTM C 476

E. Grout for Unit Masonry: Comply with ASTM C 476.

   1. Use grout of type indicated or, if not otherwise indicated, of type (fine or coarse) that will comply with Table 1.15.1 in ACI 530.1/ASCE 6/TMS 602 for dimensions of grout spaces and pour height.
   2. Proportion grout in accordance with ASTM C 476, paragraph 4.2.2 for specified 28-day compressive strength indicated, but not less than 2000 psi **(14 MPa)**].
   3. Provide grout with a slump of 8 to 11 inches as measured according to ASTM C 143/C 143M.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Proceed with installation only after unsatisfactory conditions have been corrected.

B. Before installation, examine rough-ins and built-in construction for piping systems to verify actual locations of piping.

3.2 TOLERANCES

A. Dimensions and Locations of Elements: per ACI 530.1

3.3 LAYING MASONRY WALLS

A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and for accurate location of openings, movement-type joints, returns, and offsets. Avoid using less-than-half-size units, particularly at corners, jambs, and, where possible, at other locations.

B. Use full-size units without cutting if possible. If cutting is required to provide continuous pattern or to fit adjoining construction, cut units with motor-driven saws; provide clean, sharp, unchipped edges. Allow units to dry before laying unless wetting of units is specified. Install cut units with cut surfaces and where possible cut edges concealed.

C. Bond Pattern for Exposed Masonry: Unless otherwise indicated, lay exposed masonry in running bond; do not use units with less than nominal 4-inch horizontal face dimensions at corners or jambs.

D. Built-in Work: As construction progresses, build in items specified in this and other Sections. Fill in solidly with masonry around built-in items.

E. Fill space between steel frames and masonry solidly with mortar unless otherwise indicated.

F. Where built-in items are to be embedded in cores of hollow masonry units, place a layer of metal lath, wire mesh, or plastic mesh in the joint below and rod mortar or grout into core.

G. Fill cores in hollow CMUs with grout 24 inches under bearing plates, beams, lintels, posts, and similar items unless otherwise indicated.

H. Build non-load-bearing interior partitions full height of story to underside of solid floor or roof structure above unless otherwise indicated.
   1. At fire-rated partitions, treat joint between top of partition and underside of structure above to comply with Section 078446 "Fire-Resistive Joint Systems."

3.4 MORTAR BEDDING AND JOINTING

A. Lay hollow CMUs as follows:

   1. With face shells fully bedded in mortar and with head joints of depth equal to bed joints.

2. With webs fully bedded in mortar in all courses of piers, columns, and pilasters.
3. With webs fully bedded in mortar in grouted masonry, including starting course on footings.
4. With entire units, including areas under cells, fully bedded in mortar at starting course on footings where cells are not grouted.

B. Lay solid masonry units with completely filled bed and head joints; butter ends with sufficient mortar to fill head joints and shove into place. Do not deeply furrow bed joints or slush head joints.

C. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness unless otherwise indicated.

D. Cut joints flush for masonry walls to receive plaster or other direct-applied finishes (other than paint) unless otherwise indicated.

3.5 MASONRY JOINT REINFORCEMENT

A. General: Install entire length of longitudinal side rods in mortar with a minimum cover of 5/8 inch on exterior side of walls, 1/2 inch elsewhere. Lap reinforcement a minimum of 6 inches.

1. Space reinforcement not more than 16 inches o.c.
2. Space reinforcement not more than 8 inches o.c. in foundation walls and parapet walls.
3. Provide reinforcement not more than 8 inches above and below wall openings and extending 12 inches beyond openings in addition to continuous reinforcement.

B. Interrupt joint reinforcement at control and expansion joints unless otherwise indicated.

C. Provide continuity at wall intersections by using prefabricated T-shaped units.

D. Provide continuity at corners by using prefabricated L-shaped units.
1. .

3.6 REINFORCED UNIT MASONRY INSTALLATION

A. Temporary Formwork and Shores: Construct formwork and shores as needed to support reinforced masonry elements during construction.

1. Construct formwork to provide shape, line, and dimensions of completed masonry as indicated. Make forms sufficiently tight to prevent leakage of mortar and grout. Brace, tie, and support forms to maintain position and shape during construction and curing of reinforced masonry.
2. Do not remove forms and shores until reinforced masonry members have hardened sufficiently to carry their own weight and other loads that may be placed on them during construction.

B. Placing Reinforcement: Comply with requirements in ACI 530.1/ASCE 6/TMS 602.

C. Grouting: Do not place grout until entire height of masonry to be grouted has attained enough strength to resist grout pressure.

1. Comply with requirements in ACI 530.1/ASCE 6/TMS 602 for cleanouts and for grout placement, including minimum grout space and maximum pour height.

3.7 ANCHORING MASONRY TO STRUCTURAL STEEL AND CONCRETE

A. Anchor masonry to concrete, where masonry abuts or faces concrete, to comply with the following:
   1. Provide an open space not less than 3/8” wide between masonry structural steel or concrete unless otherwise indicated. Keep space free of mortar and other rigid materials.
   2. Anchor masonry with anchors embedded in masonry joints and attached to structure
   3. Space anchors as indicated, but not more than 24 inches o.c. vertically and 36 o.c. horizontally.

3.8 CONTROL AND EXPANSION JOINTS

1. General: Install control-and expansion-joint material in unit masonry as masonry progresses. Do not allow materials to span control and expansion joints without provisions to allow for in-plane or partition movement.

3.9 LINTELS

1. Provide concrete or masonry lintels where shown and where openings of more than 24” for block-size units are shown without structural steel or other supporting lintels.
2. Provide minimum bearing of 8 inches at each jamb unless otherwise indicated.

3.10 FLASHING

A. General: Install embedded flashing at ledges and other obstructions to downward flow of water in wall where indicated.

B. Install reglets and nailers for flashing and other related construction where they are shown to be built into the masonry.

3.11 FIELD QUALITY CONTROL

A. Testing and Inspecting: Owner will engage special inspectors to perform tests and inspections and prepare reports. Allow inspectors access to scaffolding and work areas, as needed to perform tests and inspections. Retesting of materials that fail to meet specified requirements shall be done at Contractor's expense.

B. Inspections: Level 1special inspections according to the "International Building Code."

   1. Begin masonry construction only after inspectors have verified proportions of site-prepared mortar.
   2. Place grout only after inspectors have verified compliance of grout spaces and of grades, sizes, and locations of reinforcement.
   3. Place grout only after inspectors have verified proportions of site-prepared grout.

C. Testing Prior to Construction: One set of tests.

D. Testing Frequency: One set of tests for each 5000 sq. ft. of wall area or portion thereof.

E. Concrete Masonry Unit Test: For each type of unit provided, according to ASTM C 140 for compressive strength.

F. Mortar Aggregate Ratio Test (Proportion Specification): For each mix provided, according to ASTM C 780.

G. Mortar Test (Property Specification): For each mix provided, according to ASTM C 780. Test mortar for compressive strength.

H. Grout Test (Compressive Strength): For each mix provided, according to ASTM C 1019.

3.12 REPAIRING, POINTING, AND CLEANING

A. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.

B. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:
   1. Test cleaning methods on sample wall panel; leave one-half of panel uncleaned for comparison purposes. Obtain Architect's approval of sample cleaning before proceeding
   2. Clean concrete masonry by cleaning method indicated in NCMA TEK 8-2A applicable to type of stain on exposed surfaces.
   3. Preparation of Fluid applied waterproofing
      a. Clean surfaces for adhesion
      b. Mortar joints must have a minimum of 3-day cure time before application per manufacturer’s written instructions.

3.13 MASONRY WASTE DISPOSAL

A. Waste Disposal as Fill Material: Dispose of clean masonry waste, including excess or soil-contaminated sand, waste mortar, and broken masonry units, by crushing and mixing with fill material as fill is placed.
   1. .

B. Excess Masonry Waste: Remove excess clean masonry waste that cannot be used as fill, as described above, and other masonry waste, and legally dispose of off Owner's property.

END OF SECTION 042200

SECTION 04720 - CAST STONE MASONRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Cast stone, indicated as “Cast Stone” in the drawings, trim including the following:

    a. Cornice and Copings
    b. Window sills
    c. Window and Door Headers
    d. Surrounds
    e. Belt courses and Banding
    f. Water tables and Base

2. Cast stone accessories:

    a. Anchoring systems

B. Related Sections:

1. Division 3 Section “Pre-cast Concrete” for installing parapet coping
2. Division 4 Section "Concrete Unit Masonry" for for mortar mixes

1.3 PERFORMANCE REQUIREMENTS

A. Delegated Design: Design cast stone and anchoring systems, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated and required for project.

B. General: Design cast stone and anchoring systems according to ASTM C 1242.

C. Structural Performance: Provide cast stone and anchoring system capable of withstanding the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:

1. Wind Loads: Determine loads based on the following minimum design wind pressures:

    a. Uniform pressure of 30 lbf/sq. ft., acting inward or outward.

D. Thermal Movements: Provide cast stone and anchoring system that allows for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing displacement of cast stone, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.

E. Horizontal Building Movement (Interstory Drift): Allow for maximum horizontal building movement equal to quotient resulting from dividing floor-to-floor height at any floor by 400.

F. Shrinkage and Creep: Allow for progressive vertical shortening of building frame equal to 1/8 inch in 10 feet.

G. Design cast stone anchors to withstand loads indicated without exceeding allowable working stresses established by the following:
1. For Cold-Formed Steel: AISI's "North American Specification for the Design of Cold-Formed Steel Structural Members."
2. For Post-Installed Fasteners in Masonry: One-sixth of tested capacity when installed in masonry units indicated.

H. Limit deflection in each prefabricated assembly caused by indicated loads and thermal movements, acting singly or in combination with one another, to not more than 1/720 of assembly's clear span or the following, whichever is smaller:

1. 1/16 inch, measured in plane of wall.
2. 1/4 inch, measured perpendicular to wall.

I. Provisions for Fabrication and Erection Tolerances: Allow for fabrication and erection tolerances of building's structural system.

J. Provision for Deflection of Building Structure: Allow for the following:

1. Deflection due to Weight of Cast stone and anchoring System: Allow for 1/4-inch vertical deflection in 20-foot span of structural members supporting dimension stone system.
2. Live Load Deflection: Allow for 1/4-inch vertical deflection, in 20-foot span of structural members supporting cast stone system, due to live loads imposed on building's structural frame after stone installation.

K. Leakage Resistance, Water and Air: Provide cast stone system that complies with the following:

1. Air Infiltration: Not more than 0.004 cfm/sq. ft. of wall area, as measured by testing mockup per ASTM E 283 at a differential pressure of 1.57 lbf/sq. ft..
2. Water Penetration: No uncontrolled water penetration beyond plane of back of cast stone system that is not contained or drained back to exterior, as measured by testing mockup per ASTM E 331 at a differential pressure of 20 percent of positive design wind load, but not less than 10 lbf/sq. ft.

L. Control of Corrosion and Staining: Prevent galvanic and other forms of corrosion as well as staining by isolating metals and other materials from direct contact with incompatible materials. Use materials that do not stain exposed surfaces of stone and joint materials.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated.

1. For cast stone units, include construction details, material descriptions, dimensions of individual components and profiles, and finishes.

B. Shop Drawings: Show fabrication and installation details for cast stone units. Include dimensions, details of reinforcement and anchoring methods if any, and indication of finished faces.

1. Include building elevations showing layout of units and locations of joints and anchors.
2. Manufacturer’s shop drawings including profile, cross sections, reinforcements, exposed faces, annotation of components and their locations in project as indicated on the drawings

C. Samples for Initial Selection: For colored mortar.

D. Samples for Verification:

1. For each color and texture of cast stone required, 18” x 12” in size.
2. For colored mortar. Make Samples using same sand and mortar ingredients to be used on Project. Label Samples to indicated types and amounts of pigments used.

E. Full-Size Samples: For each color and texture of cast stone unit required.

1. Make available for Architect's review at Project site.
2. Make Samples from materials to be used for units used on Project immediately before beginning production of units for Project.
3. Approved Samples may be installed in the Work.

F. Qualification Data: For manufacturer .

1. Include copies of material test reports for completed projects, indicating compliance of cast stone with ASTM C 1364.

G. Material Test Reports: For each mix required to produce cast stone, based on testing according to ASTM C 1364, including test for resistance to freezing and thawing.

1. Provide test reports based on testing within previous two years.

H. Delegated-Design Submittal: For cast stone and anchoring systems indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1. Detail fabrication and assembly of cast stone and anchoring systems.
2. Include design calculations.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: A qualified manufacturer of cast stone units similar to those indicated for this Project, that has sufficient production capacity to manufacture required units, and is a plant certified by the Cast Stone Institute, the Architectural Precast Association or the Precast/Prestressed Concrete Institute for Group A, Category AT.

1. Plant shall have adequate capacity to furnish quality sizes and quantity of cast stone required without delaying progress of work.
2. Products previously produced by plant and exposed to weather shall exhibit satisfactory appearence.

B. Testing Agency Qualifications: Qualified according to ASTM E 329 for testing indicated.

C. Source Limitations for Cast Stone: Obtain cast stone units through single source from single manufacturer.

D. Source Limitations for Mortar Materials: Obtain mortar ingredients of a uniform quality, including color, from one manufacturer for each cementitious component and from one source or producer for each aggregate.

E. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects fit to adjacent components and set quality standards for materials repair/maintain methods (if needed) and execution.

1. Build mockup of wall/storefront head, jamb and sill area as shown on Drawings.
2. Build mockup of entrance wall area as shown on Drawings.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Coordinate delivery of cast stone with unit masonry work to avoid delaying the Work and to minimize the need for on-site storage.

B. Pack, handle, and ship cast stone units in suitable packs or pallets and protected from damage and discoloration.

1. Lift with wide-belt slings; do not use wire rope or ropes that might cause staining. Move cast stone units, if required, using dollies with wood supports.
2. Store cast stone units on wood skids or pallets with nonstaining, waterproof covers, securely tied. Arrange to distribute weight evenly and to prevent damage to units. Ventilate under covers to prevent condensation.
3. Protect corners from damage.

C. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.

D. Store mortar aggregates where grading and other required characteristics can be maintained and contamination can be avoided.

1.7 PROJECT CONDITIONS

A. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Comply with cold-weather construction requirements in ACI 530.1/ASCE 6/TMS 602.

1. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 deg F and above and will remain so until cast stone has dried, but no fewer than seven days after completing cleaning.

B. Hot-Weather Requirements: Comply with hot-weather construction requirements in ACI 530.1/ASCE 6/TMS 602.

PART 2 - PRODUCTS

2.1 CAST STONE MATERIALS

A. Permissible Variation in Color:

1. Total Color Difference: ASTM C 1364, 6 units
2. Hue Difference: ASTM C 1364, 2 units

B. General: Comply with ASTM C 1364 and the following:

C. Portland Cement: ASTM C 150, Type I, containing not more than 0.60 percent total alkali when tested according to ASTM C 114. Provide natural color or white cement as required to produce cast stone color indicated.

D. Coarse Aggregates: Granite, quartz, or limestone complying with ASTM C 33; gradation and colors as needed to produce required cast stone textures and colors.

E. Fine Aggregates: Natural sand or crushed stone complying with ASTM C 33, gradation and colors as needed to produce required cast stone textures and colors.

F. Color Pigment: ASTM C 979, synthetic mineral-oxide pigments or colored water-reducing admixtures; color stable, free of carbon black, nonfading, and resistant to lime and other alkalis.

G. Admixtures: Use only admixtures specified or approved in writing by Architect.

1. Do not use admixtures that contain more than 0.1 percent water-soluble chloride ions by mass of cementitious materials. Do not use admixtures containing calcium chloride.
2. Use only admixtures that are certified by manufacturer to be compatible with cement and other admixtures used.
3. Air-Entraining Admixture: ASTM C 260.[Add to mixes for units exposed to the exterior at manufacturer's prescribed rate to result in an air content of 4 to 6 percent, except do not add to zero-slump concrete mixes.]
4. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.
5. Water-Reducing, Retarding Admixture: ASTM C 494/C 494M, Type D.
6. Water-Reducing, Accelerating Admixture: ASTM C 494/C 494M, Type E.

H. Water: Potable

I. Reinforcement: Deformed steel bars complying with ASTM A 615/A 615M, Grade 60. Use galvanized or epoxy-coated reinforcement when covered with less than 1-1/2 inches of cast stone material. Panels, soffits and similar stones greater than 24 in. (600mm) in one direction shall be reinforced in that direction. Units less than 24 in. (600 mm) in both their length and width dimensions shall be non-reinforced unless otherwise specified. Welded wire fabric reinforcing shall not be used in dry cast products.

1. Epoxy Coating: ASTM A 775/A 775M.
2. Galvanized Coating: ASTM A 767/A 767M.

J. Embedded Anchors and Other Inserts: Fabricated from stainless steel complying with ASTM A 240/A 240M, ASTM A 276, or ASTM A 666, Type 304.

2.2 CAST STONE UNITS

A. Basis of Design: Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Continental Cast Stone, Grand Prairie, Texas.

2. Cast Stone Systems, Warrenton, NC

3. Heritage Cast Stone, Kansas City, Missouri

4. Stone Legends, Dallas, Texas

5. Stone Castle Industries, Houston, Texas

B. Provide cast stone units complying with ASTM C 1364 using either the vibrant dry tamp or wet-cast method.

1. Provide units that are resistant to freezing and thawing as determined by laboratory testing according to ASTM C 666/C 666M, Procedure A, as modified by ASTM C 1364.

C. Fabricate units with sharp arris and accurately reproduced details, with indicated texture on all exposed surfaces unless otherwise indicated.

1. Slope exposed horizontal surfaces 1:12 to drain unless otherwise indicated.
2. Provide raised fillets at backs of sills and at ends indicated to be built into jambs.
3. Provide drips on projecting elements unless otherwise indicated.

D. Fabrication Tolerances:

1. Variation in Cross Section: Do not vary from indicated dimensions by more than 1/8 inch.
2. Variation in Length: Do not vary from indicated dimensions by more than 1/360 of the length of unit or 1/8 inch, whichever is greater, but in no case by more than 1/4 inch.
3. Warp, Bow, and Twist: Not to exceed 1/360 of the length of unit or 1/8 inch, whichever is greater.
4. Location of Grooves, False Joints, Holes, Anchorages, and Similar Features: Do not vary from indicated position by more than 1/8 inch on formed surfaces of units and 3/8 inch on unformed surfaces.

E. Cure units as follows:

1. Cure units in enclosed moist curing room at 95 to 100 percent relative humidity and temperature of 100 deg F for 12 hours or 70 deg F for 16 hours.
2. Keep units damp and continue curing to comply with one of the following:

a. No fewer than five days at mean daily temperature of 70 deg F or above.
b. No fewer than six days at mean daily temperature of 60 deg F or above.
c. No fewer than seven days at mean daily temperature of 50 deg F or above.
d. No fewer than eight days at mean daily temperature of 45 deg F or above.

F. Acid etch units after curing to remove cement film from surfaces to be exposed to view.

G. Finishing: Remove blemishes from exposed surfaces before packaging for shipment

H. Colors and Textures: As selected by Architect from manufacturer's full range.

2.3 MORTAR MATERIALS

A. Provide mortar materials that comply with Division 4 Section "Brick Masonry Assemblies."

2.4 ACCESSORIES

A. Anchors: Type and size indicated, fabricated from Type 304 stainless steel complying with ASTM A 240/A 240M, ASTM A 276, or ASTM A 666 .
   1. Basis-of-Design Product: Subject to compliance with requirements, provide Dayton Richmond Dur-O-Wall: Stone Anchoring System (engineered specifically for this project) or comparable product by the following:
      a. Hohmann & Barnard, Inc.
      b. Heckman Building Products
      c. Halfen Anchoring Systems

B. Dowels: 1/2-inch- diameter, round bars, fabricated from Type 304 stainless steel complying with ASTM A 240/A 240M, ASTM A 276, or ASTM A 666 .

C. Proprietary Acidic Cleaner: Manufacturer's standard-strength cleaner designed for removing mortar/grout stains, efflorescence, and other new construction stains from new masonry without discoloring or damaging masonry surfaces. Use product expressly approved for intended use by cast stone manufacturer and expressly approved by cleaner manufacturer for use on cast stone and adjacent masonry materials.

   1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

      a. Diedrich Technologies, Inc.
      b. EaCo Chem, Inc.
      c. ProSoCo, Inc.

2.5 MORTAR MIXES

A. Comply with requirements in Division 4 Section "Concrete Unit Masonry" for mortar mixes.

2.6 SOURCE QUALITY CONTROL

A. Engage a qualified independent testing agency to sample and test cast stone units according to ASTM C 1364.

1. Include one test for resistance to freezing and thawing.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

C. Visual inspection:

1. Visually inspect cast stone components for fit and finish in accordance with ASTM C 1364 before installation.
2. Do not install unacceptable components

3.2 SETTING CAST STONE IN MORTAR

A. Install cast stone units to comply with requirements in Division 4 Section "Architectural Concrete Unit Masonry Assemblies".

B. Set cast stone as indicated on Drawings. Set units accurately in locations indicated with edges and faces aligned according to established relationships and indicated tolerances.

1. Install anchors, supports, fasteners, and other attachments indicated or necessary to secure units in place.
2. Coordinate installation of cast stone with installation of flashing specified in other Sections.

C. Wet joint surfaces thoroughly before applying mortar or setting in mortar.

D. Set units in full bed of mortar with full head joints unless otherwise indicated.

1. Set units with joints 1/4 to 3/8 inch wide unless otherwise indicated.
2. Build anchors and ties into mortar joints as units are set.
3. Fill dowel holes and anchor slots with mortar.
4. Fill collar joints solid as units are set.
5. Build concealed flashing into mortar joints as units are set.

6. Keep head joints in coping and other units with exposed horizontal surfaces open to receive sealant.
7. Keep joints at shelf angles open to receive sealant.

E. Rake out joints for pointing with mortar to depths of not less than 3/4 inch. Rake joints to uniform depths with square bottoms and clean sides. Scrub faces of units to remove excess mortar as joints are raked.

F. Point mortar joints by placing and compacting mortar in layers not greater than 3/8 inch. Compact each layer thoroughly and allow it to become thumbprint hard before applying next layer.

G. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness unless otherwise indicated.

H. Provide sealant joints at copings and other horizontal surfaces, at expansion, control, and pressure-relieving joints, and at locations indicated.

1. Keep joints free of mortar and other rigid materials.
2. Build in compressible foam-plastic joint fillers where indicated.
3. Form joint of width indicated, but not less than 3/8 inch .
4. Prime cast stone surfaces to receive sealant and install compressible backer rod in joints before applying sealant unless otherwise indicated.
5. Prepare and apply sealant of type and at locations indicated to comply with applicable requirements in Division 7 Section "Joint Sealants."

3.3 SETTING ANCHORED CAST STONE WITH SEALANT-FILLED JOINTS

A. Set cast stone as indicated on Drawings. Set units accurately in locations indicated with edges and faces aligned according to established relationships and indicated tolerances.

1. Install anchors, supports, fasteners, and other attachments indicated or necessary to secure units in place.
2. Shim and adjust anchors, supports, and accessories to set cast stone in locations indicated with uniform joints.

B. Keep cavities open where unfilled space is indicated between back of cast stone units and backup wall; do not fill cavities with mortar or grout.

C. Fill anchor holes with sealant.

1. Where dowel holes occur at pressure-relieving joints, provide compressible material at ends of dowels.

D. Set cast stone supported on clip or continuous angles on resilient setting shims. Use material of thickness required to maintain uniform joint widths. Hold shims back from face of cast stone a distance at least equal to width of joint.

E. Keep joints free of mortar and other rigid materials. Remove temporary shims and spacers from joints after anchors and supports are secured in place and cast stone units are anchored. Do not begin sealant installation until temporary shims and spacers are removed.

1. Form open joint of width indicated, but not less than 3/8 inch .

F. Prime cast stone surfaces to receive sealant and install compressible backer rod in joints before applying sealant unless otherwise indicated.

G. Prepare and apply sealant of type and at locations indicated to comply with applicable requirements in Division 7 Section "Joint Sealants."

3.4 INSTALLATION TOLERANCES

A. Comply with Cast Stone Institute Standard Specification

B. Variation from Plumb: Do not exceed 1/8 inch in 5 feet, 1/4 inch in 20 feet, or more.

C. Variation from Level: Do not exceed 1/8 inch in 5 feet, 1/4 inch in 20 feet, or 3/8 inch maximum.

D. Variation in Joint Width: Do not vary joint thickness more than 1/8 inch in 36 inches or one-fourth of nominal joint width, whichever is less.

E. Variation in Plane between Adjacent Surfaces (Lipping): Do not vary from flush alignment with adjacent units or adjacent surfaces indicated to be flush with units by more than 1/16 inch, except where variation is due to warpage of units within tolerances specified.

3.5 ADJUSTING AND CLEANING

A. Remove and replace stained and otherwise damaged units and units not matching approved Samples. Cast stone may be repaired if methods and results are approved by Architect.

B. Replace units in a manner that results in cast stone matching approved Samples, complying with other requirements, and showing no evidence of replacement.

C. In-Progress Cleaning: Clean cast stone as work progresses.

1. Remove mortar fins and smears before tooling joints.
2. Remove excess sealant immediately, including spills, smears, and spatter.

D. Final Cleaning: After mortar is thoroughly set and cured, clean exposed cast stone as follows:

1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
2. Test cleaning methods on sample; leave one sample uncleaned for comparison purposes. Obtain Architect's approval of sample cleaning before proceeding with cleaning of cast stone.
3. Protect adjacent surfaces from contact with cleaner by covering them with liquid strippable masking agent or polyethylene film and waterproof masking tape.
4. Wet surfaces with water before applying cleaners; remove cleaners promptly by rinsing thoroughly with clear water.
5. Clean cast stone by bucket-and-brush hand-cleaning method described in BIA Technical Notes 20.
6. Clean cast stone with proprietary acidic cleaner applied according to manufacturer's written instructions.

E. Apply manufacturer recommended cast stone water repellant for weatherproofing in accordance with manufacturer’s instructions. Apply after pointing, repair, cleaning, inspection and acceptance are completed.

1. Surface Repair:

    a. Repair chipping and other surface damage noticeable when viewed in direct daylight at 20 feet.
    b. Repair with matching touch-up material provided by manufacturer and in accordance with manufacturer’s instructions.
    c. Repair methods and results to be approved by Architect.

END OF SECTION 04720

SECTION 04813 - BRICK MASONRY ASSEMBLIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:
   1. Face brick.
   2. Mortar and grout.
   3. Ties and anchors.
   4. Embedded flashing.
   5. Miscellaneous masonry accessories.

B. Related Sections:
   1. Division 3 Section “Architectural Precast Concrete” for finishing precast trim.
   2. Division 4 Section "Cast Stone" for furnishing cast stone trim.
   3. Division 4 Section “Concrete Unit Masonry” for structural concrete masonry unit construction. Coordinated structural design requirements for masonry and reinforcement , specifically integrated reinforcement with masonry ties ,with this section.
   4. Division 5 Section "Metal Fabrications" for furnishing steel lintels and shelf angles for brick masonry.
   5. Division 7 Section "Sheet Metal Flashing and Trim" for sheet metal flashing and for furnishing manufactured reglets installed in masonry joints.
   6. Division 7 Section “ Joint Sealants” for rod and sealant at control and expansion joints
   7. Division 7 Section – Bituminous Damp proofing
   8. Division 9- “Portland Cement Plaster” for installation of stucco adjacent to brick assemblies

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: For the following:

   1. Masonry Units: Show sizes, profiles, coursing, and locations of special shapes.
   2. Fabricated Flashing: Detail corner units, end-dam units, and other special applications.

C. Samples for Initial Selection:
   1. Face Brick, two complete sets of color representing manufacturers full range of available colors and patterns
   2. Colored mortar.
   3. Weep holes/vents.

D. Samples for Verification: For each type and color of the following:
   1. Face Brick, two samples of four bricks each, representing actual product, color and texture
   2. Pigmented and colored-aggregate mortar. Make Samples using same sand and mortar ingredients to be used on Project.

E. List of Materials Used in Constructing Mockups: List generic product names together with manufacturers, manufacturers' product names, model numbers, lot numbers, batch numbers, source of supply, and other information as required to identify materials used. Include mix proportions for mortar and grout and source of aggregates.

   1. Submittal is for information only. Neither receipt of list nor approval of mockup constitutes approval of deviations from the Contract Documents unless such deviations are specifically brought to the attention of Architect and approved in writing.

F. Material Certificates: For each type and size of the following:

   1. Masonry units.

      a. Include data on material properties .
      b. For brick, include size-variation data verifying that actual range of sizes falls within specified tolerances.
      c. For exposed brick, include test report for efflorescence according to ASTM C 67.

   2. Cementitious materials. Include brand, type, and name of manufacturer.
   3. Preblended, dry mortar mixes. Include description of type and proportions of ingredients.
   4. Grout mixes. Include description of type and proportions of ingredients.
   5. Anchors, ties, and metal accessories.

G. Cold-Weather and Hot-Weather Procedures: Detailed description of methods, materials, and equipment to be used to comply with requirements.

1.4 QUALITY ASSURANCE

A. Source Limitations for Masonry Units: Obtain exposed brick of a uniform texture and color, or a uniform blend within the ranges accepted for these characteristics, from single source from single manufacturer for each product required.

B. Source Limitations for Mortar Materials: Obtain mortar ingredients of a uniform quality, including color for exposed masonry, from single manufacturer for each cementitious component and from single source or producer for each aggregate.

C. Masonry Standard: Comply with ACI 530.1/ASCE 6/TMS 602 unless modified by requirements in the Contract Documents.

D. Sample Panels: Build sample panels to verify selections made under sample submittals and to demonstrate aesthetic effects. Comply with requirements in Division 1 Section "Quality Requirements" for mockups. Build mockups to verify selections made under sample submittal and determine aesthetic effects, fit adjacent components, set quality standards for materials material repair/maintain methods

   1. Build sample panels for each type of exposed unit masonry construction in sizes approximately 48 inches long by 48 inches high by full thickness.

2. Clean one-half of exposed faces of panels with masonry cleaner indicated.
3. Protect approved sample panels from the elements with weather-resistant membrane.
4. Approval of sample panels is for color, texture, and blending of masonry units; relationship of mortar and sealant colors to masonry unit colors; tooling of joints; aesthetic qualities of workmanship; and other material and construction qualities specifically approved by Architect in writing.

    a. Approval of sample panels does not constitute approval of deviations from the Contract Documents contained in sample panels unless such deviations are specifically approved by Architect in writing.
5. Include all unit types and sizes to be used and mortar joint treatment
6. Locations: provide mock up as shown on the drawings and assembly as they would actually be constructed (materials and methods):
    a. Build mockup of the corner of the slope parapet wall area as shown on Drawings
    b. Build mockup of wall/window head/jamb/sill conditions as shown on Drawings
    c. Build mockup of wall/stucco/precast signage panel

1.5 DELIVERY, STORAGE, AND HANDLING

A. Store masonry units on elevated platforms in a dry location. If units are not stored in an enclosed location, cover tops and sides of stacks with waterproof sheeting, securely tied. If units become wet, do not install until they are dry.

B. Masonry Units shall be delivered to jobsite on banded wood pallets. Each exposed face shall be protected by a plastic protective layer. Each edge of a cube shall be protected by a pre-molded edge protector. Each cube shall be covered with a clear plastic wrap. Pallets shall be stored in single-stacks on level ground and covered with a waterproof covering (e.g. tarpaulins) to protect units from inclement weather. Units must be handled carefully to avoid breakage and damage to the finished surfaces.

C. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.

D. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.

E. Deliver preblended, dry mortar mix in moisture-resistant containers designed for use with dispensing silos. Store preblended, dry mortar mix in delivery containers on elevated platforms, under cover, and in a dry location or in covered weatherproof dispensing silos.

F. Store masonry accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.

1.6 PROJECT CONDITIONS

A. Protection of Masonry: During construction, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work. Cover partially completed masonry when construction is not in progress.

1. Extend cover a minimum of 24 inches down both sides of walls and hold cover securely in place.
2. Where one wythe of multiwythe masonry walls is completed in advance of other wythes, secure cover a minimum of 24 inches down face next to unconstructed wythe and hold cover in place.

B. Stain Prevention: Prevent grout, mortar, and soil from staining the face of masonry to be left exposed or painted. Immediately remove grout, mortar, and soil that come in contact with such masonry.

1. Protect base of walls from rain-splashed mud and from mortar splatter by spreading coverings on ground and over wall surface.
2. Protect sills, ledges, and projections from mortar droppings.
3. Protect surfaces of window and door frames, as well as similar products with painted and integral finishes, from mortar droppings.
4. Turn scaffold boards near the wall on edge at the end of each day to prevent rain from splashing mortar and dirt onto completed masonry.

C. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace unit masonry damaged by frost or by freezing conditions. Comply with cold-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.

1. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 deg F and higher and will remain so until masonry has dried, but not less than seven days after completing cleaning.

D. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.

PART 2 - PRODUCTS

2.1 MASONRY UNITS, GENERAL

A. Defective Units: Referenced masonry unit standards may allow a certain percentage of units to contain chips, cracks, or other defects exceeding limits stated in the standard. Do not use units where such defects will be exposed in the completed Work.

B. Fire-Resistance Ratings: Where indicated, provide units that comply with requirements for fire-resistance ratings indicated as determined by testing according to ASTM E 119, by equivalent masonry thickness, or by other means, as acceptable to authorities having jurisdiction.

2.2 BRICK

A. General: Provide shapes indicated and as follows, with exposed surfaces matching finish and color of exposed faces of adjacent units.

1. For ends of sills and caps and for similar applications that would otherwise expose unfinished brick surfaces, provide units without cores or frogs and with exposed surfaces finished.

2. Provide special shapes for applications where stretcher units cannot accommodate special conditions, including those at corners, movement joints, bond beams, sashes, and lintels.
3. Provide special shapes for applications requiring brick of size, form, color, and texture on exposed surfaces that cannot be produced by sawing.
4. Provide special shapes for applications where shapes produced by sawing would result in sawed surfaces being exposed to view.

B. Face Brick (brick veneer): Facing brick complying with ASTM C 216.

1. Basis-of-Design Product: Subject to compliance with requirements, provide Sioux City Brick standard modular brick or comparable product by the following:

   a. Acme Brick: Denton Texas Plant

   b. Belden Brick Company, Canton, Ohio

   c. Boral Brick, Kansas City, Missouri

2. Grade: SW .
3. Type: FBS
4. Initial Rate of Absorption: Less than 30 g/30 sq. in. per minute when tested per ASTM C 67.
5. Efflorescence: Provide brick that has been tested according to ASTM C 67 and is rated "not effloresced."
6. Size (Actual Dimensions): 2-1/4”x3-5/8’x7-5/8”.
7. Application: Use where brick is exposed unless otherwise indicated.

8. Color and Texture: As selected by Architect From manufacturers full line

2.3 MORTAR MATERIALS

A. Portland Cement: ASTM C 150, Type I or II, except Type III may be used for cold-weather construction. Provide natural color or white cement as required to produce mortar color indicated.

B. Hydrated Lime: ASTM C 207, Type S.

C. Portland Cement-Lime Mix: Packaged blend of portland cement and hydrated lime containing no other ingredients.

D. Masonry Cement: ASTM C 91.

1. Products: Subject to compliance with requirements, provide one of the following:

   a. Capital Materials Corporation; Flamingo Color Masonry Cement.
   b. Cemex S.A.B. de C.V.; Dixie Type S.
   c. Essroc, Italcementi Group; Brixment or Velvet.
   d. Holcim (US) Inc.; Mortamix Masonry Cement.

e. Lafarge North America Inc.; Magnolia Masonry Cement or Lafarge Masonry Cement.
f. Lehigh Cement Company; Lehigh Masonry Cement or Lehigh White Masonry Cement.
g. National Cement Company, Inc.; Coosa Masonry Cement.

E. Mortar Pigments: Natural and synthetic iron oxides and chromium oxides, compounded for use in mortar mixes and complying with ASTM C 979. Use only pigments with a record of satisfactory performance in masonry mortar.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Davis Colors; True Tone Mortar Colors.
b. Lanxess Corporation; Bayferrox Iron Oxide Pigments.
c. Solomon Colors, Inc.; SGS Mortar Colors.

F. Colored Cement Product: Packaged blend made from portland cement and hydrated lime, masonry cement or mortar cement and mortar pigments, all complying with specified requirements, and containing no other ingredients.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Colored Portland Cement-Lime Mix:

1) Capital Materials Corporation; Riverton Portland Cement Lime Custom Color.
2) Holcim (US) Inc.; Rainbow Mortamix Custom Color Cement/Lime.
3) Lafarge North America Inc.; Eaglebond Portland & Lime.
4) Lehigh Cement Company; Lehigh Custom Color Portland/Lime Cement.

b. Colored Masonry Cement:

1) Capital Materials Corporation; Flamingo Color Masonry Cement.
2) Cemex S.A.B. de C.V.; Richcolor Masonry Cement.
3) Essroc, Italcementi Group; Brixment-in-Color.
4) Holcim (US) Inc.; Rainbow Mortamix Custom Color Masonry Cement.
5) Lafarge North America Inc.; U.S. Cement Custom Color Masonry Cement.
6) Lehigh Cement Company; Lehigh Custom Color Masonry Cement.
7) National Cement Company, Inc.; Coosa Masonry Cement.

2. Formulate blend as required to produce color indicated or, if not indicated, as selected from manufacturer's full range of colors.
3. Pigments shall not exceed 10 percent of portland cement by weight.
4. Pigments shall not exceed 5 percent of masonry cement or mortar cement by weight.

G. Aggregate for Mortar: ASTM C 144.

1. For mortar that is exposed to view, use washed aggregate consisting of natural sand or crushed stone.
2. For joints less than 1/4 inch thick, use aggregate graded with 100 percent passing the No. 16 sieve.
3. White-Mortar Aggregates: Natural white sand or crushed white stone.
4. Colored-Mortar Aggregates: Natural sand or crushed stone of color necessary to produce required mortar color.

2.4 REINFORCEMENT

A. Masonry Joint Reinforcement, General: ASTM A 951/A 951M.

B. Masonry Joint Reinforcement for Veneers Anchored with Seismic Masonry-Veneer Anchors: Single 0.187-inch- diameter, stainless-steel continuous wire.

2.5 TIES AND ANCHORS

A. Materials: Provide ties and anchors specified in this article that are made from materials that comply with the following unless otherwise indicated:
   1. Stainless-Steel Wire: ASTM A 580/A 580M, Type 316.
   2. Stainless-Steel Sheet: ASTM A 666, Type 316.

B. Wire Ties, General: Unless otherwise indicated, size wire ties to extend at least halfway through veneer but with at least 5/8-inch cover on outside face. Outer ends of wires are bent 90 degrees and extend 2 inches parallel to face of veneer.

C. Adjustable Masonry-Veneer Anchors:

   1. General: Provide anchors that allow vertical adjustment but resist tension and compression forces perpendicular to plane of wall, for attachment over sheathing to metal studs, and as follows:

      a. Structural Performance Characteristics: Capable of withstanding a 100-lbf load in both tension and compression without deforming or developing play in excess of 0.05 inch.
   2. Screw-Attached, Masonry-Veneer Anchors: Units consisting of a wire tie and a metal anchor section.

      a. Basis-of-Design Product: Subject to compliance with requirements, provide Dayton Superior Corporation, Dur-O-Wal plate and intel anchor D/A 213 and D/A 3600/3700 ultiwythe adjustable or comparable product by one of the following products: Subject to compliance with requirements, provide one of the following :
         1) Heckmann Building Products Inc.; .
         2) Hohmann & Barnard, Inc.; .
         3) Wire-Bond; .
      b. Provide 3/16” diameter, stainless-steel wire and 12 gauge stainless steel plate.
      c. Provide manufacturer’s super heavy weight construction.

2.6 EMBEDDED FLASHING MATERIALS

A. Metal Flashing: Provide metal flashing complying with SMACNA's "Architectural Sheet Metal Manual and Division 7 Section "Sheet Metal Flashing and Trim" and as follows:

   1. Stainless Steel: ASTM A 240/A 240M, Type 304, 0.016 inch thick.
   2. Fabricate continuous flashings in sections 96 inches long minimum, but not exceeding 12 feet. Provide splice plates at joints of formed, smooth metal flashing.
   3. Fabricate through-wall metal flashing embedded in masonry from stainless steel , with ribs at 3-inch intervals along length of flashing to provide an integral mortar bond.

      a. Products: Subject to compliance with requirements, provide one of the following:

1) Cheney Flashing Company; Cheney Flashing (Dovetail) or Cheney 3-Way Flashing (Sawtooth).
2) Keystone Flashing Company, Inc.; Keystone 3-Way Interlocking Thruwall Flashing.
3) Sandell Manufacturing Co., Inc.; Mechanically Keyed Flashing.

4. Fabricate through-wall flashing with snaplock receiver on exterior face where indicated to receive counterflashing.
5. Fabricate through-wall flashing with drip edge unless otherwise indicated. Fabricate by extending flashing 1/2 inch out from wall, with outer edge bent down 30 degrees and hemmed.
6. Fabricate through-wall flashing with sealant stop unless otherwise indicated. Fabricate by bending metal back on itself 3/4 inch at exterior face of wall and down into joint 1/4 inch to form a stop for retaining sealant backer rod.
7. Metal Drip Edge: Fabricate from stainless steel. Extend at least 3 inches into wall and 1/2 inch out from wall, with outer edge bent down 30 degrees and hemmed.
8. Metal Sealant Stop: Fabricate from stainless steel. Extend at least 3 inches into wall and out to exterior face of wall. At exterior face of wall, bend metal back on itself for 3/4 inch and down into joint 1/4 inch to form a stop for retaining sealant backer rod.
9. Metal Expansion-Joint Strips: Fabricate from stainless steel to shapes indicated.

B. Flexible Flashing: Use the following unless otherwise indicated:

1. Asphalt-Coated Copper Flashing: 7-oz./sq. ft. copper sheet coated with flexible asphalt. Use only where flashing is fully concealed in masonry.

a. Products: Subject to compliance with requirements, provide one of the following :

1) Advanced Building Products Inc.; Cop-R-Cote.
2) Dayton Superior Corporation, Dur-O-Wal Division; Copper Coated Thru-Wall Flashing.
3) Hohmann & Barnard, Inc.; H & B C-Coat Flashing.
4) Phoenix Building Products; Type ACC-Asphalt Bituminous Coated.
5) Sandell Manufacturing Co., Inc.; Coated Copper Flashing.

C. Application: Unless otherwise indicated, use the following:

1. Where flashing is indicated to receive counterflashing, use metal flashing.
2. Where flashing is indicated to be turned down at or beyond the wall face, use metal flashing.
3. Where flashing is partly exposed and is indicated to terminate at the wall face, use metal flashing with a drip edge .
4. Where flashing is fully concealed, use metal flashing or flexible flashing.

D. Solder and Sealants for Sheet Metal Flashings: As specified in Division 7 Section "Sheet Metal Flashing and Trim."

E. Adhesives, Primers, and Seam Tapes for Flashings: Flashing manufacturer's standard products or products recommended by flashing manufacturer for bonding flashing sheets to each other and to substrates.

2.7 MISCELLANEOUS MASONRY ACCESSORIES

A. Compressible Filler: Premolded filler strips complying with ASTM D 1056, Grade 2A1; compressible up to 35 percent; of width and thickness indicated; formulated from neoprene urethane or PVC.

B. Bond-Breaker Strips: Asphalt-saturated, organic roofing felt complying with ASTM D 226, Type I (No. 15 asphalt felt).

C. Weep/Vent Products: Use the following unless otherwise indicated:

1. Mesh Weep/Vent: Free-draining mesh; made from polyethylene strands, full height and width of head joint and depth 1/8 inch less than depth of outer wythe; in color selected from manufacturer's full range.

a. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

1) Mortar Net USA, Ltd.; Mortar Net Weep Vents.

2. Masonry Cavity wall drainage system: Trapezoidal Free-draining mesh made from polyethylene strands, in color selected from manufacturer’s full range.

a. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

1) Mortar Net USA, Ltd.; MortarNet

2.8 MASONRY CLEANERS

A. Proprietary Acidic Cleaner (Brick veneer): Manufacturer's standard-strength cleaner designed for removing mortar/grout stains, efflorescence, and other new construction stains from new masonry without discoloring or damaging masonry surfaces. Use product expressly approved for intended use by cleaner manufacturer and manufacturer of masonry units being cleaned.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following :

a. Diedrich Technologies, Inc.
b. EaCo Chem, Inc.
c. ProSoCo, Inc.

B. Masonry Unit Cleaner: Detergent masonry cleaner shall be used following the manufacturer’s instructions and the surface shall be thoroughly rinsed with clean water. No acid or acid based solutions shall be used. Protect Masonry units from any acid cleaner used on brick veneers.

2.9 MORTAR MIXES

A. General: Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures unless otherwise indicated.

1. Do not use calcium chloride in mortar.
2. Use portland cement-lime masonry cement or mortar cement mortar unless otherwise indicated.
3. Add cold-weather admixture (if used) at same rate for all mortar that will be exposed to view, regardless of weather conditions, to ensure that mortar color is consistent.

B. Preblended, Dry Mortar Mix: Furnish dry mortar ingredients in form of a preblended mix. Measure quantities by weight to ensure accurate proportions, and thoroughly blend ingredients before delivering to Project site.

C. Mortar for Unit Masonry: Comply with ASTM C 270, Proportion Specification. Provide Type S unless another type is indicated.

D. Pigmented Mortar: Use colored cement product.
1. Mix to match Architect's sample.
2. Application: Use pigmented mortar for exposed mortar joints with the following units:
a. Face brick.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

A. Leave openings for equipment to be installed before completing masonry. After installing equipment, complete masonry to match the construction immediately adjacent to opening.

B. Use full-size units without cutting if possible. If cutting is required to provide a continuous pattern or to fit adjoining construction, cut units with motor-driven saws; provide clean, sharp, unchipped edges. Allow units to dry before laying unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.

C. Select and arrange units for exposed unit masonry to produce a uniform blend of colors and textures.

1. Mix units from several pallets or cubes as they are placed.

D. Wetting of Brick: Wet brick before laying if initial rate of absorption exceeds 30 g/30 sq. in. per minute when tested per ASTM C 67. Allow units to absorb water so they are damp but not wet at time of laying.

3.3 TOLERANCES

A. Dimensions and Locations of Elements:

1. For dimensions in cross section or elevation do not vary by more than plus 1/2 inch or minus 1/4 inch.
2. For location of elements in plan do not vary from that indicated by more than plus or minus 1/2 inch.
3. For location of elements in elevation do not vary from that indicated by more than plus or minus 1/4 inch in a story height or 1/2 inch total.

B. Lines and Levels:

1. For bed joints and top surfaces of bearing walls do not vary from level by more than 1/4 inch in 10 feet, or 1/2 inch maximum.
2. For conspicuous horizontal lines, such as lintels, sills, parapets, and reveals, do not vary from level by more than 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2 inch maximum.
3. For vertical lines and surfaces do not vary from plumb by more than 1/4 inch in 10 feet, 3/8 inch in 20 feet, or 1/2 inch maximum.
4. For conspicuous vertical lines, such as external corners, door jambs, reveals, and expansion and control joints, do not vary from plumb by more than 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2 inch maximum.
5. For lines and surfaces do not vary from straight by more than 1/4 inch in 10 feet, 3/8 inch in 20 feet, or 1/2 inch maximum.
6. For vertical alignment of exposed head joints, do not vary from plumb by more than 1/4 inch in 10 feet, or 1/2 inch maximum.
7. For faces of adjacent exposed masonry units, do not vary from flush alignment by more than 1/16 inch except due to warpage of masonry units within tolerances specified for warpage of units.

C. Joints:

1. For bed joints, do not vary from thickness indicated by more than plus or minus 1/8 inch, with a maximum thickness limited to 1/2 inch; do not vary from bed-joint thickness of adjacent courses by more than 1/8 inch.
2. For exposed head joints, do not vary from thickness indicated by more than plus or minus 1/8 inch. Do not vary from adjacent bed-joint and head-joint thicknesses by more than 1/8 inch.
3. For exposed bed joints and head joints of stacked bond, do not vary from a straight line by more than 1/16 inch from one masonry unit to the next.

3.4 LAYING MASONRY WALLS

A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and for accurate location of openings, movement-type joints, returns, and offsets. Avoid using less-than-half-size units, particularly at corners, jambs, and, where possible, at other locations.

B. Bond Pattern for Exposed Masonry: Unless otherwise indicated, lay exposed masonry in bond pattern indicated on Drawings; do not use units with less than nominal 4-inch horizontal face dimensions at corners or jambs.

C. Stopping and Resuming Work: Stop work by racking back units in each course from those in course below; do not tooth. When resuming work, clean masonry surfaces that are to receive mortar, remove loose masonry units and mortar, and wet brick if required before laying fresh masonry.

D. Built-in Work: As construction progresses, build in items specified in this and other Sections. Fill in solidly with masonry around built-in items.

E. Fill space between concrete columns and walls, steel frames and masonry solidly with mortar unless otherwise indicated.

3.5 MORTAR BEDDING AND JOINTING

A. Lay hollow brick as follows:

1. With face shells fully bedded in mortar and with head joints of depth equal to bed joints.
2. With entire units, including areas under cells, fully bedded in mortar at starting course on footings.

B. Lay solid masonry units with completely filled bed and head joints; butter ends with sufficient mortar to fill head joints and shove into place. Do not deeply furrow bed joints or slush head joints.

C. Set pre-cast trim units in full bed of mortar with full vertical joints. Fill dowel, anchor, and similar holes.

1. Clean soiled surfaces with fiber brush and soap powder and rinse thoroughly with clear water.
2. Wet joint surfaces thoroughly before applying mortar.

D. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness unless otherwise indicated.

3.6 ANCHORING MASONRY VENEERS

A. Anchor masonry veneers to wall framing and concrete backup with masonry-veneer anchors to comply with the following requirements:

1. Fasten screw-attached anchors through sheathing to wall framing with metal fasteners of type indicated. Use two fasteners unless anchor design only uses one fastener.
2. Embed tie sections connector sections and continuous wire in masonry joints. Provide not less than 1 ¾ inches of air space between back of masonry veneer and face of sheathing.
3. Locate anchor sections to allow maximum vertical differential movement of ties up and down.
4. Space anchors as indicated, but not more than 18 inches o.c. vertically and 24 inches o.c. horizontally, with not less than 1 anchor for each 2 sq. ft. of wall area. Install additional anchors within 12 inches of openings and at intervals, not exceeding 8 inches, around perimeter.
5. Space anchors as indicated, but not more than 16 inches o.c. vertically and 24 inches o.c. horizontally with not less than 1 anchor for each 2.67 sq. ft. of wall area. Install

additional anchors within 12 inches of openings and at intervals, not exceeding 36 inches, around perimeter.

3.7 EXPANSION JOINTS

A. General: Install expansion joint materials in unit masonry as masonry progresses. Do not allow materials to span expansion joints without provision to allow for in-plane wall or partition movement.

B. Form expansion joints in brick as follows:
1. Build in compressible joint fillers where indicated.
2. Form open joint full depth of brick wythe and of width indicated, but not less than 3/8 inch for installation of sealant and backer rod specified in Division 7 Section "Joint Sealants."

C. Provide horizontal, pressure-relieving joints by either leaving an air space or inserting a compressible filler of width required for installing sealant and backer rod specified in Division 7 Section "Joint Sealants," but not less than 3/8 inch .

1. Locate horizontal, pressure-relieving joints beneath shelf angles supporting masonry.

3.8 LINTELS

A. Install steel lintels where indicated.

B. Provide minimum bearing of 8 inches at each jamb unless otherwise indicated.

3.9 FLASHING, WEEP HOLES, CAVITY DRAINAGE, AND VENTS

A. General: Install embedded flashing and weep holes in masonry at shelf angles, lintels, ledges, other obstructions to downward flow of water in wall, and where indicated. Install vents at shelf angles, ledges, and other obstructions to upward flow of air in cavities, and where indicated.

B. Install flashing as follows unless otherwise indicated:

1. Prepare masonry surfaces so they are smooth and free from projections that could puncture flashing. Where flashing is within mortar joint, place through-wall flashing on sloping bed of mortar and cover with mortar. Before covering with mortar, seal penetrations in flashing with adhesive, sealant, or tape as recommended by flashing manufacturer.
2. At masonry-veneer walls, extend flashing through veneer, across air space behind veneer, and up face of sheathing at least 8 inches; with upper edge tucked under building paper or building wrap, lapping at least 4 inches.
3. At lintels and shelf angles, extend flashing a minimum of 6 inches into masonry at each end. At heads and sills, extend flashing 6 inches at ends and turn up not less than 2 inches to form end dams.
4. Interlock end joints of ribbed sheet metal flashing by overlapping ribs not less than 1-1/2 inches or as recommended by flashing manufacturer, and seal lap with elastomeric sealant complying with requirements in Division 7 Section "Joint Sealants" for application indicated.

5. Install metal drip edges with ribbed sheet metal flashing by interlocking hemmed edges to form hooked seam. Seal seam with elastomeric sealant complying with requirements in Division 7 Section "Joint Sealants" for application indicated.
6. Cut flexible flashing off flush with face of wall after masonry wall construction is completed.

C. Install reglets and nailers for flashing and other related construction where they are shown to be built into masonry.

D. Install weep holes in head joints in exterior wythes of first course of masonry immediately above embedded flashing and as follows:

1. Use specified weep/vent products to form weep holes.
2. Use wicking material to form weep holes above flashing under brick sills. Turn wicking down at lip of sill to be as inconspicuous as possible.
3. Space weep holes 24 inches o.c. unless otherwise indicated.
4. Trim wicking material flush with outside face of wall after mortar has set.

E. Place pea gravel in cavities as soon as practical to a height equal to height of first course above top of flashing, but not less than 2 inches, to maintain drainage.

F. Place cavity drainage material in cavities to comply with configuration requirements for cavity drainage material in "Miscellaneous Masonry Accessories" Article.

G. Install vents in head joints in exterior wythes at spacing indicated. Use specified weep/vent products to form vents.

1. Close cavities off vertically and horizontally with blocking in manner indicated. Install through-wall flashing and weep holes above horizontal blocking.

3.10 FIELD QUALITY CONTROL

A. Testing and Inspecting: Owner will engage special inspectors to perform tests and inspections and prepare reports. Allow inspectors access to scaffolding and work areas, as needed to perform tests and inspections. Retesting of materials that fail to meet specified requirements shall be done at Contractor's expense.

B. Inspections: Level 1 special inspections according to the "International Building Code."

1. Begin masonry construction only after inspectors have verified proportions of site-prepared mortar.

C. Mortar Aggregate Ratio Test (Proportion Specification): For each mix provided, according to ASTM C 780.

3.11 REPAIRING, POINTING, AND CLEANING

A. Remove and replace masonry units that are loose, chipped, broken, stained, or otherwise damaged or that do not match adjoining units. Install new units to match adjoining units; install in fresh mortar, pointed to eliminate evidence of replacement.

B. Pointing: During the tooling of joints, enlarge voids and holes, except weep holes, and completely fill with mortar. Point up joints, including corners, openings, and adjacent construction, to provide a neat, uniform appearance. Prepare joints for sealant application, where indicated.

C. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.

D. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:

1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
2. Test cleaning methods on sample wall panel; leave one-half of panel uncleaned for comparison purposes. Obtain Architect's approval of sample cleaning before proceeding with cleaning of masonry.
3. Protect adjacent stone and nonmasonry surfaces from contact with cleaner by covering them with liquid strippable masking agent or polyethylene film and waterproof masking tape.
4. Wet wall surfaces with water before applying cleaners; remove cleaners promptly by rinsing surfaces thoroughly with clear water.
5. Clean brick by bucket-and-brush hand-cleaning method described in "BIA Technical Notes 20."
6. Clean concrete masonry by cleaning method indicated in NCMA TEK 8-2A applicable to type of stain on exposed surfaces.
7. Clean stone and pre-cast trim to comply with stone supplier's written instructions.
8. Clean limestone units to comply with recommendations in ILI's "Indiana Limestone Handbook."

3.12 MASONRY WASTE DISPOSAL

A. Salvageable Materials: Unless otherwise indicated, excess masonry materials are Contractor's property. At completion of unit masonry work, remove from Project site.

B. Excess Masonry Waste: Remove excess clean masonry waste that cannot be used as fill, as described above, and other masonry waste, and legally dispose of off Owner's property.

END OF SECTION 04813

DIVISION 05

SECTION 05120 - STRUCTURAL STEEL

PART 1 - GENERAL

1.1 SUMMARY

A. Scope: The work included in this section of the specifications includes all labor, materials, equipment, and services necessary for furnishing and installing structural and miscellaneous steel as indicated on the drawings and as herein specified.

B. This Section includes structural steel and architecturally exposed structural steel.

1.2 PERFORMANCE REQUIREMENTS

A. Structural performance: Engineer structural steel connections required by the Contract Documents to be selected or completed by the fabricator to withstand design loadings indicated.

B. Engineering Responsibility: Engage a fabricator who utilizes a qualified professional engineer to prepare calculations, Shop Drawings, and other structural data for structural steel connections.

C. All concrete reinforcing work shall conform to standards set forth in CRSI Manual of Standard Practice

1.3 SUBMITTALS

A. Product Data for each type of product specified.

B. Shop Drawings detailing fabrication of structural steel components.

1. Include details of cuts, connections, splices, camber, holes, and other pertinent data.
2. Indicate welds by standard AWS symbols, distinguishing between shop and field welds, and show size, length, and type of each weld.
3. Indicate type, size, and length of bolts, distinguishing between shop and field bolts. Identify high-strength bolted slip-critical, direct-tension, or tensioned shear/bearing connections.
4. Include Shop Drawings signed and sealed by a qualified professional engineer responsible for their preparation.
5. Structural steel, including chemical and physical properties.
6. Bolts, nuts, and washers, including mechanical properties and chemical analysis.
7. Shop primers.
8. Non-shrink grout.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: Engage an experienced Installer who has completed structural steel work similar in material, design, and extent to that indicated for this Project and with a record of successful in-service performance.

B. Fabricator Qualifications: Engage a firm experienced in fabricating structural steel similar to that indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to fabricate structural steel without delaying the Work.

C. Comply with applicable provisions of the following specifications and documents: AISC’S “Specification for Structural Steel Buildings - Allowable Stress Design and Plastic Design.”

D. Professional Engineer Qualifications: A professional engineer who is legally authorized to practice in the State of Louisiana and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for projects with structural steel framing that are similar to that indicated for this Project in material, design, and extent.

E. Welding Standards: Comply with applicable provisions of AWS D1.1 “Structural Welding Code - Steel.”

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver structural steel to Project site in such quantities and at such times to ensure continuity of installation.

B. Store materials to permit easy access for inspection and identification. Keep steel members off ground by using pallets, platforms, or other supports. Protect steel members and packaged materials from erosion and deterioration.

1. Store fasteners in a protected place. Clean and relubricate bolts and nuts that become dry or rusty before use.
2. Do not store materials on structure in a manner that might cause distortion or damage to members or supporting structures. Repair or replace damaged materials or structures as directed.

1.6 SEQUENCING

A. Supply anchorage items to be embedded in or attached to other construction without delaying the Work. Provide setting diagrams, templates, instructions, and directions as required, for installation.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Structural Steel Angles, Plates, and Bars: Carbon Steel - ASTM A 36 (ASTM A 36M).

B. Steel channels, S, M and HP shapes: ASTM A 572, Grade 50.

C. Steel W shapes: ASTM A 572 or ASTM A 992, Grade 50.

D. Cold-Formed Structural Steel Tubing: ASTM A 500, Grade B.

E. Steel Pipe: ASTM A 53, Type E or S, Grade B.

1. Weight Class: Standard

F. Anchor Rods, Bolts, Nuts, and Washers:

1. Anchor Bolts: ASTM A 307
2. Headed Bolts: ASTM A 325 (ASTM A325M), Type 1, heavy hex steel structural bolts and heavy hex carbon-steel nuts.
3. Washers: ASTM A 36 (ASTM A 36M).

2.2 PRIMER

A. Interior unexposed structural steel that is not to receive sprayed-on fireproofing shall receive one shop coat of paint in accordance with Steel Structures Painting Council's Painting System Guide No. 7.00 utilizing SSPC Paint 13 or Paint 15, Type I.

B. All exposed or visible structural steel not designated to be galvanized shall receive one or more coats of paint after fabrication in accordance with all requirements of the Steel Structures Painting Council's requirements for Zone 1A for interior steel or Zone 1B for exterior steel. All such paints shall be compatible with the finish coat as specified in Division 9.

C. No paint shall be placed within two (2) inches of any steel surface that is to be field welded (except for joist seats and beam flanges where joist seats are to be welded) nor on the top flange of any beams that receive shear studs.

D. Members shown on the drawings to be galvanized and any other exterior lintels or members not designated to be painted that are exposed or in contact with exterior masonry shall be galvanized after fabrication in accordance with ASTM A123 "Standard Specification for Zinc (Hot Galvanized) Coatings on Products Fabricated from Rolled Steel Shapes, Plates, Bars, and Strip", latest edition.

E. Any steel that is to receive sprayed-on fireproofing shall be uncoated.

F. Any surface coating that is damaged shall be touched up to provide full coverage and protection.

2.3 GROUT

A. Nonmetallic, Shrinkage-Resistant Grout: Premixed, nonmetallic, non-corrosive, non-staining grout containing selected silica sands, Portland cement, shrinkage compensating agents, plasticizing and water-reducing agents, complying with ASTM C 1107, of consistency suitable for application, and a 30-minute working time.

2.4 FABRICATION

A. Fabricate and assemble structural steel in shop to greatest extent possible. Fabricate structural steel according to AISC specifications referenced in this Section and in Shop Drawings.

1. Mark and match-mark materials for field assembly.
2. Fabricate for delivery a sequence that will expedite erection and minimize field handling of structural steel.
3. Complete structural steel assemblies, including welding of units, before starting shop-priming operations.
4. Comply with fabrication tolerance limits of AISC’s “Code of Standard Practice for Steel Buildings and Bridges” for structural steel.

B. Fabricate architecturally exposed structural steel with exposed surfaces smooth, square, and free of surface blemishes, including pitting, rust and scale seam marks, roller marks, rolled trade names, and roughness.

1. Remove blemishes by filling, grinding, or by welding and grinding, prior to cleaning, treating, and shop priming.
2. Comply with fabrication requirements, including tolerance limits, of AISC’s “Code of Standard Practice for Steel Buildings and Bridges” for architecturally exposed structural steel.

C. Thermal Cutting: Perform thermal cutting by machine to greatest extent possible.

1. Plane thermally cut edges to be welded.

D. Finishing: Accurately mill ends of columns and other members transmitting loads in bearing.

2.5 SHOP CONNECTIONS

A. Shop install and tighten high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

1. Bolts: ASTM A 325 (ASTM A 325N) high-strength bolts, unless otherwise indicated.
2. Connection Type: Snug tightened, unless indicated as slip-critical, direct-tension, or tensioned shear/bearing connections.

B. Weld Connections: Comply with AWS D1.1 for procedures, appearance and quality of welds, and methods used in correcting welding work.

1. Verify that weld sizes, fabrication sequence, and equipment used for architecturally exposed structural steel will limit distortions to allowable tolerances. Prevent surface bleeding of back-side welding on exposed steel surfaces. Grind smooth exposed fillet welds 1/2 inch (13 mm) and larger. Grind flush butt welds. Dress exposed welds.

2.6 SHOP PRIMING

A. Surface Preparation: Clean surfaces to be painted. Remove loose rust, loose mill scale, spatter, slag or flux deposits. Prepare surfaces according to SSPC Specifications as follows:

1. SSPC-SP3 "Power Tool Cleaning".

2.7 GALVANIZING

A. Items shown on the plans to be galvanized and bolts for same shall be hot-dipped zinc coated after fabrications. Galvanizing shall be done in accordance with ASTM Serial Designation A123. Any zinc coating that is damaged shall be touched up with Galvacon as manufactured by Southern Coatings in accordance with the manufacturer's recommendations.

2.8 SOURCE QUALITY CONTROL

A. Owner will engage an independent testing and inspecting agency to perform shop inspections and tests and to prepare test reports.

1. Testing agency will conduct and interpret tests and state in each report whether test specimens comply with or deviate from requirements.

B. Correct deficiencies in or remove and replace structural steel that inspections and test reports indicate do not comply with specified requirements.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Before erection proceeds, and with the steel erector present, verify elevations of concrete and masonry bearing surfaces and locations of anchorages for compliance with requirements.

B. Do not proceed with erection until unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Provide temporary shores, guys, braces, and other supports during erection to keep structural steel secure, plumb, and in alignment against temporary construction loads and loads equal in intensity to design loads. Remove temporary supports when permanent structural steel, connections, and bracing are in place, unless otherwise indicated.

1. Do not remove temporary shoring supporting composite deck construction until cast-in-place concrete has attained its design compressive strength.

3.3 ERECTION

A. Set structural steel accurately in locations and to elevations indicated and according to AISC specifications referenced in this Section.

1. Set base and bearing plates for structural members on wedges, shims, or setting nuts as required.
2. Tighten anchor bolts after supported members have been positioned and plumbed. Do not remove wedges or shims but, if protruding, cut off flush with edge of base or bearing plate prior to packing with grout.
3. Pack grout solidly between bearing surfaces and plates so no voids remain. Finish exposed surfaces, protect installed materials, and allow to cure.

B. Align and adjust various members forming part of complete frame or structure before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that will be in permanent contact. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.

1. Level and plumb individual members of structure.

C. Splice members only where indicated.

3.4 FIELD CONNECTIONS

A. Install and tighten high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

B. Weld Connections: Comply with AWS D1.1 for procedures, appearance and quality of welds, and methods used in correcting welding work.

3.5 QUALITY CONTROL

A. If applicable, the Contractor will engage an independent testing and inspection agency to inspect high-strength bolted connections and welded connections and to perform tests and prepare test reports.

1. Testing agency shall conduct and interpret tests, state in each report whether test specimens comply with requirements, and specifically state any deviations therefrom.
2. Provide access for testing agency to places where structural steel work is being fabricated or produced so that required inspection and testing can be accomplished.
3. Testing agency may inspect structural steel at plant before shipment.

B. Correct deficiencies in structural steel work that inspections and laboratory test reports have indicated to be not in compliance with requirements. Perform additional tests, at Contractor's expense, as necessary to reconfirm any noncompliance of original work and to show compliance of corrected work.

C. Shop-Bolted Connections: Inspect or test in accordance with AISC specifications.

1. Verify that gaps of installed Direct Tension Indicators are less than gaps specified in ASTM F 959, Table 2.

D. Shop Welding: Inspect and test during fabrication of structural steel assemblies, as follows:

1. Certify welders and conduct inspections and tests as required. Record types and locations of defects found in work. Record work required and performed to correct deficiencies.
2. Perform visual inspection of all welds.
3. Perform tests of welds as follows.

a. Ultrasonic Inspection: ASTM E 164.

E. Field-Bolted Connections: Inspect in accordance with AISC specifications.

F. Field Welding: Inspect and test during erection of structural steel as follows:

1. Certify welders and conduct inspections and tests as required. Record types and locations of defects found in work. Record work required and performed to correct deficiencies.
2. Perform visual inspection of all welds.

3. Perform tests of welds as follows:

a. Ultrasonic Inspection: ASTM E 164.

3.6 CLEANING

A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint. Apply paint to exposed areas using same material as used for shop painting.

1. Apply by brush or spray to provide a minimum dry film thickness of 1.5 mils.

END OF SECTION 05 12 00

SECTION 05210- STEEL JOIST FRAMING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. K-series steel joists.
2. K-series steel joist substitutes.
3. Joist accessories.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of joist, accessory, and product.

B. LEED Submittals:

1. Product Data for Credit MR 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.
2. Laboratory Test Reports for Credit EQ 4: For primers, documentation indicating that products comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

C. Shop Drawings:

1. Include layout, designation, number, type, location, and spacing of joists.
2. Include joining and anchorage details, bracing, bridging, and joist accessories; splice and connection locations and details; and attachments to other construction.

1.3 INFORMATIONAL SUBMITTALS

A. Welding certificates.

B. Manufacturer certificates.

C. Mill Certificates: For each type of bolt.

1.4 QUALITY ASSURANCE

A. Manufacturer Qualifications: A manufacturer certified by SJI to manufacture joists complying with applicable standard specifications and load tables in SJI's "Specifications."

1. Manufacturer's responsibilities include providing professional engineering services for designing special joists to comply with performance requirements.

B. Welding Qualifications: Qualify field-welding procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle joists as recommended in SJI's "Specifications."

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of pre-consumer recycled content not less than 25 percent.

2.2 K-SERIES STEEL JOISTS

A. Manufacture steel joists of type indicated according to "Standard Specifications for Open Web Steel Joists, K-Series" in SJI's "Specifications," with steel-angle top- and bottom-chord members, underslung ends, and parallel top chord.

B. Steel Joist Substitutes: Manufacture according to "Standard Specifications for Open Web Steel Joists, K-Series" in SJI's "Specifications," with steel-angle or -channel members.

2.3 LONG-SPAN STEEL JOISTS

A. Manufacture steel joists according to "Standard Specifications for Longspan Steel Joists, LH-Series and Deep Longspan Steel Joists, DLH-Series" in SJI's "Specifications," with steel-angle top- and bottom-chord members; of joist type and end and top-chord arrangements as indicated.

2.4 JOIST GIRDERS

A. Manufacture joist girders according to "Standard Specifications for Joist Girders" in SJI's "Specifications," with steel-angle top- and bottom-chord members; with end and top-chord arrangements as indicated.

2.5 PRIMERS

A. Low-Emitting Materials: Paints and coatings shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

B. Primer: SSPC-Paint 15, or manufacturer's standard shop primer complying with performance requirements in SSPC-Paint 15.

C. Primer: Provide shop primer that complies with Division 09 painting Sections.

2.6 JOIST ACCESSORIES

A. Bridging: Provide bridging anchors and number of rows of horizontal or diagonal bridging of material, size, and type required by SJI's "Specifications" for type of joist, chord size, spacing, and span. Furnish additional erection bridging if required for stability.

B. Bridging: Schematically indicated. Detail and fabricate according to SJI's "Specifications." Furnish additional erection bridging if required for stability.

C. Furnish ceiling extensions, either extended bottom-chord elements or a separate extension unit of enough strength to support ceiling construction. Extend ends to within 1/2 inch (13 mm) of finished wall surface unless otherwise indicated.

D. Carbon-Steel Bolts and Threaded Fasteners: ASTM A 307, Grade A (ASTM F 568M, Property Class 4.6), carbon-steel, hex-head bolts and threaded fasteners; carbon-steel nuts; and flat, unhardened steel washers.

1. Finish: Hot-dip zinc coating, ASTM A 153/A 153M, Class C.

E. High-Strength Bolts, Nuts, and Washers: ASTM A 325 (ASTM A 325M), Type 1, heavy hex steel structural bolts; ASTM A 563 (ASTM A 563M) heavy hex carbon-steel nuts; and ASTM F 436 (ASTM F 436M) hardened carbon-steel washers.

1. Finish: Hot-dip zinc coating, ASTM A 153/A 153M, Class C.

F. Furnish miscellaneous accessories including splice plates and bolts required by joist manufacturer to complete joist assembly.

2.7 CLEANING AND SHOP PAINTING

A. Clean and remove loose scale, heavy rust, and other foreign materials from fabricated joists and accessories.

B. Apply one coat of shop primer.

C. Shop priming of joists and joist accessories is specified in Division 09 painting Sections.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Do not install joists until supporting construction is in place and secured.

B. Install joists and accessories plumb, square, and true to line; securely fasten to supporting construction according to SJI's "Specifications," joist manufacturer's written recommendations, and requirements in this Section.

1. Before installation, splice joists delivered to Project site in more than one piece.
2. Space, adjust, and align joists accurately in location before permanently fastening.
3. Install temporary bracing and erection bridging, connections, and anchors to ensure that joists are stabilized during construction.

C. Field weld joists to supporting steel bearing plates and framework. Coordinate welding sequence and procedure with placement of joists. Comply with AWS requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.

D. Bolt joists to supporting steel framework using carbon-steel bolts.

E. Bolt joists to supporting steel framework using high-strength structural bolts. Comply with Research Council on Structural Connection's "Specification for Structural Joints Using ASTM A 325 or ASTM A 490 Bolts" for high-strength structural bolt installation and tightening requirements.

F. Install and connect bridging concurrently with joist erection, before construction loads are applied. Anchor ends of bridging lines at top and bottom chords if terminating at walls or beams.

3.2 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to inspect field welds and bolted connections and to perform field tests and inspections and prepare test and inspection reports.

END OF SECTION 05 21 0

SECTION 05400- COLD FORMED METAL FRAMING

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

A. This Section includes all materials, labor, equipment and other items required to provide cold formed structural metal framing elements listed below as shown on the Drawings. Types of elements include:

1. Load bearing studs.
2. All accessories needed for the above.

B. Related Requirements:
1. Division 9 " Non-Loading Bearing Steel Framing" for Z channels at exterior walls

1. 2 REFERENCES

A. AISI - Specifications for the Design of Cold-Formed Steel Structural Members.

1.3 QUALIFICATIONS

A. Installer: Company specializing in performing the work of this Section with minimum three years documented experience.

PART 2 - PRODUCTS

2.1 FRAMING MATERIALS

A. Steel: For 18 gage and lighter comply with ASTM A653, Grade 33, 33,000 psi minimum yield point. For 16 gage and heavier comply with ASTM A653, Grade 50, 50,000 psi minimum yield point.

2.2 FASTENERS

A. Self-drilling, Self-tapping screws in accordance with ASTM A90 or AISI 1019 galvanized.

B. Welding shall be in accordance with AWS D1.3.

2.3 ACCESSORIES

A. Bracing, Furring, Bridging: Formed sheet steel thickness determined for conditions encountered, manufacturer's standard shapes and same finish as framing members.

2.4 FABRICATION

A. Fabricate assemblies of framed sections to sizes and profiles required with framing members fitted, reinforced, and braced to suit design requirements.
B. All members shall be fabricated to within + or - 1/8" of the required length.

2.5 FINISHES

A. All studs, tracks, bridging and accessories shall be galvanized to G90 coating class meeting ASTM A525 and ASTM C955.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that conditions are ready to receive work.

B. Verify that rough-in utilities are in proper location.

3.2 ERECTION

A. Align and secure top and bottom tracks with a minimum of one #10 screw in each flange of every stud. The maximum gap between either end of any stud and the top or bottom track shall be 1/16".

B. At track joints, pieces of track shall be securely anchored to a common structural element, or fully spliced together.

C. Where multiple studs are required at window jambs, door jambs, or the sides of other openings they shall be attached to each other sufficiently to work as a unit to resist all loads from the opening.

D. All headers, sills, etc. shall be properly connected and supported at their ends to allow all vertical and lateral loads to be transferred to the supporting elements.

E. Jack studs or cripples shall be installed below window sills, above window and door heads, and elsewhere at the same spacing as wall studs. They shall be securely attached to supporting members.

F. Fit track under and above openings.

G. Stud splicing is not permissible

H. Bridging for studs shall be attached in a manner to prevent stud rotation. Bridging rows shall be spaced as recommended by the manufacturer of the system.

I. Unless shown otherwise on the drawings bridging for joists or rafters shall be manufacturer's standard placed as follows:

Span	Number of Rows
Up to 14 ft.	1
14 to 20 ft.	2
20 to 26 ft.	3

J. Coordinate erection of studs with requirements of door and window frames; install supports and attachments.

K. Construct corners using a minimum of three studs.

L. Coordinate installation of wood bucks, anchors, and wood blocking with electrical and mechanical work to be placed within or behind stud framing.

M. Where galvanized surfaces or components are damaged, repair in accordance with ASTM A780.

N. All bearing wall studs shall be adequately braced at all times during construction to prevent lateral buckling prior to placement of wall board, sheetrock, sheathing, plywood or other permanent finish material.

3.3 ERECTION TOLERANCES

A. Maximum Variation From True Position: 1/8 inch.

B. Maximum Variation of any Member from Plane: 1/8 inch.

C. Maximum Variation from Plumb: 1/8 inch.

END OF SECTION 05 40 0

SECTION 05501 – ARCHITECTURAL METAL FABRICATIONS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Miscellaneous steel framing and supports.
2. Shelf angles.
3. Metal ladders.
4. Structural-steel door frames.
5. Miscellaneous steel trim including steel angle corner guards, steel edgings and chair railsMetal bollards.
6. Steel Framing and supports for mechanical and electrical equipment
7. Steel Framing and supports for countertops
8. Steel Framing and supports for overhead doors
9. Steel Framing and supports for applications where framing and supports are not specified in other sections
10. Elevator pit sump covers
11. Elevator machine room beams, hoist beams, and divider beams
12. Steel shapes for supporting elevator door sills
13. Steel Framing for low partitions
14. Downspout guards.
15.
16. Steel pipe columns supporting wood frame construction and leveling plates

B. Loose bearing and leveling platesProducts furnished, but not installed, under this Section:

1. Loose steel lintels.
2. Anchor bolts, steel pipe sleeves, slotted-channel inserts, and wedge-type inserts indicated to be cast into concrete or built into unit masonry.
3. Steel weld plates and angles for casting into concrete specified in other Sections

1.2 PERFORMANCE REQUIREMENTS

A. Delegated Design: Design ladders, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

B. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes acting on exterior metal fabrications by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects.

1.3 SUBMITTALS

A. Product Data: For the following:
1. Paint products.
2. Grout.

B. Shop Drawings: Show fabrication and installation details for metal fabrications.

1. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items.

C. Delegated-Design Submittal: For installed products indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

PART 2 - PRODUCTS

2.1 METALS, GENERAL

A. Metal Surfaces, General: Provide materials with smooth, flat surfaces without blemishes.

2.2 FERROUS METALS

A. Recycled Content of Steel Products: Provide products with average recycled content of steel products so postconsumer recycled content plus one-half of preconsumer recycled content is not less than 25 percent.

B. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.

C. Stainless-Steel Bars and Shapes: ASTM A 276, Type 316L.

D. Rolled-Steel Floor Plate: ASTM A 786/A 786M, rolled from plate complying with ASTM A 36/A 36M or ASTM A 283/A 283M, Grade C or D.

E. Rolled-Stainless-Steel Floor Plate: ASTM A 793.

F. Steel Tubing: ASTM A 500, cold-formed steel tubing.

G. Steel Pipe: ASTM A 53/A 53M, standard weight (Schedule 40) unless otherwise indicated.

H. Cast Iron: Either gray iron, ASTM A 48/A 48M, or malleable iron, ASTM A 47/A 47M.

2.3 FASTENERS

A. General: Unless otherwise indicated, provide Type 304 Type 316 stainless-steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B 633 or ASTM F 1941, Class Fe/Zn 5, at exterior walls.

B. Cast-in-Place Anchors in Concrete: Either threaded type or wedge type unless otherwise indicated; galvanized ferrous castings, either ASTM A 47/A 47M malleable iron or ASTM A 27/A 27M cast steel. Provide bolts, washers, and shims as needed, all hot-dip galvanized per ASTM F 2329.

C. Post-Installed Anchors: Torque-controlled expansion anchors .

1. Material for Interior Locations: Carbon-steel components zinc plated to comply with ASTM B 633 or ASTM F 1941, Class Fe/Zn 5, unless otherwise indicated.
2. Material for Exterior Locations and Where Stainless Steel is Indicated: Alloy Group 1 stainless-steel bolts, ASTM F 593, and nuts, ASTM F 594.

2.4 MISCELLANEOUS MATERIALS

A. Shop Primers: Provide primers that comply with Division 9 Section "High-Performance Coatings."

B. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.

C. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.

D. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107. Provide grout specifically recommended by manufacturer for interior and exterior applications.

E. Concrete: Comply with requirements in Division 3 Section "Cast-in-Place Concrete" for normal-weight, air-entrained, concrete with a minimum 28-day compressive strength of 3000 psi.

2.5 FABRICATION, GENERAL

A. Shop Assembly: Preassemble items in the shop to greatest extent possible. Use connections that maintain structural value of joined pieces.

B. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges. Remove sharp or rough areas on exposed surfaces.

C. Weld corners and seams continuously to comply with the following:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. At exposed connections, finish exposed welds and surfaces smooth and blended.

D. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners or welds where possible. Locate joints where least conspicuous.

E. Fabricate seams and other connections that will be exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.

F. Where units are indicated to be cast into concrete or built into masonry, equip with integrally welded steel strap anchors not less than 24 inches o.c.

G. Cut, reinforce, drill and tap metal fabrications as indicated to receive finish hardware, screws and similar items

2.6 MISCELLANEOUS FRAMING AND SUPPORTS

A. General: Provide steel framing and supports not specified in other Sections as needed to complete the Work.

B. Fabricate units from steel shapes, plates, and bars of welded construction unless otherwise indicated. Fabricate to sizes, shapes, and profiles indicated and as necessary to receive adjacent construction.

2.7 SHELF ANGLES

A. Fabricate shelf angles from steel angles of sizes indicated and for attachment to concrete framing. Provide horizontally slotted holes to receive 3/4-inch (19-mm) bolts, spaced not more than 6 inches (150 mm) from ends and 24 inches (600 mm) o.c., unless otherwise indicated.

B. For cavity walls, provide vertical channel brackets to support angles from backup masonry and concrete.

C. Galvanize shelf angles located in exterior walls.

D. Prime shelf angles located in exterior walls with [zinc-rich primer.] [primer specified in Division 9 Section "High-Performance Coatings."]

E. Furnish wedge-type concrete inserts, complete with fasteners, to attach shelf angles to cast-in-place concrete.

2.8 METAL LADDERS

A. General:

1. Comply with ANSI A14.3 unless otherwise indicated.
2. For equipment platforms & elevator pit ladders, comply with ASME A17.1.

B. Steel Ladders:

1. Space siderails as indicated apart unless otherwise indicated.
2. Siderails: Continuous, steel flat bars, with eased edges. Sizes as indicated.
3. Rungs: steel bars. Sizes as indicated.
4. Fit rungs in centerline of siderails; plug-weld and grind smooth on outer rail faces.
5. Provide nonslip abrasive surfaces on top of each rung.
6. Galvanize ladders, including brackets and fasteners.
7. Prime ladders, including brackets and fasteners, with primer specified in Division 9 Section "High-Performance Coatings."

2.9 STRUCTURAL-STEEL DOOR FRAMES

A. Fabricate structural-steel door frames from steel shapes fully welded together, with 5/8-by-1-1/2-inch (16-by-38-mm) steel channel stops. Plug-weld built-up members and continuously weld exposed joints. Reinforce frames and drill and tap as necessary to accept finish hardware.

1. Provide with integrally welded steel strap anchors for securing door frames into adjoining concrete or masonry.

B. Galvanize steel frames.

C. Prime steel frames with primer specified in Division 9 Section "High-Performance Coatings."

2.10 MISCELLANEOUS STEEL TRIM

A. Unless otherwise indicated, fabricate units from steel shapes, plates, and bars of profiles shown with continuously welded joints and smooth exposed edges. Miter corners and use concealed field splices where possible.

B. Provide cutouts, fittings, and anchorages as needed to coordinate assembly and installation with other work.

C. Galvanize miscellaneous steel trim.

D. Prime miscellaneous steel trim with primer specified in Division 9 Section "High-Performance Coatings."

2.11 PIPE BOLLARDS

A. Products: Subject to compliance with requirements, provide the following

B. Basis-of-Design Product: Subject to compliance with requirements, provide Blue Ember Technologies, LLC MaxiForce Bollards line of products Model MFRN-RS2-N5, Sykesville, MD 21784, Tel 410-552-9888, Fax 410-552-9939, Website: http://www.maxiforcebollards.com or comparable product by one of the following:

1. BRP Enterprises, Inc.
2. Canterbury International.
3. Creative Pipe, Inc.
4. Dero Bike Rack Co.
5. DuMor Inc.
6. FairWeather Site Furnishings; Division of Leader Manufacturing, Inc.
7. Huntco Supply, LLC.
8. Keystone Ridge Designs, Inc.
9. L. A. Steelcraft.

C. Bollard Construction:

1. Pipe OD: Not less than 5 inches. Free from surface blemishes and defects where exposed to view in the finished installation:

   a. Steel Plate: A36, ASTM A36/A36M
   b. Steel Tube: A500, ASTM A500
   c. Fasteners: Series 300 Stainless Steel

2. Round
3. Style: Dome top with removable head
4. Overall Height: As indicated on the drawings

5. Overall Width: 5 inches
6. Overall Depth: As indicated .
7. Base: none
8. Accessories: Bolt on style head (non welded)
9. Installation Method: direct ground mount, concrete filled

D. Finish: Factory applied after surface imperfections removed and exposed faces of welded joints dressed smooth

1. Color: Yellow

2. Galvanized and Powder Coat Finish: Hot Dipped galvanized and powder coated

E. Metal Components: Form to required shapes and sizes with true, consistent curves, lines, and angles. Separate metals from dissimilar materials to prevent electrolytic action.

F. Exposed Surfaces: Polished, sanded, or otherwise finished; all surfaces smooth, free of burrs, barbs, splinters, and sharpness; all edges and ends rolled, rounded, or capped.

G. Factory Assembly: Assemble components in the factory to greatest extent possible to minimize field assembly. Clearly mark units for assembly in the field.

2.12 ELEVATOR PIT SUMP COVERS

A. Fabricate from 3/16-inch abrasive-surface floor plate with four 1-inch diameter holes for water drainage

B. Provide steel angle supports as needed

2.13 DOWNSPOUT GUARDS

A. Fabricate downspout guards from 3/8-inch- (9.5-mm-) thick by 12-inch- (300-mm-) wide steel plate, bent to fit flat against the wall or column at both ends and to fit around downspout with 2-inch (50-mm) clearance between downspout and guard. Drill each end for two 3/4-inch (19-mm) anchor bolts.

B. Lead coated copper downspout guards.

C. Prime downspout guards with primer specified in Section 09960 "High-Performance Coatings."

2.14 METAL DOWNSPOUT BOOTS

A. Provide downspout boots made from cast iron in heights indicated with inlets of size and shape to suit downspouts. Provide units with flanges and holes for countersunk anchor bolts.

1. Outlet: Vertical, to discharge into pipe and to subsurface drainage

B. Prime cast iron downspout boots with primer specified in Section 09960 "High-Performance Coatings."

C. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   1. J.R. Hoe & Sons, Inc.
   2. Neenah Foundry Company

2.15 STEEL WELD PLATES & ANGLES

A. Provide steel weld plates and angles not specified in other sections for items supported from concrete construction as needed to complete the work. Provide each unit with no fewer than two integrally welded steel strap anchors for embedding in concrete.

2.16 ABRASIVE METAL NOSINGS, TREADS, AND THRESHOLDS

A. Cast-Metal Units: nickel silver (leaded nickel bronze), with an integral-abrasive, as-cast finish.

   1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

      a. American Safety Tread Co., Inc.
      b. Balco Inc.
      c. Wooster Products Inc.

B. Extruded Units: Aluminumwith abrasive filler in an epoxy-resin binder.

   1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

      a. ACL Industries, Inc.
      b. American Safety Tread Co., Inc.
      c. Balco Inc.
      d. Wooster Products Inc.

   2. Provide ribbed units, with abrasive filler strips projecting 1/16 inch (1.5 mm) above aluminum extrusion.
   3. Provide solid-abrasive-type units without ribs.

C. Provide anchors for embedding units in concrete, either integral or applied to units, as standard with manufacturer.

D. Drill for mechanical anchors and countersink. Locate holes not more than 4 inches (100 mm) from ends and not more than 12 inches (300 mm) o.c.

E. Apply bituminous paint to concealed surfaces of cast-metal units.

F. Apply clear lacquer to concealed surfaces of extruded units.

2.17 LOOSE BEARING AND LEVELING PLATES

A. Provide loose bearing and leveling plates for steel items bearing on masonry or concrete construction. Drill plates to receive anchor bolts and for grouting.

2.18 LOOSE STEEL LINTELS

A. Fabricate loose steel lintels from steel angles and shapes of size indicated for openings and recesses in masonry walls and partitions at locations indicated.

B. Galvanize loose steel lintels located in exterior walls.

C. Prime loose steel lintels located in exterior walls with [zinc-rich primer.] [primer specified in Division 9 Section "High-Performance Coatings."]

2.19 STEEL WELD PLATES AND ANGLES

A. Provide steel weld plates and angles not specified in other Sections, for items supported from concrete construction as needed to complete the Work. Provide each unit with no fewer than two integrally welded steel strap anchors for embedding in concrete.

2.20 FINISHES, GENERAL

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Finish metal fabrications after assembly.

2.21 INSTALLING MISCELLANEOUS FRAMING AND SUPPORTS

A. General: Install framing and supports to comply with requirements of items being supported, including manufacturer’s written instructions and requirements indicated on shop drawings

B. Install pipe columns on concrete footings with grouted baseplates. Position and grout column baseplates as specified in “Installing Bearing and Leveling Plates” article.

2.22 STEEL AND IRON FINISHES

A. Galvanizing: Hot-dip galvanize items as indicated to comply with ASTM A 153/A 153M for steel and iron hardware and with ASTM A 123/A 123M for other steel and iron products.

B. Shop prime iron and steel items unless they are to be embedded in concrete, sprayed-on fireproofing, or masonry, or unless otherwise indicated.

1. Shop prime with universal shop primer unless primers specified in Division 9 Section "High-Performance Coatings" are indicated.

C. Preparation for Shop Priming: Prepare surfaces to comply with SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal fabrications. Set metal fabrications accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.

B. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.

C. Field Welding: Comply with the following requirements:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. At exposed connections, finish exposed welds and surfaces smooth and blended.

D. Fastening to In-Place Construction: Provide anchorage devices and fasteners where metal fabrications are required to be fastened to in-place construction.

E. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.

3.2 INSTALLING NOSING, TREADS, AND THRESHOLDS

A. Center nosings on tread widths unless otherwise indicated

B. For nosings embedded in concrete steps or curbs, align nosings flush with riser faces and level with tread surfaces

C. Seal thresholds exposed to exterior wall with elastomeric sealant complying with Section 07920 “Joint Sealants” to provide watertight installation

3.3 INSTALLING METAL BOLLARDS

A. Anchor bollards in concrete with pipe sleeves preset and anchored into concrete . Fill annular space around bollard solidly with nonshrink, nonmetallic grout.

B. Fill bollards solidly with concrete, mounding top surface to shed water.

3.4 INSTALLING BEARING AND LEVELING PLATES

A. Clean concrete and masonry bearing surfaces of bond-reducing materials, and roughen to improve bond to surfaces. Clean bottom surface of plates.

B. Set bearing and leveling plates on wedges, shims, or leveling nuts. After bearing members have been positioned and plumbed, tighten anchor bolts. Do not remove wedges or shims but, if protruding, cut off flush with edge of bearing plate before packing with grout.

C. Pack grout solidly between bearing surfaces and plates to ensure that no voids remain.

3.5 ADJUSTING AND CLEANING

A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas. Paint uncoated and abraded areas with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.

B. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780.

END OF SECTION 05500

SECTION 05511 - METAL STAIRS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Preassembled galvanized steel stairs with concrete-filled treads (Stair 2).
2. Monumental Stairs (Stair 1).
3. Steel tube railings attached to metal stairs.
4. Steel tube handrails attached to walls adjacent to metal stairs.

B. Related Sections:

1. Division 3 Section "Cast-in-Place Concrete" for concrete fill for stair treads and platforms.
2. Division 5 Section "Pipe and Tube Railings" for pipe and tube railings.
3. Division 9 Section "High Performance Coatings" for final finish of galvanized metal stairs.

1.3 PERFORMANCE REQUIREMENTS

A. Delegated Design: Design metal stairs, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

B. Structural Performance of Stairs: Metal stairs shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated.

1. Uniform Load: 100 lbf/sq. ft..
2. Concentrated Load: 300 lbf applied on an area of 4 sq. in..
3. Uniform and concentrated loads need not be assumed to act concurrently.
4. Stair Framing: Capable of withstanding stresses resulting from railing loads in addition to loads specified above.
5. Limit deflection of treads, platforms, and framing members to L/240 or 1/4 inch, whichever is less

C. Monumental Stairs:

1. General: In engineering monumental stair case to withstand structural loads indicated, determine allowable design stresses of materials based on the following:
   a. Hot formed structural steel: AISI “Specification for design of hot-formed steel structural members”
2. Structural performance of stairs: Design, engineer, fabricate and install monumental staircase to comply with NAAMM recommended live load of 100 pounds per square foot or alternatively 300 pound minimum concentrated load.
3. Structural performance of building: Provide engineering calculations of top and bottom moment connections to enable “Builder Engineer to properly design structural reinforcement for building to carry loads of monumental staircase structure.

D. Structural Performance of Railings: Railings shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated.

1. Handrails and Top Rails of Guards:

   a. Uniform load of 50 lbf/ ft. applied in any direction.
   b. Concentrated load of 200 lbf applied in any direction.
   c. Uniform and concentrated loads need not be assumed to act concurrently.

2. Infill of Guards:

   a. Concentrated load of 50 lbf applied horizontally on an area of 1 sq. ft..
   b. Infill load and other loads need not be assumed to act concurrently.

1.4 SUBMITTALS

A. Product Data: For metal stairs and the following:

1. Prefilled metal-pan stair treads.
2. Nonslip aggregates and nonslip-aggregate finishes.
3. Abrasive nosings.
4. Grout.

B. Shop Drawings (General): Include plans, elevations, sections, details, and attachments to other work.
   1. Monumental Stairs:
      a. Include setting drawings and directions for installation of anchor bolts and other anchorages to be installed to support stair structure.
      b. Include structural analysis data sealed and signed by the qualified professional engineer who was responsible for their preparation.

C. Samples for Initial Selection: For products involving selection of color, texture, or design.

D. Monumental Stairs: Samples for verification of each profile and pattern of fabricated metal and each type of metal finish required, prepared on metal of same thickness and alloy indicated for final unit of work.

E. Delegated-Design Submittal: For installed products indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

F. Qualification Data: For qualified professional engineer .

G. Welding certificates.

H. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers certifying that shop primers are compatible with topcoats.

I. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for stairs and railings.

1. Test railings according ASTM E 894 and ASTM E 935.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Fabricator of products.

B. NAAMM Stair Standard: Comply with "Recommended Voluntary Minimum Standards for Fixed Metal Stairs" in NAAMM AMP 510, "Metal Stairs Manual," for class of stair designated, unless more stringent requirements are indicated.

1. Preassembled Stairs: Commercial class.

C. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

D. Welding Qualifications: Qualify procedures and personnel according to the following:

1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
2. AWS D1.2 “Structural Welding Code – Aluminum”

E. Pre-installation Conference: Conduct conference at job site.
1. AWS D1.3, "Structural Welding Code - Sheet Steel."

1.6 COORDINATION

A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.

B. Coordinate installation of anchorages for metal stairs. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

C. Coordinate locations of hanger rods and struts with other work so that they will not encroach on required stair width and will be within the fire-resistance-rated stair enclosure.

1.7 PROJECT CONDITIONS

A. Field measurements: Where monumental staircase is indicated to fit other construction, check actual dimensions of other construction by accurate field measurement before fabrication; show recorded measurements on final shop drawings. Coordinate fabrication schedule with construction progress to avoid delaying the work

PART 2 - PRODUCTS

2.1 METALS, GENERAL

A. Metal Surfaces, General: Provide materials with smooth, flat surfaces unless otherwise indicated. For components exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.

2.2 FERROUS METALS

A. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.

B. Steel Tubing: ASTM A 500 (cold formed) or ASTM A 513.

C. Rolled-Steel Floor Plate: ASTM A 786/A 786M, rolled from plate complying with ASTM A 36/A 36M or ASTM A 283/A 283M, Grade C or D.

D. Galvanized-Steel Sheet: ASTM A 653/A 653M, G90 coating, structural steel, Grade 33, unless another grade is required by design loads.

2.3 NONFERROUS METALS

A. Aluminum Extrusions: ASTM B 221, Alloy 6063-T6.

B. Aluminum Castings: ASTM B 26/B 26M, Alloy 443.0-F.

2.4 ABRASIVE NOSINGS

A. Cast-Metal Units: Cast nickel silver, with an integral abrasive, as-cast finish consisting of aluminum oxide, silicon carbide, or a combination of both. Fabricate units in lengths necessary to accurately fit openings or conditions.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. American Safety Tread Co., Inc.
b. Balco Inc.
c. Barry Pattern & Foundry Co., Inc.
d. Granite State Casting Co.
e. Safe-T-Metal Company, Inc.
f. Wooster Products Inc.

2. Configuration: Cross-hatched units, 3 inches wide without lip.

B. Provide anchors for embedding units in concrete, either integral or applied to units, as standard with manufacturer.

C. Apply bituminous paint to concealed surfaces of cast-metal units set into concrete.

2.5 FASTENERS

A. General: Provide zinc-plated fasteners with coating complying with ASTM B 633 or ASTM F 1941, Class Fe/Zn 12 for exterior use, and Class Fe/Zn 5 where built into exterior walls. Select fasteners for type, grade, and class required.

B. Bolts and Nuts: Regular hexagon-head bolts, ASTM A 307, Grade A; with hex nuts, ASTM A 563; and, where indicated, flat washers.

C. Anchor Bolts: ASTM F 1554, Grade 36, of dimensions indicated; with nuts, ASTM A 563; and, where indicated, flat washers.

1. Provide mechanically deposited or hot-dip, zinc-coated anchor bolts.

D. Machine Screws: ASME B18.6.3.

E. Lag Screws: ASME B18.2.1.

F. Plain Washers: Round, ASME B18.22.1.

G. Lock Washers: Helical, spring type, ASME B18.21.1.

H. Post-Installed Anchors: Torque-controlled expansion anchors or chemical anchors capable of sustaining, without failure, a load equal to six times the load imposed when

installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing according to ASTM E 488, conducted by a qualified independent testing agency.

1. Material : Alloy Group 2 stainless-steel bolts, ASTM F 593, and nuts, ASTM F 594.

2.6 MISCELLANEOUS MATERIALS

A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.

B. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.

C. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107. Provide grout specifically recommended by manufacturer for interior and exterior applications.

D. Concrete Materials and Properties: Comply with requirements in Division 3 Section "Cast-in-Place Concrete" for normal-weight, air-entrained, ready-mix concrete with a minimum 28-day compressive strength of 3000 psi unless otherwise indicated.

E. Nonslip-Aggregate Concrete Finish: Factory-packaged abrasive aggregate made from fused, aluminum-oxide grits or crushed emery; rustproof and nonglazing; unaffected by freezing, moisture, or cleaning materials.

F. Welded Wire Fabric: ASTM A 185/A 185M, 6 by 6 inches, W1.4 by W1.4, unless otherwise indicated.

2.7 FABRICATION, GENERAL

A. Provide complete stair assemblies, including metal framing, hangers, struts, railings, clips, brackets, bearing plates, and other components necessary to support and anchor stairs and platforms on supporting structure.

1. Join components by welding unless otherwise indicated.
2. Use connections that maintain structural value of joined pieces.
3. Fabricate treads and platforms of exterior stairs so finished walking surfaces slope to drain.

B. Preassembled Stairs: Assemble stairs in shop to greatest extent possible. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation.

C. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.

D. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.

E. Form exposed work with accurate angles and surfaces and straight edges.

F. Weld connections to comply with the following:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. Weld exposed corners and seams continuously unless otherwise indicated.
5. At exposed connections, finish exposed welds to comply with NOMMA's "Voluntary Joint Finish Standards" for Type 2 welds: completely sanded joint, some undercutting and pinholes okay .

G. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners where possible. Where exposed fasteners are required, use Phillips flat-head (countersunk) screws or bolts unless otherwise indicated. Locate joints where least conspicuous.

H. Fabricate joints that will be exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.

I. Monumental Stairs
   a. Form structural members and stair pans to require shapes and size, with true curves, lines, and angles. Provide components in sizes and profiles indicated, but not less than required to comply with requirements indicated for structural performance.
   b. Provide necessary lugs and brackets to assemble units and to attach to other work.
   c. Comply with AWS for recommended practices in shop and field welding.
   d. Assemble items in shop to the greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for assembly and coordinate installation. Use connections and connecting welds that maintain structural value of joined pieces.

2.8 STEEL-FRAMED STAIRS (Stair 2)

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Lapeyre Stair.
2. Alfab, Inc.
3. American Stair, Inc.
4. Sharon Companies Ltd. (The).

B. Stair Framing:

1. Fabricate stringers of steel plates or channels .

   a. Provide closures for exposed ends of channel stringers.

2. Construct platforms of steel plate or channel headers and miscellaneous framing members as needed to comply with performance requirements .
3. Weld stringers to headers; weld framing members to stringers and headers.
4. Where stairs are enclosed by gypsum board shaft-wall assemblies, provide hanger rods or struts to support landings from floor construction above or below. Locate hanger rods and struts where they will not encroach on required stair width and will be within the fire-resistance-rated stair enclosure.
5. Where masonry walls support metal stairs, provide temporary supporting struts designed for erecting steel stair components before installing masonry.

C. Metal-Pan Stairs: Form risers, subtread pans, and subplatforms to configurations shown from steel sheet of thickness needed to comply with performance requirements but not less than 0.067 inch .
1. Steel Sheet: Galvanized-steel sheet.
2. Directly weld metal pans to stringers; locate welds on top of subtreads where they will be concealed by concrete fill. Do not weld risers to stringers.
3. Attach risers and subtreads to stringers with brackets made of steel angles or bars. Weld brackets to stringers and attach metal pans to brackets by welding, riveting, or bolting.
4. Shape metal pans to include nosing integral with riser.
5. Attach abrasive nosings to risers.
6. At Contractor's option, provide stair assemblies with metal-pan subtreads filled with reinforced concrete during fabrication.

   Smooth Soffit Construction: Construct subplatforms with flat metal under surfaces to produce smooth soffits.

2.9 MONUMENTAL STAIRS (Stair 1)

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the work include, but are not limited to the following:
1. Big D Metalworks of Texas
2. Couturier Iron Craft

2.10 STAIR RAILINGS

A. Comply with applicable requirements in Division 5 Section "Pipe and Tube Railings ."

1. Fabricate newels of square steel tubing and provide newel caps of pressed steel , as shown.

2. Rails may be bent at corners, rail returns, and wall returns, instead of using prefabricated fittings.
3. Connect posts to stair framing by direct welding unless otherwise indicated.

B. Welded Connections: Fabricate railings with welded connections. Cope components at connections to provide close fit, or use fittings designed for this purpose. Weld all around at connections, including at fittings.

1. Finish welds to comply with NOMMA's "Voluntary Joint Finish Standards" for Type 2 welds: completely sanded joint, some undercutting and pinholes okay .

C. Form changes in direction of railings as follows:
1. By radius bends of radius indicated.

D. Form simple and compound curves by bending members in jigs to produce uniform curvature for each repetitive configuration required; maintain cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of components.

E. Close exposed ends of railing members with prefabricated end fittings.

F. Provide wall returns at ends of wall-mounted handrails unless otherwise indicated. Close ends of returns unless clearance between end of rail and wall is 1/4 inch or less.

G. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, end closures, flanges, miscellaneous fittings, and anchors for interconnecting components and for attaching to other work. Furnish inserts and other anchorage devices for connecting to concrete or masonry work.

1. Connect posts to stair framing by direct welding unless otherwise indicated.
2. For galvanized railings, provide galvanized fittings, brackets, fasteners, sleeves, and other ferrous-metal components.

H. Fillers: Provide fillers made from steel plate, or other suitably crush-resistant material, where needed to transfer wall bracket loads through wall finishes to structural supports. Size fillers to suit wall finish thicknesses and to produce adequate bearing area to prevent bracket rotation and overstressing of substrate.

2.11 FINISHES

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Finish metal stairs after assembly.

C. Galvanizing: Hot-dip galvanize to comply with ASTM A 153/A 153M for steel and iron hardware and with ASTM A 123/A 123M for other steel and iron products.

1. Do not quench or apply post galvanizing treatments that might interfere with paint adhesion.
2. Fill vent and drain holes that will be exposed in finished Work, unless indicated to remain as weep holes, by plugging with zinc solder and filing off smooth.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing metal stairs to in-place construction. Include threaded fasteners for concrete and masonry inserts, through-bolts, lag bolts, and other connectors.

B. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal stairs. Set units accurately in location, alignment, and elevation, measured from established lines and levels and free of rack.

C. Install metal stairs by welding stair framing to steel structure or to weld plates cast into concrete unless otherwise indicated.

D. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.

E. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.

F. Field Welding: Comply with requirements for welding in "Fabrication, General" Article.

G. Place and finish concrete fill for treads and platforms to comply with Division 3 Section "Cast-in-Place Concrete."

1. Install abrasive nosings with anchors fully embedded in concrete. Center nosings on tread width.

H. Install precast concrete treads with adhesive supplied by manufacturer.

3.2 INSTALLING METAL STAIRS WITH GROUTED BASEPLATES

A. Clean concrete and masonry bearing surfaces of bond-reducing materials, and roughen to improve bond to surfaces. Clean bottom surface of baseplates.

B. Set steel stair baseplates on wedges, shims, or leveling nuts. After stairs have been positioned and aligned, tighten anchor bolts. Do not remove wedges or shims but, if protruding, cut off flush with edge of bearing plate before packing with grout.

1. Use nonmetallic, nonshrink grout unless otherwise indicated.
2. Pack grout solidly between bearing surfaces and plates to ensure that no voids remain.

3.3 INSTALLING RAILINGS

A. Adjust railing systems before anchoring to ensure matching alignment at abutting joints. Space posts at spacing indicated or, if not indicated, as required by design loads. Plumb posts in each direction. Secure posts and rail ends to building construction as follows:

1. Anchor posts to steel by welding directly to steel supporting members.
2. Anchor handrail ends to concrete and masonry with steel round flanges welded to rail ends and anchored with postinstalled anchors and bolts.

B. Attach handrails to wall with wall brackets. Use type of bracket with flange tapped for concealed anchorage to threaded hanger bolt . Provide bracket with 1-1/2-inch clearance from inside face of handrail and finished wall surface. Locate brackets as indicated or, if not indicated, at spacing required to support structural loads. Secure wall brackets to building construction as required to comply with performance requirements.

3.4 ADJUSTING AND CLEANING

A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.

1. Apply by brush or spray to provide a minimum 2.0-mil dry film thickness.

B. Touchup Painting: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint are specified in Division 9 painting Sections and Division 9 Section "High-Performance Coatings."

C. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780.

END OF SECTION 05511

SECTION 05521 - PIPE AND TUBE RAILINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Steel pipe and tube railings.
2. Aluminum pipe and tube railings at exterior stairs and ramps
3. Stainless-steel pipe and tube railings at Stair 1

1.3 PERFORMANCE REQUIREMENTS

A. General: In engineering railings to withstand structural loads indicated, determine allowable design working stresses of railing materials based on the following:

1. Steel: 72 percent of minimum yield strength.

B. Structural Performance: Railings shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:

1. Handrails and Top Rails of Guards:

a. Uniform load of 50 lbf/ ft. (0.73 kN/m) applied in any direction.
b. Concentrated load of 200 lbf (0.89 kN) applied in any direction.
c. Uniform and concentrated loads need not be assumed to act concurrently.

2. Infill of Guards:

a. Concentrated load of 50 lbf (0.22 kN) applied horizontally on an area of 1 sq. ft. (0.093 sq. m).
b. Infill load and other loads need not be assumed to act concurrently.

C. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes acting on exterior metal fabrications by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects.

1. Temperature Change: 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

D. Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.

1.4 ACTION SUBMITTALS

A. Product Data: For the following:

1. Manufacturer's product lines of mechanically connected railings.
2. Railing brackets.
3. Grout, anchoring cement, and paint products.

B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.

C. Samples for Initial Selection: For products involving selection of color, texture, or design**,** .

D. Samples for Verification: For each type of exposed finish required.

1. Sections of each distinctly different linear railing member, including handrails, top rails, posts, and balusters.
2. Fittings and brackets.
3. Architectural mesh section.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified professional engineer.

B. Welding certificates.

C. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers certifying that shop primers are compatible with topcoats.

D. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, according to ASTM E 894 and ASTM E 935.

1.6 QUALITY ASSURANCE

A. Source Limitations: Obtain each type of railing from single source from single manufacturer.

B. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

C. Welding Qualifications: Qualify procedures and personnel according to the following:

1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
2. AWS D1.2/D1.2M, "Structural Welding Code - Aluminum."
3. AWS D1.6, "Structural Welding Code - Stainless Steel."

1.7 PROJECT CONDITIONS

A. Field Measurements: Verify actual locations of walls and other construction contiguous with metal fabrications by field measurements before fabrication.

1.8 COORDINATION AND SCHEDULING

A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.

B. Coordinate installation of anchorages for railings. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

C. Schedule installation so wall attachments are made only to completed walls. Do not support railings temporarily by any means that do not satisfy structural performance requirements.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Steel Pipe and Tube Railings:

   a. Pisor Industries, Inc.
   b. Wagner, R & B, Inc.; a division of the Wagner Companies.
   c. HDI.

2. Aluminum Pipe and Tube Railings:

   a. ATR Technologies, Inc.
   b. Hollaender Manufacturing Company.
   c. Tri Tech, Inc.

3. Aluminum Mesh:
   a. McNichols Co.
   b. Viva Railing Systems

4. Stainless-Steel Pipe and Tube Railings:

   a. Blum, Julius & Co., Inc.
   b. HDI

c. Stainless Fabricators, Inc.
d. Wagner, R & B, Inc.; a division of the Wagner Companies.
e. Tri Tech, Inc.

2.2 METALS, GENERAL

A. Metal Surfaces, General: Provide materials with smooth surfaces, without seam marks, roller marks, rolled trade names, stains, discolorations, or blemishes.

B. Brackets, Flanges, and Anchors: Cast or formed metal of same type of material and finish as supported rails unless otherwise indicated.

2.3 STEEL AND IRON

A. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.

B. Tubing: ASTM A 500 (cold formed) .

C. Pipe: ASTM A 53/A 53M, Type F or Type S, Grade A, Standard Weight (Schedule 40), unless another grade and weight are required by structural loads.

D. Plates, Shapes, and Bars: ASTM A 36/A 36M.

E. Expanded Metal: ASTM F 1267, Type II (expanded and flattened), Class 1 (uncoated).

1. Style Designation: 3/4 number 13 .

2.4 ALUMINUM

A. Aluminum, General: Provide alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated, and with not less than the strength and durability properties of alloy and temper designated below for each aluminum form required.

B. Extruded Bars and Tubing: ASTM B 221 (ASTM B 221M), Alloy 6063-T5/T52.

C. Plate and Sheet: ASTM B 209 (ASTM B 209M), Alloy 6061-T6.

D. Die and Hand Forgings: ASTM B 247 (ASTM B 247M), Alloy 6061-T6.

E. Castings: ASTM B 26/B 26M, Alloy A356.0-T6.

F. Woven-Wire Mesh: Intermediate-crimp, square pattern, 2-inch (50-mm) woven-wire mesh, made from 0.162-inch (4.1-mm) nominal diameter wire complying with ASTM B 211 (ASTM B 211M), Alloy 6061-T94.

2.5 STAINLESS STEEL

A. Tubing: ASTM A 554, **Grade MT 316L**

B. Pipe: ASTM A 312/A 312M, **Grade TP 316L**.

C. Castings: ASTM A 743/A 743M, [**Grade CF 8 or CF 20**] [**Grade CF 8M or CF 3M**].

D. Plate and Sheet: ASTM A 240/A 240M or ASTM A 666, **Type 316L**.

2.6 FASTENERS

A. General: Provide the following:

1. Ungalvanized-Steel Railings: Plated steel fasteners complying with ASTM B 633 or ASTM F 1941 (ASTM F 1941M), Class Fe/Zn 5 for zinc coating.
2. Hot-Dip Galvanized Railings: Type 304 stainless-steel or hot-dip zinc-coated steel fasteners complying with ASTM A 153/A 153M or ASTM F 2329 for zinc coating.
3. Aluminum Railings: Type 316 stainless-steel fasteners.
4. Stainless-Steel Railings: Type 316 stainless-steel fasteners.

B. Fasteners for Anchoring Railings to Other Construction: Select fasteners of type, grade, and class required to produce connections suitable for anchoring railings to other types of construction indicated and capable of withstanding design loads.

C. Fasteners for Interconnecting Railing Components:

1. Provide concealed fasteners for interconnecting railing components and for attaching them to other work, unless otherwise indicated.
2. Provide tamper-resistant flat-head machine screws for exposed fasteners unless otherwise indicated.

D. Post-Installed Anchors: Torque-controlled expansion anchors capable of sustaining, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing according to ASTM E 488, conducted by a qualified independent testing agency.
1. Material for Exterior Locations and Where Stainless Steel is Indicated: Alloy Group 1 (A1) stainless-steel bolts, ASTM F 593 (ASTM F 738M), and nuts, ASTM F 594 (ASTM F 836M).

2.7 MISCELLANEOUS MATERIALS

A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.

1. For aluminum and stainless-steel railings, provide type and alloy as recommended by producer of metal to be welded and as required for color match, strength, and compatibility in fabricated items.

B.

C. Universal Shop Primer: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI#79 and compatible with topcoat.

1. Use primer containing pigments that make it easily distinguishable from zinc-rich primer.

D. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107. Provide grout specifically recommended by manufacturer for interior and exterior applications.

E. Anchoring Cement: Factory-packaged, nonshrink, nonstaining, hydraulic-controlled expansion cement formulation for mixing with water at Project site to create pourable anchoring, patching, and grouting compound.

1. Water-Resistant Product: At exterior locations provide formulation that is resistant to erosion from water exposure without needing protection by a sealer or waterproof coating and that is recommended by manufacturer for exterior use.

2.8 FABRICATION

A. General: Fabricate railings to comply with requirements indicated for design, dimensions, member sizes and spacing, details, finish, and anchorage, but not less than that required to support structural loads.

B. Assemble railings in the shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation. Use connections that maintain structural value of joined pieces.

C. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch (1 mm) unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.

D. Form work true to line and level with accurate angles and surfaces.

E. Fabricate connections that will be exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.

F. Cut, reinforce, drill, and tap as indicated to receive finish hardware, screws, and similar items.

G. Connections: Fabricate railings with welded connections unless otherwise indicated.

H. Welded Connections: Cope components at connections to provide close fit, or use fittings designed for this purpose. Weld all around at connections, including at fittings.

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove flux immediately.
4. At exposed connections, finish exposed surfaces smooth and blended so no roughness shows after finishing and welded surface matches contours of adjoining surfaces.

I. Welded Connections for Aluminum Pipe: Fabricate railings to interconnect members with concealed internal welds that eliminate surface grinding, using manufacturer's standard system of sleeve and socket fittings.

J. Nonwelded Connections: Connect members with concealed mechanical fasteners and fittings. Fabricate members and fittings to produce flush, smooth, rigid, hairline joints.

1. Fabricate splice joints for field connection using an epoxy structural adhesive if this is manufacturer's standard splicing method.

K. Form changes in direction as follows:

1. As detailed.

L. Bend members in jigs to produce uniform curvature for each configuration required; maintain cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of components.

M. Close exposed ends of railing members with prefabricated end fittings.

N. Provide wall returns at ends of wall-mounted handrails unless otherwise indicated. Close ends of returns unless clearance between end of rail and wall is 1/4 inch (6 mm) or less.

O. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, flanges, miscellaneous fittings, and anchors to interconnect railing members to other work unless otherwise indicated.

1. At brackets and fittings fastened to plaster or gypsum board partitions, provide crush-resistant fillers, or other means to transfer loads through wall finishes to structural supports and prevent bracket or fitting rotation and crushing of substrate.

P. Provide inserts and other anchorage devices for connecting railings to concrete or masonry work. Fabricate anchorage devices capable of withstanding loads imposed by railings. Coordinate anchorage devices with supporting structure.

Q. For railing posts set in concrete, provide steel sleeves not less than 6 inches (150 mm) long with inside dimensions not less than 1/2 inch (13 mm) greater than outside dimensions of post, with metal plate forming bottom closure.

R. Woven-Wire Mesh Infill Panels: Fabricate infill panels from woven-wire mesh crimped into 1-by-1/2-by-1/8-inch (25-by-13-by-3-mm) metal channel frames. Make wire mesh and frames from same metal as railings in which they are installed.

1. Orient wire mesh with wires perpendicular and parallel to top rail.

2.9 FINISHES, GENERAL

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

C. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

D. Provide exposed fasteners with finish matching appearance, including color and texture, of railings.

2.10 STEEL AND IRON FINISHES

A. Galvanized Railings:

1. Hot-dip galvanize exterior steel and iron railings, including hardware, after fabrication.
2. Hot-dip galvanize indicated steel and iron railings, including hardware, after fabrication.
3. Comply with ASTM A 123/A 123M for hot-dip galvanized railings.
4. Comply with ASTM A 153/A 153M for hot-dip galvanized hardware.
5. Do not quench or apply post galvanizing treatments that might interfere with paint adhesion.
6. Fill vent and drain holes that will be exposed in the finished Work, unless indicated to remain as weep holes, by plugging with zinc solder and filing off smooth.

B. For galvanized railings, provide hot-dip galvanized fittings, brackets, fasteners, sleeves, and other ferrous components.

C. Preparing Galvanized Railings for Shop Priming: After galvanizing, thoroughly clean railings of grease, dirt, oil, flux, and other foreign matter, and treat with etching cleaner.

D. Primer Application: Apply shop primer to prepared surfaces of railings unless otherwise indicated. Comply with requirements in SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting. Primer need not be applied to surfaces to be embedded in concrete or masonry.

1. Shop prime uncoated railings with universal shop primer unless indicated.
2. Do not apply primer to galvanized surfaces.

E. Shop-Painted Finish: Comply with Section 09911 "Exterior Painting." Section 09960 "High-Performance Coatings."

1. Color: As selected by Architect from manufacturer's full range.

2.11 ALUMINUM FINISHES

A. Mechanical Finish: AA-M12 (Mechanical Finish: nonspecular as fabricated).

B. Clear Anodic Finish: AAMA 611, AA-M12C22A41, Class I, 0.018 mm or thicker.

2.12 STAINLESS-STEEL FINISHES

A. Remove tool and die marks and stretch lines, or blend into finish.

B. Grind and polish surfaces to produce uniform, directionally textured, polished finish indicated, free of cross scratches. Run grain with long dimension of each piece.

C. 180-Grit Polished Finish: Oil-ground, uniform, directionally textured finish.

D. 320-Grit Polished Finish: Oil-ground, uniform, fine, directionally textured finish.

E. Polished and Buffed Finish: Oil-ground, 180-grit finish followed by buffing.

F. Directional Satin Finish: No. 4.

G. Dull Satin Finish: No. 6.

H. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine plaster and gypsum board assemblies, where reinforced to receive anchors, to verify that locations of concealed reinforcements have been clearly marked for Installer. Locate reinforcements and mark locations if not already done.

3.2 INSTALLATION, GENERAL

A. Fit exposed connections together to form tight, hairline joints.

B. Perform cutting, drilling, and fitting required for installing railings. Set railings accurately in location, alignment, and elevation; measured from established lines and levels and free of rack.

1. Do not weld, cut, or abrade surfaces of railing components that have been coated or finished after fabrication and that are intended for field connection by mechanical or other means without further cutting or fitting.
2. Set posts plumb within a tolerance of 1/16 inch in 3 feet (2 mm in 1 m).
3. Align rails so variations from level for horizontal members and variations from parallel with rake of steps and ramps for sloping members do not exceed 1/4 inch in 12 feet (5 mm in 3 m).

C. Corrosion Protection: Coat concealed surfaces of aluminum that will be in contact with grout, concrete, masonry, wood, or dissimilar metals, with a heavy coat of bituminous paint.

D. Adjust railings before anchoring to ensure matching alignment at abutting joints.

E. Fastening to In-Place Construction: Use anchorage devices and fasteners where necessary for securing railings and for properly transferring loads to in-place construction.

3.3 RAILING CONNECTIONS

A. Welded Connections: Use fully welded joints for permanently connecting railing components. Comply with requirements for welded connections in "Fabrication" Article whether welding is performed in the shop or in the field.

3.4 ANCHORING POSTS

A. Use metal sleeves preset and anchored into concrete for installing posts. After posts have been inserted into sleeves, fill annular space between post and sleeve with nonshrink, nonmetallic grout or anchoring cement, mixed and placed to comply with anchoring material manufacturer's written instructions.

B. Cover anchorage joint with flange of same metal as post, welded to post after placing anchoring material.

C. Anchor posts to metal surfaces with oval flanges, angle type, or floor type as required by conditions, connected to posts and to metal supporting members as follows:

1. For aluminum pipe railings, attach posts using fittings designed and engineered for this purpose.
2. For stainless-steel pipe railings, weld flanges to post and bolt to supporting surfaces.

3.5 ATTACHING RAILINGS

A. Attach railings to wall with wall brackets. Provide brackets with clearance from inside face of handrail and finished wall surface. Distance from wall to handrail to be determined by architect. Locate brackets as indicated or, if not indicated, at spacing required to support structural loads.

1. Use type of bracket with flange tapped for concealed anchorage to threaded hanger bolt.

2. For concrete and solid masonry anchorage, use drilled-in expansion shields and hanger or lag bolts.
3. For hollow masonry anchorage, use toggle bolts.

3.6 ADJUSTING AND CLEANING

A. Clean aluminum and stainless steel by washing thoroughly with clean water and soap and rinsing with clean water.

B. Touchup Painting: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint are specified in Section 09911 "Exterior Painting" and Section 09912 "Interior Painting."

3.7 PROTECTION

A. Protect finishes of railings from damage during construction period with temporary protective coverings approved by railing manufacturer. Remove protective coverings at time of Substantial Completion.

END OF SECTION 05521

SECTION 05530 - METAL GRATINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Metal bar gratings at Roof Equipment Platforms
2. Metal frames and supports for gratings.

B. Related Sections:

1. Section 051200 "Structural Steel Framing" for structural-steel framing system components.
2. Section 05511 "Metal Stairs" for grating treads and landings of steel-framed stairs.
3. Section 05521 "Pipe and Tube Railings" for metal pipe and tube handrails and railings.

1.3 PERFORMANCE REQUIREMENTS

A. Delegated Design: Design gratings, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

B. Structural Performance: Gratings shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated.

1. Walkways and Elevated Platforms Other Than Exits: Uniform load of 60 lbf/sq. ft. (2.87 kN/sq. m).
   a. Limit deflection to L/240 or 1/4 inch (6.4 mm), whichever is less.
2. Walkways and Elevated Platforms Used as Exits: Uniform load of 100 lbf/sq. ft. (4.79 kN/sq. m).
   a. Limit deflection to L/360 or 1/4 inch (6.4 mm), whichever is less.

1.4 ACTION SUBMITTALS

A. Product Data: For the following:

1. Formed-metal plank gratings.
2. Clips and anchorage devices for gratings.
3. Paint products.

B. Shop Drawings: Include plans, sections, details, and attachments to other work.

C. Delegated-Design Submittal: For installed products indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified professional engineer.

B. Mill Certificates: Signed by manufacturers of stainless-steel sheet certifying that products furnished comply with requirements.

C. Welding certificates.

D. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers certifying that shop primers are compatible with topcoats.

1.6 QUALITY ASSURANCE

A. Metal Bar Grating Standards: Comply with NAAMM MBG 531, "Metal Bar Grating Manual ."

B. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

C. Welding Qualifications: Qualify procedures and personnel according to the following:

1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
2. AWS D1.3, "Structural Welding Code - Sheet Steel."

1.7 PROJECT CONDITIONS

A. Field Measurements: Verify actual locations of walls and other construction contiguous with gratings by field measurements before fabrication.

1.8 COORDINATION

A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.

B. Coordinate installation of anchorages for gratings, grating frames, and supports. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

PART 2 - PRODUCTS

2.1 FERROUS METALS

A. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.

B. Steel Bars for Bar Gratings: ASTM A 36/A 36M or steel strip, ASTM A 1011/A 1011M or ASTM A 1018/A 1018M.

C. Wire Rod for Bar Grating Crossbars: ASTM A 510 (ASTM A 510M).

D. Galvanized-Steel Sheet: ASTM A 653/A 653M, structural quality, Grade 33 (Grade 230), with G90 (Z275) coating.

2.2 FASTENERS

A. General: Select fasteners for type, grade, and class required.

B. Steel Bolts and Nuts: Regular hexagon-head bolts, ASTM A 307, Grade A (ASTM F 568M, Property Class 4.6); with hex nuts, ASTM A 563 (ASTM A 563M); and, where indicated, flat washers.

C. Anchor Bolts: ASTM F 1554, Grade 36, of dimensions indicated; with nuts, ASTM A 563 (ASTM A 563M); and, where indicated, flat washers.

1. Hot-dip galvanize or provide mechanically deposited, zinc coating where item being fastened is indicated to be galvanized.

D. Plain Washers: Round, ASME B18.22.1 (ASME B18.22M).

E. Lock Washers: Helical, spring type, ASME B18.21.1 (ASME B18.21.2M).

F. Post-Installed Anchors: Torque-controlled expansion anchors or chemical anchors capable of sustaining, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing according to ASTM E 488, conducted by a qualified independent testing agency.

1. Material for Exterior Locations and Where Stainless Steel is Indicated: Alloy Group 2 (A4) stainless-steel bolts, ASTM F 593 (ASTM F 738M), and nuts, ASTM F 594 (ASTM F 836M).

2.3 MISCELLANEOUS MATERIALS

A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy that is welded.

B. Shop Primers: Provide primers that comply with Section 099113 "Exterior Painting" and Section 099123 "Interior Painting," and Section 099600 "High-Performance Coatings."

C. Universal Shop Primer: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI#79 and compatible with topcoat.

1. Use primer containing pigments that make it easily distinguishable from zinc-rich primer.

D. Epoxy Zinc-Rich Primer: Complying with MPI#20 and compatible with topcoat.

E. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.

F. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.

2.4 FABRICATION

A. Shop Assembly: Fabricate grating sections in shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.

B. Cut, drill, and punch material cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch (1 mm) unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.

C. Form from materials of size, thickness, and shapes indicated, but not less than that needed to support indicated loads.

D. Fit exposed connections accurately together to form hairline joints.

E. Welding: Comply with AWS recommendations and the following:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.

F. Provide for anchorage of type indicated; coordinate with supporting structure. Fabricate and space the anchoring devices to secure gratings, frames, and supports rigidly in place and to support indicated loads.

1. Fabricate toeplates to fit grating units and weld to units in shop unless otherwise indicated.
2. Fabricate toeplates for attaching in the field.
3. Toeplate Height: 4 inches (100 mm) unless otherwise indicated.

2.5 METAL BAR GRATINGS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Alabama Metal Industries Corporation; a Gibraltar Industries company.
2. All American Grating.
3. IKG Industries; a division of Harsco Corporation.

B. Welded Steel Grating :

1. Bearing Bar Spacing: 15/16 inch (24 mm) o.c.
2. Bearing Bar Depth: As required to comply with structural performance requirements.
3. Bearing Bar Thickness: 3/16 inch (4.8 mm) minimum and as required to comply with structural performance requirements.
4. Crossbar Spacing: 4 inches (102 mm) o.c.
5. Traffic Surface: Plain .
6. Steel Finish: Hot-dip galvanized with a coating weight of not less than 1.8 oz./sq. ft. (550 g/sq. m) of coated surface.

C. Do not notch bearing bars at supports to maintain elevation.

2.6 GRATING FRAMES AND SUPPORTS

A. Frames and Supports for Metal Gratings: Fabricate from metal shapes, plates, and bars of welded construction to sizes, shapes, and profiles indicated and as necessary to receive gratings. Miter and weld connections for perimeter angle frames. Cut, drill, and tap units to receive hardware and similar items.

1. Unless otherwise indicated, fabricate from same basic metal as gratings.
2. Equip units indicated to be cast into concrete or built into masonry with integrally welded anchors. Unless otherwise indicated, space anchors 24 inches (600 mm) o.c. and provide minimum anchor units in the form of steel straps 1-1/4 inches (32 mm) wide by 1/4 inch (6 mm) thick by 8 inches (200 mm) long.

B. Galvanize steel frames and supports in the following locations:

1. Exterior.

2.7 STEEL FINISHES

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Finish gratings, frames, and supports after assembly.

C. Galvanizing: Hot-dip galvanize items as indicated to comply with ASTM A 153/A 153M for steel and iron hardware and with ASTM A 123/A 123M for other steel and iron products.

1. Do not quench or apply post galvanizing treatments that might interfere with paint adhesion.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing gratings to in-place construction. Include threaded fasteners for concrete and masonry inserts, through-bolts, lag bolts, and other connectors.

B. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing gratings. Set units accurately in location, alignment, and elevation; measured from established lines and levels and free of rack.

C. Provide temporary bracing or anchors in formwork for items that are to be built into concrete or masonry.

D. Fit exposed connections accurately together to form hairline joints.

1. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade the surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.

E. Attach toeplates to gratings by welding at locations indicated.

F. Field Welding: Comply with the following requirements:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.

G. Corrosion Protection: Coat concealed surfaces of aluminum that will come into contact with grout, concrete, masonry, wood, or dissimilar metals, with a heavy coat of bituminous paint.

3.2 INSTALLING METAL BAR GRATINGS

A. General: Install gratings to comply with recommendations of referenced metal bar grating standards that apply to grating types and bar sizes indicated, including installation clearances and standard anchoring details.

B. Attach removable units to supporting members with type and size of clips and fasteners indicated or, if not indicated, as recommended by grating manufacturer for type of installation conditions shown.

C. Attach nonremovable units to supporting members by welding where both materials are same; otherwise, fasten by bolting as indicated above.

3.3 ADJUSTING AND CLEANING

A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with same material as used for shop painting to comply with SSPC-PA 1 requirements for touching up shop-painted surfaces.

1. Apply by brush or spray to provide a minimum 2.0-mil (0.05-mm) dry film thickness.

B. Touchup Painting: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint are specified in Section 09911 "Exterior Painting"

C. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780.

END OF SECTION 05530

DIVISION 06

SECTION 06105 - MISCELLANEOUS CARPENTRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Framing with dimension lumber.
2. Rooftop equipment bases and support curbs.
3. Wood blocking, cants, and nailers.
4. Wood sleepers.
5. Plywood backing panels.
6. Utility Shelving

B. Related Requirements:

1. Section 02361 "Termite Control" for site application of borate treatment to wood framing.

2. Section 06402 “Interior Architectural Wood”
3. Section 06160 "Sheathing” for cladding of Storage Building.
4. Section 06441 “Ornamental Woodwork” for Pergola construction of exposed woodwork
5. Section 07460 “Siding” for cladding of Storage Building

1.3 DEFINITIONS

A. Dimension Lumber: Lumber of 2 inches nominal (38 mm actual) or greater but less than 5 inches nominal (114 mm actual) in least dimension.

B. Lumber grading agencies, and the abbreviations used to reference them, include the following:

1. NeLMA: Northeastern Lumber Manufacturers' Association.
2. NHLA: National Hardwood Lumber Association.
3. NLGA: National Lumber Grades Authority.
4. SPIB: The Southern Pine Inspection Bureau.
5. WCLIB: West Coast Lumber Inspection Bureau.
6. WWPA: Western Wood Products Association.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.

1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Indicate type of preservative used and net amount of preservative retained.
2. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Include physical properties of treated materials based on testing by a qualified independent testing agency.
3. For fire-retardant treatments, include physical properties of treated lumber both before and after exposure to elevated temperatures, based on testing by a qualified independent testing agency according to ASTM D 5664.
4. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.
5. Include copies of warranties from chemical treatment manufacturers for each type of treatment.

1.5 INFORMATIONAL SUBMITTALS

A. Evaluation Reports: For the following, from ICC-ES:

1. Preservative-treated wood.
2. Fire-retardant-treated wood.
3. Power-driven fasteners.
4. Powder-actuated fasteners.
5. Expansion anchors.
6. Metal framing anchors.

1.6 QUALITY ASSURANCE

A. Testing Agency Qualifications: For testing agency providing classification marking for fire-retardant treated material, an inspection agency acceptable to authorities having jurisdiction that periodically performs inspections to verify that the material bearing the classification marking is representative of the material tested.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Stack lumber flat with spacers beneath and between each bundle to provide air circulation. Protect lumber from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.

PART 2 - PRODUCTS

2.1 WOOD PRODUCTS, GENERAL

A. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, provide lumber that complies with the applicable rules of any rules-writing agency certified by the ALSC Board of Review. Provide lumber graded by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.

1. Factory mark each piece of lumber with grade stamp of grading agency.

2. For exposed lumber indicated to receive a stained or natural finish, mark grade stamp on end or back of each piece .
3. Where nominal sizes are indicated, provide actual sizes required by DOC PS 20 for moisture content specified. Where actual sizes are indicated, they are minimum dressed sizes for dry lumber.
4. Provide dressed lumber, S4S, unless otherwise indicated.

B. Maximum Moisture Content of Lumber: 15 percent for 2-inch nominal (38-mm actual) thinckness or less, 19 percent for more than 2-inch nominal (38-mm actual) thickness unless otherwise indicated.

2.2 WOOD-PRESERVATIVE-TREATED MATERIALS

A. Preservative Treatment by Pressure Process: AWPA U1; Use Category UC2 for interior construction not in contact with the ground, Use Category UC3b for exterior construction not in contact with the ground, and Use Category UC4a for items in contact with the ground.

1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium.
2. For exposed items indicated to receive a stained or natural finish, use chemical formulations that do not require incising, contain colorants, bleed through, or otherwise adversely affect finishes.

B. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Do not use material that is warped or does not comply with requirements for untreated material.

C. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.

1. For exposed lumber indicated to receive a stained or natural finish, mark end or back of each piece .

D. Application: Treat all miscellaneous carpentry unless otherwise indicated. items indicated on Drawings, and the following:

1. Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.
2. Wood sills,, Blocking, furring, and similar concealed members in contact with masonry or concrete.
3. Wood floor plates that are installed over concrete slabs-on-grade.

2.3 FIRE-RETARDANT-TREATED MATERIALS

A. General: Where fire-retardant-treated materials are indicated, use materials complying with requirements in this article, that are acceptable to authorities having jurisdiction, and with fire-test-response characteristics specified as determined by testing identical products per test method indicated by a qualified testing agency.

B. Fire-Retardant-Treated Lumber and Plywood by Pressure Process: Products with a flame spread index of 25 or less when tested according to ASTM E 84, and with no evidence of significant progressive combustion when the test is extended an additional 20 minutes, and with

the flame front not extending more than 10.5 feet (3.2 m) beyond the centerline of the burners at any time during the test.

1. Use treatment that does not promote corrosion of metal fasteners.
2. Interior Type A: Treated materials shall have a moisture content of 28 percent or less when tested according to ASTM D 3201 at 92 percent relative humidity. Use where exterior type is not indicated.

C. Kiln-dry lumber after treatment to a maximum moisture content of of 15 percent**.**

D. Identify fire-retardant-treated wood with appropriate classification marking of testing and inspecting agency acceptable to authorities having jurisdiction.

2.4 DIMENSION LUMBER FRAMING

2.5 Non-Load-Bearing Interior Partitions: No. 2 **Southern Yellow Pine** MISCELLANEOUS LUMBER

A. General: Provide miscellaneous lumber indicated and lumber for support or attachment of other construction, including the following:

1. Blocking.
2. Nailers.
3. Rooftop equipment bases and support curbs.
4. Cants.
5. Furring.
6. Grounds.
7.

B. For items of dimension lumber size, provide Construction or No. 2 Southern Yellow Pine For concealed boards, provide lumber with 19 percent maximum moisture content and any of the following species and grades:

1. Mixed southern pine, No. 2grade; SPIB.
2. Spruce-pine-fir (south) or spruce-pine-fir, Construction or No. 2 Common grade; NeLMA, NLGA, WCLIB, or WWPA.

C. For blocking not used for attachment of other construction, Utility, Stud, or No. 3 grade lumber of any species may be used provided that it is cut and selected to eliminate defects that will interfere with its attachment and purpose.

D. For blocking and nailers used for attachment of other construction, select and cut lumber to eliminate knots and other defects that will interfere with attachment of other work.

E. For furring strips for installing plywood or hardboard paneling, select boards with no knots capable of producing bent-over nails and damage to paneling.

2.6 PLYWOOD BACKING PANELS

A. Equipment Backing Panels: DOC PS 1, Exposure 1, C-D Plugged fire-retardant treated, in thickness indicated or, if not indicated, not less than 1/2-inch (13-mm) nominal thickness.

2.7 FASTENERS

A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.

B. Nails, Brads, and Staples: ASTM F 1667.

C. Power-Driven Fasteners: NES NER-272.

D. Wood Screws: ASME B18.6.1.

E. Screws for Fastening to Metal Framing: ASTM C 1002 , length as recommended by screw manufacturer for material being fastened.

F. Lag Bolts: ASME B18.2.1 (ASME B18.2.3.8M).

G. Bolts: Steel bolts complying with ASTM A 307, Grade A (ASTM F 568M, Property Class 4.6); with ASTM A 563 (ASTM A 563M) hex nuts and, where indicated, flat washers.

H. Expansion Anchors: Anchor bolt and sleeve assembly of material indicated below with capability to sustain, without failure, a load equal to 6 times the load imposed when installed in unit masonry assemblies and equal to 4 times the load imposed when installed in concrete as determined by testing per ASTM E 488 conducted by a qualified independent testing and inspecting agency.

1. Material: Carbon-steel components, zinc plated to comply with ASTM B 633, Class Fe/Zn 5.
2. Material: Stainless steel with bolts and nuts complying with ASTM F 593 and ASTM F 594, Alloy Group 1 or 2 (ASTM F 738M and ASTM F 836M, Grade A1 or A4).

2.8 METAL FRAMING ANCHORS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Cleveland Steel Specialty Co.
2. KC Metals Products, Inc.
3. Phoenix Metal Products, Inc.
4. Simpson Strong-Tie Co., Inc.
5. USP Structural Connectors.

B. Galvanized-Steel Sheet: Hot-dip, zinc-coated steel sheet complying with ASTM A 653/A 653M, G60 (Z180) coating designation.

1. Use for interior locations unless otherwise indicated.

C. Hot-Dip Heavy-Galvanized Steel Sheet: ASTM A 653/A 653M; Structural Steel (SS), high-strength low-alloy steel Type A (HSLAS Type A), or high-strength low-alloy steel Type B (HSLAS Type B); G185 (Z550) coating designation; and not less than 0.036 inch (0.9 mm) thick.

1. Use for wood-preservative-treated lumber and where indicated.

D. Stainless-Steel Sheet: ASTM A 666, Type 316.

1. Use for exterior locations and where indicated.

2.9 MISCELLANEOUS MATERIALS

A. Flexible Flashing: Composite, self-adhesive, flashing product consisting of a pliable, butyl rubber or rubberized-asphalt compound, bonded to a high-density polyethylene film, aluminum foil, or spunbonded polyolefin to produce an overall thickness of not less than 0.025 inch (0.6 mm).

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Set carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit carpentry to other construction; scribe and cope as needed for accurate fit. Locate furring, nailers, blocking, grounds, and similar supports to comply with requirements for attaching other construction.

B. Where wood-preservative-treated lumber is installed adjacent to metal decking, install continuous flexible flashing separator between wood and metal decking.

C. Framing Standard: Comply with AF&PA's WCD 1, "Details for Conventional Wood Frame Construction," unless otherwise indicated.

D. Install plywood backing panels by fastening to studs; coordinate locations with utilities requiring backing panels. Install fire-retardant treated plywood backing panels with classification marking of testing agency exposed to view.

E. Metal Framing Anchors: Install metal framing anchors to comply with manufacturer's written instructions. Install fasteners through each fastener hole.

F. Do not splice structural members between supports unless otherwise indicated.

G. Provide blocking and framing as indicated and as required to support facing materials, fixtures, specialty items, and trim.

1. Provide metal clips for fastening gypsum board or lath at corners and intersections where framing or blocking does not provide a surface for fastening edges of panels. Space clips not more than 16 inches (406 mm) o.c.

H. Provide fire blocking in furred spaces, stud spaces, and other concealed cavities as indicated and as follows:

1. Fire block furred spaces of walls, at each floor level, at ceiling, and at not more than 96 inches (2438 mm) o.c. with solid wood blocking or noncombustible materials accurately fitted to close furred spaces.
2. Fire block concealed spaces of wood-framed walls and partitions at each floor level, at ceiling line of top story, and at not more than 96 inches (2438 mm) o.c. Where fire blocking is not inherent in framing system used, provide closely fitted solid wood blocks of same width as framing members and 2-inch nominal (38-mm actual) thickness.

3. Fire block concealed spaces between floor sleepers with same material as sleepers to limit concealed spaces to not more than 100 sq. ft. (9.3 sq. m) and to solidly fill space below partitions.
4. Fire block concealed spaces behind combustible cornices and exterior trim at not more than 20 feet (6 m) o.c.

I. Sort and select lumber so that natural characteristics will not interfere with installation or with fastening other materials to lumber. Do not use materials with defects that interfere with function of member or pieces that are too small to use with minimum number of joints or optimum joint arrangement.

J. Comply with AWPA M4 for applying field treatment to cut surfaces of preservative-treated lumber.

1. Use inorganic boron for items that are continuously protected from liquid water.
2. Use copper naphthenate for items not continuously protected from liquid water.

K. Securely attach carpentry work to substrate by anchoring and fastening as indicated, complying with the following:
1. Table 2304.9.1, "Fastening Schedule," in ICC's International Building Code.
2. Table R602.3(1), "Fastener Schedule for Structural Members," and Table R602.3(2), "Alternate Attachments," in ICC's International Residential Code for One- and Two-Family Dwellings.

L. Use steel common nails unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting wood. Drive nails snug but do not countersink nail heads unless otherwise indicated.

3.2 WOOD GROUND, SLEEPER, BLOCKING, AND NAILER INSTALLATION

A. Install where indicated and where required for attaching other work. Form to shapes indicated and cut as required for true line and level of attached work. Coordinate locations with other work involved.

B. Attach items to substrates to support applied loading. Recess bolts and nuts flush with surfaces unless otherwise indicated.

C. Provide permanent grounds of dressed, pressure-preservative-treated, key-beveled lumber not less than 1-1/2 inches (38 mm) wide and of thickness required to bring face of ground to exact thickness of finish material. Remove temporary grounds when no longer required.

3.3 WOOD FURRING INSTALLATION

A. Install level and plumb with closure strips at edges and openings. Shim with wood as required for tolerance of finish work.

B. Furring to Receive Gypsum Board: Install 1-by-2-inch nominal-size (19-by-38-mm actual-size) furring vertically at 16 inches (406 mm) o.c.

3.4 PROTECTION

A. Protect wood that has been treated with inorganic boron (SBX) from weather. If, despite protection, inorganic boron-treated wood becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

B. Protect miscellaneous rough carpentry from weather. If, despite protection, miscellaneous rough carpentry becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

END OF SECTION 06105

SECTION 06160 - SHEATHING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Wall sheathing.
2. Roof sheathing.
3. Sheathing joint and penetration treatment.
4. Building Paper
5. Flexible flashing at openings in sheathing

B. Related Requirements:

1. Section 06105 "Miscellaneous Carpentry" for plywood backing panels.
2. Section 07250 "Weather Barriers" for water-resistive barrier applied over wall sheathing.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.

1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated plywood complies with requirements. Indicate type of preservative used and net amount of preservative retained.
2. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated plywood complies with requirements. Include physical properties of treated materials.
3. For fire-retardant treatments, include physical properties of treated plywood both before and after exposure to elevated temperatures, based on testing by a qualified independent testing agency according to ASTM D 5516.
4. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.

5. Include copies of warranties from chemical treatment manufacturers for each type of treatment.
6. For building paper, include data on air/moisture-infiltration protection based on testing according to referenced standards

1.4 INFORMATIONAL SUBMITTALS

A. Evaluation Reports: For following products, from ICC-ES:

1. Preservative-treated plywood.
2. Foam-plastic sheathing.
3. Glass-mat gypsum wall sheathing

1.5 QUALITY ASSURANCE

A. Testing Agency Qualifications: For testing agency providing classification marking for fire-retardant-treated material, an inspection agency acceptable to authorities having jurisdiction that periodically performs inspections to verify that the material bearing the classification marking is representative of the material tested.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Stack panels flat with spacers beneath and between each bundle to provide air circulation. Protect sheathing from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Test-Response Characteristics: For assemblies with fire-resistance ratings, provide materials and construction identical to those of assemblies tested for fire resistance per ASTM E 119 by a testing and inspecting agency acceptable to authorities having jurisdiction.

2.2 WOOD PANEL PRODUCTS

A. Plywood: Either DOC PS 1 or DOC PS 2 unless otherwise indicated.

B. Thickness: As needed to comply with requirements specified, but not less than thickness indicated.

C. Factory mark panels to indicate compliance with applicable standard.

2.3 PRESERVATIVE-TREATED PLYWOOD

A. Preservative Treatment by Pressure Process: AWPA U1; Use Category UC2 for interior construction not in contact with the ground, Use Category UC3b for exterior construction not in contact with the ground, and Use Category UC4a for items in contact with the ground.

1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium.

B. Mark plywood with appropriate classification marking of an inspection agency acceptable to authorities having jurisdiction.

C. Application: Treat all plywood unless otherwise indicated .

2.4 FIRE-RETARDANT-TREATED PLYWOOD

A. General: Where fire-retardant-treated materials are indicated, use materials complying with requirements in this article that are acceptable to authorities having jurisdiction and with fire-test-response characteristics specified as determined by testing identical products per test method indicated by a qualified testing agency.
1. Exterior Type: Treated materials shall comply with requirements specified above for fire-retardant-treated plywood by pressure process after being subjected to accelerated weathering according to ASTM D 2898. Use for exterior locations and where indicated.
2. Interior Type A: Treated materials shall have a moisture content of 28 percent or less when tested according to ASTM D 3201 at 92 percent relative humidity. Use where exterior type is not indicated.

B. Kiln-dry material after treatment to a maximum moisture content of 15 percent. Do not use material that is warped or does not comply with requirements for untreated material.

C. Identify fire-retardant-treated plywood with appropriate classification marking of qualified testing agency.

2.5 WALL SHEATHING

A. Plywood Wall Sheathing: Exterior, Structural I sheathing.

1. Span Rating: Not less than 16/0 .
2. Nominal Thickness: Not less than 1/2 inch (13 mm) unless otherwise indicated. Provide ¾” sheathing on walls scheduled to receive fiber cement siding.

B. Glass-mat Gypsum Wall Sheathing: ASTMC 1177/1177M

1. Product: Subject to compliance with requirements, one of the following:

a. CertainTeed Corporation; GlasRoc.
b. G-P Gypsum Corporation; Dens-Glass Gold.
c. National Gypsum Company; Gold Bond e(2)XP.
d. Temple-Inland Inc.; GreenGlass
e. United States Gypsum Co.; Securock.

2. Type and Thickness: Type X, 5/8" inch thick

3. Size: 48 by 96 inches for vertical installation

C. Cementitious Backer Units: ASTM C 1325, Type A.

1. Products: Subject to compliance with requirements, provide one of the following :

a. C-Cure; C-Cure Board 990.
b. Custom Building Products; Wonderboard.
c. FinPan, Inc.; Util-A-Crete Concrete Backer Board.
d. USG Corporation; DUROCK Cement Board.

2.6 Thickness: 5/8 inch ROOF SHEATHING

A. Glass-Mat Faced Gypsum Roof Boards: ASTM C 1177/1177M.

1. Products: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
a. G-P Gypsum Corporation; Dens-Deck Duraguard.
b. United States Gypsum Co.; Securock. Glass Mat Roof Board

2. Type and Thickness: 5/8 inch (15.9 mm) thick.
3. Size: 48 by 96 inches (1219 by 2438 mm) for horizontal installation.

B. Plywood Roof Sheathing: Exterior Structural I Sheathing

1. Span rating: Not less than 16/0

2. Nominal Thickness: Not less than 15/32 inch

2.7 FASTENERS

A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.

1. For roof and wall sheathing, provide fasteners of Type 304 stainless steel.

B. Nails, Brads, and Staples: ASTM F 1667.

C. Power-Driven Fasteners: NES NER-272.

D. Wood Screws: ASME B18.6.1.

E. Screws for Fastening Wood Structural Panels to Cold-Formed Metal Framing: ASTM C 954, except with wafer heads and reamer wings, length as recommended by screw manufacturer for material being fastened.

1. For wall and roof sheathing panels, provide screws with organic-polymer or other corrosion-protective coating having a salt-spray resistance of more than 800 hours according to ASTM B 117.

F. Screws for Fastening Gypsum Sheathing to Cold-Formed Metal Decking: Steel drill screws, in length recommended by sheathing manufacturer for thickness of sheathing to be attached, with organic-polymer or other corrosion-protective coating having a salt-spray resistance of more than 800 hours according to ASTM C1177.

2.8 WEATHER RESISTANT SHEATHING PAPER

A. Building Paper: ASTM 226, Type I (No. 15 asphalt – saturated organic felt) unperforated

2.9 MISCELLANEOUS MATERIALS

A. Flexible Flashing: Composite, self-adhesive, flashing product consisting of a pliable, rubberized-asphalt compound, bonded to a high-density, cross-laminated polyethylene film to produce an overall thickness of not less than 0.040 inch.

1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:

a. Carlisle Coatings & Waterproofing; CCW-705-TWF Thru-Wall Flashing.
b. Grace Construction Products, a unit of W. R. Grace & Co. - Conn.; Vycor Plus Self-Adhered Flashing.

B. Primer for Flexible Flashing: Product recommended by manufacturer of flexible flashing for substrate.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Do not use materials with defects that impair quality of sheathing or pieces that are too small to use with minimum number of joints or optimum joint arrangement. Arrange joints so that pieces do not span between fewer than three support members.

B. Cut panels at penetrations, edges, and other obstructions of work; fit tightly against abutting construction unless otherwise indicated.

C. Securely attach to substrate by fastening as indicated, complying with the following:

1. NES NER-272 for power-driven fasteners.
2. Table 2304.9.1, "Fastening Schedule," in ICC's "International Building Code."
3. Table R602.3(1), "Fastener Schedule for Structural Members," and Table R602.3(2), "Alternate Attachments," in ICC's "International Residential Code for One- and Two-Family Dwellings."

D. Coordinate wall and roof sheathing installation with flashing and joint-sealant installation so these materials are installed in sequence and manner that prevent exterior moisture from passing through completed assembly.

E. Do not bridge building expansion joints; cut and space edges of panels to match spacing of structural support elements.

F. Coordinate sheathing installation with installation of materials installed over sheathing so sheathing is not exposed to precipitation or left exposed at end of the workday when rain is forecast.

3.2 WOOD STRUCTURAL PANEL INSTALLATION

A. General: Comply with applicable recommendations in APA Form No. E30, "Engineered Wood Construction Guide," for types of structural-use panels and applications indicated.

B. Fastening Methods: Fasten panels as indicated below:

1. Wall Sheathing & Roof Sheathing:
   a. Screw to cold-formed metal framing.
   b. Space panels 1/8 inch (3 mm) apart at edges and ends.

3.3 GYPSUM SHEATHING INSTALLATION

A. Comply with GA-253 and with manufacturer's written instructions.

B. Apply fasteners so heads bear tightly against face of sheathing, but do not cut into facing.

C. Horizontal Installation: Install sheathing with V-grooved edge down and tongue edge up. Interlock tongue with groove to bring long edges in contact with edges of adjacent panels without forcing. Abut ends over centers of studs, and stagger end joints of adjacent panels not less than one stud spacing. Attach at perimeter and within field of panel to each stud.

D. Vertical Installation: Install vertical edges centered over studs. Abut ends and edges with those of adjacent panels. Attach at perimeter and within field of panel to each stud.

E. Seal sheathing joints according to sheathing manufacturer's written instructions

3.4 CEMENTITIOUS BACKER UNIT INSTALLATION

A. Install panels and treat joints according to ANSI A108.11 and manufacturer's written instructions for type of application indicated.

3.5 WEATHER-RESISTANT SHEATHING – Paper Installation

A. General: Cover Sheathing with weather-resistant sheathing paper as follows:
1. Cut back barrier ½ inch on each side of the break in supporting members at expansion – or control-joint locations
2. Apply barrier to cover vertical flashing with a minimum 4-inch overlap, unless otherwise indicated.

B. Building Paper: Apply horizontally with 2 inch overlap and a 6 inch end lap; fasten to sheathing with galvanized staples or roofing nails.

3.6 FLEXIBLE FLASHING INSTALLATION

A. Apply flexible flashing where indicated to comply with manufacturers written instructions.

1. Prime substrates as recommended by flashing manufacturer.
2. Lap seams and junctures with other materials at least 4 inches, except that at flashing flanges of other construction, laps need not exceed flange width.
3. Lap flashing over weather-resistant building paper at bottom and sides of openings.
4. Lap weather-resistant building paper over flashing at heads of openings.
5. After flashing has been applied, roll surfaces with a hard rubber or metal roller to ensure that flashing is completely adhered to substrates.

3.7 FIELD QUALITY CONTROL

A. ABAA Quality Assurance Program: Perform examinations, preparation, installation, testing, and inspections under ABAA's Quality Assurance Program.

B. Testing and Inspecting Agency: Engage a qualified testing agency to perform tests and inspections.

C. Inspections: Air-barrier and water-resistant glass-mat gypsum sheathing, accessories, and installation are subject to inspection for compliance with requirements. Inspections may include the following:]

1. Continuity of air-barrier system has been achieved throughout the building envelope with no gaps or holes.
2. Laps in strips and transition strips have complied with minimum requirements and have been shingled in the correct direction (or mastic has been applied on exposed edges), with no fishmouths.
3. Termination mastic has been applied on cut edges.
4. Strips and transition strips have been firmly adhered to substrate.
5. Compatible materials have been used.
6. Transitions at changes in direction and structural support at gaps have been provided.
7. Connections between assemblies (sheathing and sealants) have complied with requirements for cleanliness, surface preparation and priming, structural support, integrity, and continuity of seal.
8. All penetrations have been sealed.

D. Tests: As determined by testing agency from among the following tests:

1. Air-Leakage-Location Testing: Air-barrier sheathing assemblies will be tested for evidence of air leakage according to [**ASTM E1186, chamber pressurization or depressurization with smoke tracers**] [**ASTM E1186, chamber depressurization using detection liquids**] <**Insert requirement**>.
2. Air-Leakage-Volume Testing: Air-barrier assemblies will be tested for air-leakage rate according to [**ASTM E783**] [**or**] [**ASTM E2357**].

E. Air barriers will be considered defective if they do not pass tests and inspections.

F. Repair damage to air barriers caused by testing; follow manufacturer's written instructions.

G. Prepare test and inspection reports.

3.8 PROTECTION

A. Paper-Surfaced Gypsum Sheathing: Protect sheathing by covering exposed exterior surface of sheathing with weather-resistant sheathing paper securely fastened to framing. Apply covering immediately after sheathing is installed.

END OF SECTION 06160

SECTION 06402 - INTERIOR ARCHITECTURAL WOODWORK

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Interior standing and running trim.
2. Wood cabinets at Administrative offices
3. Solid-surfacing-material countertops.
4. Closet and utility shelving.
5. Shop finishing of interior woodwork.

B. Related Sections include the following:
1. Division 6 Section "Miscellaneous Carpentry" for wood furring, blocking, shims, and hanging strips required for installing woodwork and concealed within other construction before woodwork installation.
2. Division 6 Section “Plastic Laminate Faced Architectural Cabinets” for installing cabinets.
3. Division 10 Section “ Storage Shelving” for wire shelving locations

1.3 DEFINITIONS

A. Interior architectural woodwork includes wood furring, blocking, shims, and hanging strips for installing woodwork items unless concealed within other construction before woodwork installation.

1.4 SUBMITTALS

A. Product Data: For solid-surfacing material and cabinet hardware and accessories.

B. Shop Drawings: Show location of each item, dimensioned plans and elevations, large-scale details, attachment devices, and other components including adjacent wall construction.

1. Show details full size.
2. Show locations and sizes of furring, blocking, and hanging strips, including concealed blocking and reinforcement specified in other Sections.

3. Show locations and sizes of cutouts and holes for plumbing fixtures and other items installed in architectural woodwork.
4. Show veneer leaves with dimensions, grain direction, exposed face, and identification numbers indicating the flitch and sequence within the flitch for each leaf.

C. Samples for Initial Selection:
1. Thermoset decorative panels.
2. Solid-surfacing materials.

D. Samples for Verification:

1. Lumber with or for transparent finish, not less than 50 sq. in.or 5 inches wide by 24 inches long base on condition where the lumber is scheduled to be used, for each species and cut, finished on 1 side and 1 edge.
2. Veneer leaves representative of and selected from flitches to be used for transparent-finished woodwork.
3. Veneer-faced panel products with or for transparent finish, 8 by 10 inches for each species and cut. Include at least one face-veneer seam and finish as specified.
4. Thermoset decorative-panels, 8 by 10 inches, for each type, color, pattern, and surface finish, with edge banding on 1 edge.

5. Exposed cabinet hardware and accessories, one unit for each type and finish.

E. Product Certificates: For each type of product, signed by product manufacturer.

F. Woodwork Quality Standard Compliance Certificates: AWI Quality Certification Program certificates.

G. Qualification Data: For Installer and fabricator.

1.5 QUALITY ASSURANCE

A. Fabricator Qualifications: Shop that employs skilled workers who custom-fabricate products similar to those required for this Project and whose products have a record of successful in-service performance. Shop is a certified participant in AWI's Quality Certification Program.

B. Installer Qualifications: Certified participant in AWI's Quality Certification Program.

C. Source Limitations: Engage a qualified woodworking firm to assume undivided responsibility for production of interior architectural woodwork with sequence-matched wood veneers.

D. Quality Standard: Unless otherwise indicated, comply with AWI's "Architectural Woodwork Quality Standards" for grades of interior architectural woodwork indicated for construction, finishes, installation, and other requirements.

1. Provide AWI Quality Certification Program labels and certificates indicating that woodwork complies with requirements of grades specified.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Do not deliver woodwork until painting and similar operations that could damage woodwork have been completed in installation areas. If woodwork must be stored in other than installation areas, store only in areas where environmental conditions comply with requirements specified in "Project Conditions" Article.

1.7 PROJECT CONDITIONS

A. Environmental Limitations: Do not deliver or install woodwork until building is enclosed, wet work is complete, and HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period.

B. Environmental Limitations: Do not deliver or install woodwork until building is enclosed, wet work is complete, and HVAC system is operating and maintaining temperature between 60 and 90 deg F (16 and 32 deg C) and relative humidity between 43 and 70 percent during the remainder of the construction period.

C. Field Measurements: Where woodwork is indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication, and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

1. Locate concealed framing, blocking, and reinforcements that support woodwork by field measurements before being enclosed, and indicate measurements on Shop Drawings.

1.8 COORDINATION

A. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of Work specified in other Sections to ensure that interior architectural woodwork can be supported and installed as indicated.

B. Hardware Coordination: Distribute copies of approved hardware schedule specified in Division 8 Section " Door Hardware (Scheduled by Describing Products)" to fabricator of architectural woodwork; coordinate Shop Drawings and fabrication with hardware requirements.

PART 2 - PRODUCTS

2.1 WOODWORK FABRICATORS

A. Available Fabricators: Subject to compliance with requirements, fabricators offering interior architectural woodwork that may be incorporated into the Work include, but are not limited to, the following:

2.2 MATERIALS

A. General: Provide materials that comply with requirements of AWI's quality standard for each type of woodwork and quality grade specified, unless otherwise indicated.

B. Wood Species and Cut for Transparent Finish: White oak, rift sawn or cut.

C. Wood Species for Opaque Finish: Poplar or any closed-grain hardwood..

D. Wood Products: Comply with the following:

1. Hardboard: AHA A135.4.
2. Medium-Density Fiberboard: ANSI A208.2, Grade MD.
3. Softwood Plywood: DOC PS 1.
4. Veneer-Faced Panel Products (Hardwood Plywood): HPVA HP-1.
5. =

2.3 CABINET HARDWARE AND ACCESSORIES

A. General: Provide cabinet hardware and accessory materials associated with architectural cabinets, except for items specified in Division 8 Section " Door Hardware (Scheduled by Describing Products)."

B. Frameless Concealed Hinges (European Type): BHMA A156.9, B01602, 170 degrees of opening.

C. Back-Mounted Pulls: BHMA A156.9, B02011.

D. Catches: Magnetic catches, BHMA A156.9, B03141.

E. -Shelf Rests: BHMA A156.9, B04013; metal, two-pin type with shelf hold-down clip.

F. Drawer Slides: BHMA A156.9, B05091.
1. Heavy Duty (Grade 1HD-100 and Grade 1HD-200): Side mounted; full-extension type; zinc-plated steel ball-bearing slides.

G. Door Locks: BHMA A156.11, E07121.

H. Drawer Locks: BHMA A156.11, E07041.

I. Grommets for Cable Passage through Countertops: 1-1/4-inch OD, color to be selected by architect, molded-plastic grommets and matching plastic caps with slot for wire passage.

J. Exposed Hardware Finishes: For exposed hardware, provide finish that complies with BHMA A156.18 for BHMA finish number indicated.
   1. Satin Chromium Plated: BHMA 626 for brass or bronze base; BHMA 652 for steel base.

K. For concealed hardware, provide manufacturer's standard finish that complies with product class requirements in BHMA A156.9.

2.4 MISCELLANEOUS MATERIALS

A. Furring, Blocking, Shims, and Hanging Strips: Softwood or hardwood lumber, kiln dried to less than 15 percent moisture content.

B. Anchors: Select material, type, size, and finish required for each substrate for secure anchorage. Provide nonferrous-metal or hot-dip galvanized anchors and inserts on inside face of exterior walls and elsewhere as required for corrosion resistance. Provide toothed-steel or lead expansion sleeves for drilled-in-place anchors.

2.5 FABRICATION, GENERAL

A. Interior Woodwork Grade: Unless otherwise indicated, provide Premium or Custom-grade as indicated interior woodwork complying with referenced quality standard.

B. Wood Moisture Content: Comply with requirements of referenced quality standard for wood moisture content in relation to ambient relative humidity during fabrication and in installation areas.

C. Fabricate woodwork to dimensions, profiles, and details indicated. Ease edges to radius indicated for the following:

   1. Corners of Cabinets and Edges of Solid-Wood (Lumber) Members 3/4 Inch Thick or Less: 1/16 inch.
   2. Edges of Rails and Similar Members More Than 3/4 InchThick: 1/8 inch

D. Complete fabrication, including assembly, finishing, and hardware application, to maximum extent possible before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.
   1. Trial fit assemblies at fabrication shop that cannot be shipped completely assembled. Install dowels, screws, bolted connectors, and other fastening devices that can be removed after trial fitting. Verify that various parts fit as intended and check measurements of assemblies against field measurements indicated on Shop Drawings before disassembling for shipment.

E. Shop-cut openings to maximum extent possible to receive hardware, appliances, plumbing fixtures, electrical work, and similar items. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Sand edges of cutouts to remove splinters and burrs.

1. Seal edges of openings in countertops with a coat of varnish.

2.6 INTERIOR STANDING AND RUNNING TRIM FOR TRANSPARENT FINISH

A. Grade: Premium.

B. Wood Species and Cut: Match species and cut indicated for other types of transparent-finished architectural woodwork located in same area of building, unless otherwise indicated.

C. For trim items wider than available lumber, use veneered construction. Do not glue for width.

D. For rails wider or thicker than available lumber, use veneered construction. Do not glue for width or thickness.

E. Backout or groove backs of flat trim members and kerf backs of other wide, flat members, except for members with ends exposed in finished work.

F. Assemble casings in plant except where limitations of access to place of installation require field assembly.

G. Assemble moldings in plant to maximum extent possible. Miter corners in plant and prepare for field assembly with bolted fittings designed to pull connections together.

2.7 INTERIOR STANDING AND RUNNING TRIM FOR OPAQUE FINISH

A. Grade: Custom.

B. Wood Species: poplar or any closed-grain hardwood.

C. Backout or groove backs of flat trim members and kerf backs of other wide, flat members, except for members with ends exposed in finished work.

D. Assemble casings in plant except where limitations of access to place of installation require field assembly.

E. Assemble moldings in plant to maximum extent possible. Miter corners in plant and prepare for field assembly with bolted fittings designed to pull connections together.

2.8 WOOD CABINETS FOR TRANSPARENT FINISH

A. Grade: Premium.

B. AWI Type of Cabinet Construction: Flush overlay.

C. Wood Species and Cut for Exposed Surfaces: White oaksimilar to flush wood doors.

1. Grain Direction: Vertically for drawer fronts, doors, and fixed panels.
2. Matching of Veneer Leaves: Book match.
3. Vertical Matching of Veneer Leaves: End match.
4. Veneer Matching within Panel Face: Running match.
5. Veneer Matching within Room: Provide cabinet veneers in each room or other space from a single flitch with doors, drawer fronts, and other surfaces matched in a sequenced set with continuous match where veneers are interrupted perpendicular to the grain.

D. Semiexposed Surfaces: Provide surface materials indicated below:

1. Cabinet interiors or similar surfaces Other Than Drawer Bodies: Thermoset decorative panels.
2. Drawer Sides and Backs: Solid-hardwood lumber.
3. Drawer Bottoms: Hardwood plywood.

E. Provide dust panels of 1/4-inch plywood or tempered hardboard above compartments and drawers, unless located directly under tops.

2.9 SOLID-SURFACING-MATERIAL COUNTERTOPS

A. Grade: Custom.

B. Solid-Surfacing-Material Thickness: 3/4 inch

C. Colors, Patterns, and Finishes: Provide materials and products that result in colors of solid-surfacing material complying with the following requirements:

D. Fabricate tops in one piece, unless otherwise indicated. Comply with solid-surfacing-material manufacturer's written recommendations for adhesives, sealers, fabrication, and finishing.

1. Fabricate tops with shop-applied edges of materials and configuration indicated.
2. Fabricate tops with loose backsplashes and side spashes for field application.

E. Install integral sink bowls in countertops in shop.

F. Drill holes in countertops for plumbing fittings and soap dispensers in shop.

2.10 CLOSET AND UTILITY SHELVING

A. Shelf Material: 3/4-inch medium-density fiberboard with solid-lumber edge.

B. Cleats: 3/4-inch solid lumber.

C. Wood Species: Any closed-grain hardwood.

2.11 SHOP FINISHING

A. Grade: Provide finishes of same grades as items to be finished.

B. General: Finish architectural woodwork at fabrication shop as specified in this Section. Defer only final touchup, cleaning, and polishing until after installation.

C. General: Shop finish transparent-finished interior architectural woodwork at fabrication shop as specified in this Section. Refer to Division 9 painting Sections for finishing opaque-finished architectural woodwork.

D. Shop Priming: Shop apply the prime coat including backpriming, if any, for items specified to be field finished. Refer to Division 9 painting Sections for material and application requirements.

E. Preparation for Finishing: Comply with referenced quality standard for sanding, filling countersunk fasteners, sealing concealed surfaces, and similar preparations for finishing architectural woodwork, as applicable to each unit of work.

1. Backpriming: Apply one coat of sealer or primer, compatible with finish coats, to concealed surfaces of woodwork. Apply two coats to back of paneling and to end-grain surfaces. Concealed surfaces of plastic-laminate-clad woodwork do not require backpriming when surfaced with plastic laminate, backing paper, or thermoset decorative panels.

F. Transparent Finish:

1. Grade: Premium.
2. AWI Finish System: Conversion varnish.
3. WI Finish System 1a.: Nitrocellulose lacquer.
4. Staining: Match Architect's sample.
5. Wash Coat for Stained Finish: Apply wash-coat sealer to woodwork made from closed-grain wood before staining and finishing.
6. Filled Finish for Open-Grain Woods: After staining (if any), apply paste wood filler to open-grain woods and wipe off excess. Tint filler to match stained wood.

    a. Apply wash-coat sealer after staining and before filling.

7. Sheen: Satin, 31-45 gloss units measured on 60-degree gloss meter per ASTM D 523.

PART 3 - EXECUTION

3.1 PREPARATION

A. Before installation, condition woodwork to average prevailing humidity conditions in installation areas.

B. Before installing architectural woodwork, examine shop-fabricated work for completion and complete work as required, including removal of packing and backpriming.

3.2 INSTALLATION

A. Grade: Install woodwork to comply with requirements for the same grade specified in Part 2 for fabrication of type of woodwork involved.

B. Assemble woodwork and complete fabrication at Project site to comply with requirements for fabrication in Part 2, to extent that it was not completed in the shop.

C. Install woodwork level, plumb, true, and straight. Shim as required with concealed shims. Install level and plumb (including tops) to a tolerance of 1/8 inch in 96 inches.

D. Scribe and cut woodwork to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.

E. Anchor woodwork to anchors or blocking built in or directly attached to substrates. Secure with countersunk, concealed fasteners and blind nailing as required for complete installation. Use fine finishing nails for exposed fastening at interior of cabinets only, countersunk fasteners and filled flush with woodwork and matching final finish if transparent finish is indicated.

F. Standing and Running Trim: Install with minimum number of joints possible, using full-length pieces (from maximum length of lumber available) to greatest extent possible. Do not use pieces less than 96 inches long, except where shorter single-length pieces are necessary.

1. Fill gaps, if any, between top of base and wall with plastic wood filler, sand smooth, and finish same as wood base if finished.
2. Install standing and running trim with no more variation from a straight line than 1/8 inch in 96 inches.

G. Cabinets: Install without distortion so doors and drawers fit openings properly and are accurately aligned. Adjust hardware to center doors and drawers in openings and to provide unencumbered operation. Complete installation of hardware and accessory items as indicated.

1. Install cabinets with no more than 1/8 inch in 96-inch sag, bow, or other variation from a straight line.
2. Maintain veneer sequence matching of cabinets with transparent finish.

3. Fasten wall cabinets through back, near top and bottom, at ends and not more than 16 inches o.c. with No. 10 wafer-head sheet metal screws through metal backing or metal framing behind wall finish.

H. Countertops: Anchor securely by screwing through corner blocks of base cabinets or other supports into underside of countertop.

1. Align adjacent solid-surfacing-material countertops and form seams to comply with manufacturer's written recommendations using adhesive in color to match countertop. Carefully dress joints smooth, remove surface scratches, and clean entire surface.
2. Install countertops with no more than 1/8 inch in 96-inch sag, bow, or other variation from a straight line.
3. Secure backsplashes and side splashes to walls with adhesive.
4. Caulk space between backsplash or side splashes and wall with sealant specified in Division 7 Section "Joint Sealants."

I. Touch up finishing work specified in this Section after installation of woodwork. Fill nail holes with matching filler where exposed.

J. Refer to Division 9 Sections for final finishing of installed architectural woodwork not indicated to be shop finished].

3.3 ADJUSTING AND CLEANING

A. Repair damaged and defective woodwork, where possible, to eliminate functional and visual defects; where not possible to repair, replace woodwork. Adjust joinery for uniform appearance.

B. Clean, lubricate, and adjust hardware.

C. Clean woodwork on exposed and semiexposed surfaces. Touch up shop-applied finishes to restore damaged or soiled areas.

END OF SECTION 06402

SECTION 06411 - PLASTIC-LAMINATE-FACED ARCHITECTURAL CABINETS

TIPS:

To view non-printing **Editor's Notes** that provide guidance for editing, click on MasterWorks/Single-File Formatting/Toggle/Editor's Notes.

To read **detailed research, technical information about products and materials, and coordination checklists**, click on MasterWorks/Supporting Information.

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Plastic-laminate-faced architectural cabinets.
2. Wood furring, blocking, shims, and hanging strips for installing plastic-laminate-faced architectural cabinets that are not concealed within other construction.

B. Related Requirements:

1. Section 06105 "Miscellaneous Rough Carpentry" for wood furring, blocking, shims, and hanging strips required for installing cabinets that are concealed within other construction before cabinet installation.
2. Division 06 “Interior Architectural Woodwork” for countertop installation at wood and plastic laminate cabinets.
3. Section 09111 "Non-Load Bearing Steel Framing" for for installing cabinets that are concealed within other construction before cabinet installation

1.3 COORDINATION

A. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of Work specified in other Sections to support loads imposed by installed and fully loaded cabinets.

B. Hardware Coordination: Distribute copies of approved hardware schedule specified in Section 08710 "Door Hardware” to fabricator of architectural cabinets; coordinate Shop Drawings and fabrication with hardware requirements.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at **Project site**

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include data for fire-retardant treatment from chemical-treatment manufacturer and certification by treating plant that treated materials comply with requirements.

B. Shop Drawings: For plastic-laminate-faced architectural cabinets.

1. Include plans, elevations, sections, and attachment details.
2. Show full-size details.
3. Show locations and sizes of furring, blocking, and hanging strips, including concealed blocking and reinforcement specified in other Sections.
4. Show locations and sizes of cutouts and holes for items installed in plastic-laminate architectural cabinets.

C. Samples: For each exposed product and for each color and texture specified, in manufacturer's or fabricator's standard size.

D. Samples for Initial Selection:
1. Plastic laminates
2. PVC edge material
3. Thermoset decorative panel

E. Samples for Verification: For the following:

1. Plastic Laminates: 8 by 10 inches for each type, color, pattern, and surface finish required.

2. Thermoset Decorative Panels: 8 by 10 inches for each color, pattern, and surface finish.

3. Exposed Cabinet Hardware and Accessories: One full-size unit for each type and finish.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For fabricator.

B. Product Certificates: For **each type of product.**

C. Quality Standard Compliance Certificates: AWI Quality Certification Program

D. Evaluation Reports: For fire-retardant-treated materials, from ICC-ES.

1.7 QUALITY ASSURANCE

A. Fabricator Qualifications: Shop that employs skilled workers who custom fabricate products similar to those required for this Project and whose products have a record of successful in-service performance.

1. Shop Certification: AWI's Quality Certification Program accredited

B. Installer Qualifications: Fabricator of products. AWI's Quality Certification Program accredited participant

C. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.

1. Build mockups of typical architectural cabinets as shown on Drawings
2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Do not deliver cabinets until painting and similar finish operations that might damage architectural cabinets have been completed in installation areas. Store cabinets in installation areas or in areas where environmental conditions comply with requirements specified in "Field Conditions" Article.

1.9 FIELD CONDITIONS

A. Environmental Limitations: Do not deliver or install cabinets until building is enclosed, wet-work is complete, and HVAC system is operating and maintaining temperature between 60 and 90 deg F and relative humidity between 43 and 70 percent during the remainder of the construction period.

B. Field Measurements: Where cabinets are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication, and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

1. Locate concealed framing, blocking, and reinforcements that support cabinets by field measurements before being enclosed/concealed by construction, and indicate measurements on Shop Drawings.

C. Established Dimensions: Where cabinets are indicated to fit to other construction, establish dimensions for areas where cabinets are to fit. Provide allowance for trimming at site, and coordinate construction to ensure that actual dimensions correspond to established dimensions.

PART 2 - PRODUCTS

2.1 PLASTIC-LAMINATE-FACED ARCHITECTURAL CABINETS

A. Quality Standard: Unless otherwise indicated, comply with the "Architectural Woodwork Standards" for grades of cabinets indicated for construction, finishes, installation, and other requirements.

1. Provide inspections of fabrication and installation together with labels and certificates from AWI certification program indicating that woodwork complies with requirements of grades specified.
2. The Contract Documents contain requirements that are more stringent than the referenced quality standard. Comply with requirements of Contract Documents in addition to those of the referenced quality standard.

B. Grade: Premium

C. Type of Construction: Frameless

D. Door and Drawer-Front Style: Flush overlay.

E. High-Pressure Decorative Laminate: NEMA LD 3, grades as indicated or if not indicated, as required by quality standard.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. A. Formica Corporation
   b. Panolam Industries International Inc.
   c. Wisonart International; Div of Premark International, Inc.

F. Core Materials:
1. Cabinet Core Material: plywood
2. Shelves: ¾ inch thick plywood
3. Front, back, and intermediate rails: ¾ inch plywood
4. Backs of cabinets: ½ inch thick particle board
5. Door Fronts: ¾ inch thick plywood
6. Drawer Sides and Backs: ½ inch solid hardwood plywood with glued dovetail or multiple-dowel joints
7. Drawer Bottoms: ¾ inch plywood glued dadoed into front, back and sides of drawer
8. Doors: ¾ inch thick, plywood and solid wood stiles and rails

G. Laminate Cladding for Exposed Surfaces:

1. Horizontal Surfaces: Grade HGS.
2. Postformed Surfaces: Grade HGP.
3. Vertical Surfaces: Grade HGS.
4. Edges: PVC edge banding, 0.12 inch thick, matching laminate in color, pattern, and finish.
5. Pattern Direction: Vertically for drawer fronts, doors, and fixed panels

H. Materials for Semiexposed Surfaces:

1. Surfaces Other Than Drawer Bodies: High-pressure decorative laminate, NEMA LD 3, Grade VGS.

a. Edges of Plastic-Laminate Shelves: PVC edge banding, 0.12 inch thick, matching laminate in color, pattern, and finish.

b. For semiexposed backs of panels with exposed plastic-laminate surfaces, provide surface of high-pressure decorative laminate, NEMA LD 3, Grade VGS

2. Drawer Sides and Backs: Thermoset decorative panels with PVC or polyester edge banding.
3. Drawer Bottoms: Thermoset decorative panels.
4. Cabinet Bases: Exterior grade softwood plywood

I. Drawer Construction: Fabricate with exposed fronts fastened to subfront with mounting screws from interior of body.

1. Join subfronts, backs, and sides with glued rabbeted joints supplemented by mechanical fasteners

J. Colors, Patterns, and Finishes: Provide materials and products that result in colors and textures of exposed laminate surfaces complying with the following requirements:
1. As selected by Architect from laminate manufacturer's full range in the following categories:

a. Solid colors, **matte** finish.

2.2 WOOD MATERIALS

A. Wood Products: Provide materials that comply with requirements of referenced quality standard for each type of architectural cabinet and quality grade specified unless otherwise indicated.

1. Wood Moisture Content: 8 to 13 percent.

B. Composite Wood and Agrifiber Products: Provide materials that comply with requirements of referenced quality standard for each type of architectural cabinet and quality grade specified unless otherwise indicated.

1. Softwood Plywood: DOC PS 1
2. Thermoset Decorative Panels: Particleboard or MDF finished with thermally fused, melamine-impregnated decorative paper and complying with requirements of NEMA LD 3, Grade VGL, for Test Methods 3.3, 3.4, 3.6, 3.8, and 3.10.

2.3 CABINET HARDWARE AND ACCESSORIES

A. General: Provide cabinet hardware and accessory materials associated with architectural cabinets except for items specified in Section 08710 "Door Hardware."

B. Butt Hinges: 2-3/4-inch five-knuckle steel hinges made from 0.095-inch- thick metal, and as follows:
1. Semiconcealed Hinges for Overlay Doors: BHMA A156.9, B01521.

C. Wire Pulls: Back mounted, solid metal [4 inches (100 mm) long, 5/16 inch

D. Catches: Magnetic catches, BHMA A156.9, B03141

E. Shelf Rests: BHMA A156.9, B04013; metal, two-pin type with shelf hold-down clip.

F. Drawer Slides: BHMA A156.9.

1. Grade 1 and Grade 2: Side mounted and extending under bottom edge of drawer;full extension type; epoxy coated steel with polymer rollers

2. Grade 1HD-100 and Grade 1HD-200: Side mounted; full-overtravel-extension type; zinc-plated-steel ball-bearing slides.
3. For drawers not more than 3 inches high and not more than 24 inches wide, provide Grade 1.
4. For drawers more than 3 inches high, but not more than 6 high and not more than 24 inches wide, provide Grade 1HD-100.
5. For drawers more than 6 inches high or more than 24 inches wide, provide Grade 1HD-200.
6. For computer keyboard shelves, provide Grade 1HD-100.

G. Door Locks: BHMA A156.11, E07121.

H. Drawer Locks: BHMA A156.11, E07041.

I. Door and Drawer Silencers: BHMA A156.16, L03011.

J. Grommets for Cable Passage: **2-inch** OD, molded-plastic grommets and matching plastic caps with slot for wire passage.

1. Color: to match cabinet color

K. Exposed Hardware Finishes: For exposed hardware, provide finish that complies with BHMA A156.18 for BHMA finish number indicated.

1. Dark, Oxidized, Satin Bronze, Oil Rubbed: BHMA 613 for bronze base; BHMA 640 for steel base; match Architect's sample.
2. Bright Brass, Clear Coated: BHMA 605 for brass base; BHMA 632 for steel base.
3. Satin Chromium Plated: BHMA 626 for brass or bronze base; BHMA 652 for steel base.
4. Bright Chromium Plated: BHMA 625 for brass or bronze base; BHMA 651 for steel base.
5. Satin Stainless Steel: BHMA 630.

L. For concealed hardware, provide manufacturer's standard finish that complies with product class requirements in BHMA A156.9.

2.4 MISCELLANEOUS MATERIALS

A. Furring, Blocking, Shims, and Hanging Strips: Softwood or hardwood lumber kiln-dried to less than 15 percent moisture content.

B. Anchors: Select material, type, size, and finish required for each substrate for secure anchorage. Provide metal expansion sleeves or expansion bolts for post-installed anchors. Use nonferrous-metal or hot-dip galvanized anchors and inserts at inside face of exterior walls and at floors.

C. Adhesive for Bonding Plastic Laminate: Contact cement

1. Adhesive for Bonding Edges: Hot-melt adhesive

2.5 FABRICATION

A. Fabricate architectural cabinets to dimensions, profiles, and details indicated.

B. Complete fabrication, including assembly and hardware application, to maximum extent possible before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.

1. Notify Architect seven days in advance of the dates and times architectural cabinet fabrication will be complete.
2. Trial fit assemblies at fabrication shop that cannot be shipped completely assembled. Install dowels, screws, bolted connectors, and other fastening devices that can be removed after trial fitting. Verify that various parts fit as intended and check measurements of assemblies against field measurements before disassembling for shipment.

C. Shop-cut openings to maximum extent possible to receive hardware, appliances, electrical work, and similar items. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Sand edges of cutouts to remove splinters and burrs.

PART 3 - EXECUTION

3.1 PREPARATION

A. Before installation, condition cabinets to humidity conditions in installation areas for not less than 72 hours.

3.2 INSTALLATION

A. Grade: Install cabinets to comply with quality standard grade of item to be installed.

B. Assemble cabinets and complete fabrication at Project site to extent that it was not completed in the shop.

C. Anchor cabinets to anchors or blocking built in or directly attached to substrates. Secure with wafer-head cabinet installation screws.

D. Install cabinets level, plumb, and true in line to a tolerance of 1/8 inch in 96 inches (3 mm in 2400 mm)using concealed shims.

1. Scribe and cut cabinets to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.
2. Install cabinets without distortion so doors and drawers fit openings and are accurately aligned. Adjust hardware to center doors and drawers in openings and to provide

unencumbered operation. Complete installation of hardware and accessory items as indicated.

a. Install cabinets with o more than 1/8inch in96-inch sag, bow, or other variation from a straight line.
b. Fasten wall cabinets through back, near top and bottom, and at ends not more than 16 inches o.c. with No. 10 wafer-head sheet metal screws through metal backing or metal framing behind wall finish.

3.3 ADJUSTING AND CLEANING

A. Repair damaged and defective cabinets, where possible, to eliminate functional and visual defects. Where not possible to repair, replace architectural cabinets. Adjust joinery for uniform appearance.

B. Clean, lubricate, and adjust hardware.

C. Clean cabinets on exposed and semiexposed surfaces.

END OF SECTION 06411

SECTION 06441 - ORNAMENTAL WOODWORK

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Exterior ornamental woodwork for Arbor
2. Wood furring, blocking, shims, and hanging strips for installing ornamental work items unless concealed within other construction before woodwork installation.
3. Shop finishing of exterior ornamental woodwork.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product, including panel products finishing materials and processes.

B. Shop Drawings: Show location of each item, dimensioned plans and elevations, large-scale details, attachment devices, and other components.

C. Samples:
1. Lumber for transparent finish, for each species and cut, finished on one side and one edge.
2. Lumber and panel products with shop-applied opaque finish, for each finish system and color, with exposed surface finished.

1.3 INFORMATIONAL SUBMITTALS

A. Woodwork Quality Standard Compliance Certificates: [**AWI Quality Certification Program certificates**] [**WI Certified Compliance Program certificates**].

1.4 QUALITY ASSURANCE

A. Fabricator Qualifications: [**Certified participant in AWI's Quality Certification Program**] [**Licensee of WI's Certified Compliance Program**].

B. Installer Qualifications: [**Fabricator of products**] [**Certified participant in AWI's Quality Certification Program**] [**Licensee of WI's Certified Compliance Program**].

1.5 FIELD CONDITIONS

A. Weather Limitations for Exterior Work: Proceed with installation of exterior ornamental woodwork only when existing and forecasted weather conditions permit work to be performed and at least one coat of specified finish to be applied without exposure to rain, snow, or dampness.

B. Environmental Limitations for Interior Work: Do not deliver or install interior ornamental woodwork until building is enclosed, wet work is complete, and HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period.

PART 2 - PRODUCTS

2.1 ORNAMENTAL WOODWORK FABRICATORS

A. Fabricators: Subject to compliance with requirements, [**provide products by the following**] [**provide products by one of the following**] [**available fabricators offering products that may be incorporated into the Work include, but are not limited to, the following**]:

1. <**Insert, in separate subparagraphs, names and possibly contact information for preapproved woodworking firms**>.

2.2 ORNAMENTAL WOODWORK, GENERAL

A. Quality Standard: Unless otherwise indicated, comply with the "Architectural Woodwork Standards" for grades of ornamental woodwork indicated for construction, finishes, installation, and other requirements.

1. Provide labels and certificates from AWI certification program indicating that woodwork, including installation, complies with requirements of grades specified.

2.3 EXTERIOR ORNAMENTAL WORK FOR OPAQUE FINISH

A. Exterior ornamental work for opaque finish includes the following:

1. Arbor

B. Grade: Premium.

C. Regional Materials: Exterior ornamental work for opaque finish shall be manufactured within 500 miles of Project site from materials that have been extracted, harvested, or recovered, as well as manufactured, within 500 miles (800 km) of Project site.

D. Certified Wood: Wood and composite wood components of exterior ornamental work for opaque finish shall be certified as "FSC Pure"according to FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship," and FSC STD-40-004, "FSC Standard for Chain of Custody Certification."

E. Wood Species: Spanish Cedar

2.4 WOOD MATERIALS

A. Wood Products: Provide materials that comply with requirements of referenced quality standard for each type of ornamental woodwork and quality grade specified unless otherwise indicated.

1. Wood Moisture Content for Exterior Materials: 8 to 13 percent.

B. Composite Wood and Agrifiber Products: Provide materials that comply with requirements of referenced quality standard for each type of ornamental woodwork and quality grade specified unless otherwise indicated.

1. Recycled Content of Medium-Density Fiberboard and Particleboard: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 20 percent.
2. Composite Wood and Agrifiber Products: Products shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
3. Medium-Density Fiberboard: ANSI A208.2, Grade 130 , made with binder containing no urea formaldehyde].
4. Softwood Plywood: DOC PS 1, exterior,medium-density overlay.
5. Veneer-Faced Panel Products (Hardwood Plywood): HPVA HP-1made with adhesive containing no urea formaldehyde.

C. Water-Repellent Preservative Treated Materials: Comply with AWPA N1 (dip, spray, flood, or vacuum-pressure treatment) for exterior ornamental woodwork items indicated to receive water-repellent preservative treatment.

1. Preservative Chemicals: 3-iodo-2-propynyl butyl carbamate (IPBC)[**, combined with an insecticide containing chloropyrifos (CPF)**].
2. Extent of Water-Repellent Preservative Treatment: Treat [**exterior ornamental woodwork indicated**] [**all exterior ornamental woodwork unless otherwise indicated**].

2.5 MISCELLANEOUS MATERIALS

A. Exterior Blocking, Shims, and Nailers: Softwood or hardwood lumber, pressure-preservative treated, kiln dried to less than 15 percent moisture content.

1. Preservative Treatment by Pressure Process: AWPA U1; Use Category UC3b.

a. Kiln dry lumber after treatment to a maximum moisture content of 19 percent.
b. Mark lumber with treatment quality mark of an inspection agency approved by the American Lumber Standards Committee's (ALSC) Board of Review.

B. Nails for Exterior Use: hot-dip galvanized.

C. Screws for Exterior Use: hot-dip galvanized.

D. Provide self-drilling screws for metal-framing supports.

E. Anchors: Select material, type, size, and finish required for each substrate for secure anchorage. Provide metal expansion sleeves or expansion bolts for post-installed anchors. Use nonferrous-metal or hot-dip galvanized anchors and inserts at inside face of exterior walls and at floors.

F. Adhesives: Do not use adhesives that contain urea formaldehyde.

G. Adhesives: Use adhesives that meet the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

H. VOC Limits for Installation Adhesives and Sealants: Use products that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):

1. Wood Glues: 30 g/L.
2. Multipurpose Construction Adhesives: 70 g/L.
3. Structural Wood Member Adhesive: 140 g/L.
4. Architectural Sealants: 250 g/L.

2.6 FABRICATION

A. Fabricate ornamental woodwork to dimensions, profiles, and details indicated. Ease edges to radius indicated for the following:

1. Edges of Solid-Wood (Lumber) Members: 1/16 inch (1.5 mm) unless otherwise indicated.
2. Edges of Rails and Similar Members More Than 3/4 Inch (19 mm) Thick: 1/8 inch (3 mm).

B. Complete fabrication, including assembly and finishing, to maximum extent possible before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.

2.7 SHOP PRIMING

A. Exterior Ornamental Woodwork for Opaque Finish: Shop prime with one coat of wood primer specified in Section 09911 "Exterior Painting."

B. Preparations for Finishing: Comply with referenced quality standard for sanding, filling countersunk fasteners, sealing concealed surfaces, and similar preparations for finishing ornamental woodwork, as applicable to each unit of work.

1. Backpriming: Apply one coat of sealer or primer, compatible with finish coats, to concealed surfaces of woodwork. Apply two coats to surfaces installed in contact with concrete or masonry and to end-grain surfaces.

PART 3 - EXECUTION

3.1 PREPARATION

A. Before installation, condition ornamental woodwork to average prevailing humidity conditions in installation areas.

3.2 INSTALLATION

A. Grade: Install ornamental woodwork to comply with same grade as item to be installed.

B. Install ornamental woodwork level, plumb, true, and straight. Shim as required with concealed shims. Install level and plumb to a tolerance of 1/8 inch in 96 inches (3 mm in 2400 mm).

C. Scribe and cut ornamental woodwork to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.

D. Preservative-Treated Wood: Where cut or drilled in field, treat cut ends and drilled holes according to AWPA M4.

E. Anchor ornamental woodwork to anchors or blocking built in or directly attached to substrates. Secure with countersunk, concealed fasteners and blind nailing. Use fine finishing nails or finishing screws for exposed fastening, countersunk and filled flush with ornamental woodwork.

END OF SECTION 064400

SECTION 06640 - PLASTIC PANELING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes glass-fiber reinforced plastic (FRP) wall paneling and trim accessories.

1.2 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Samples: For plastic paneling and trim accessories.

1.3 QUALITY ASSURANCE

A. Surface-Burning Characteristics: As determined by testing identical products according to ASTM E 84 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Flame-Spread Index: 25or less.
2. Smoke-Developed Index: 450 or less.

PART 2 - PRODUCTS

2.1 PLASTIC SHEET PANELING

A. Gelcoat-finished, glass-fiber reinforced plastic panels complying with ASTM D 5319.
1. Basis-of-Design Product: Subject to compliance with requirements, provide Marlite gelcoated-finished, glass fiber reinforced plastic panel or comparable product by one of the following:

.

a. Kemlite Company Inc
b. Nudo Products, Inc.

2. Nominal Thickness: Not less than 0.09 inch.
3. Surface Finish: Molded Pebble Texture.
4. Color: As selected by Architect from manufacturer's full range.
5. Panel Size: 48” x 120”

2.2 ACCESSORIES

A. Trim Accessories: Manufacturer's standard one-piece vinyl extrusions designed to retain and cover edges of panels. Provide division bars, inside corners, outside corners, and caps as needed to conceal edges.

1. Color: As selected by Architect from manufacturer's full range.

B. Adhesive: As recommended by plastic paneling manufacturer.

C. Sealant: silicone waterproof sealant provided by plastic paneling manufacturer..

PART 3 - EXECUTION

3.1 PREPARATION

A. Clean substrates of substances that could impair bond of adhesive, including oil, grease, dirt, and dust.

B. Condition panels by unpacking and placing in installation space before installation according to manufacturer's written recommendations.

C. Lay out paneling before installing. Locate panel joints to provide equal panels at ends of walls not less than half the width of full panels.

3.2 INSTALLATION

A. Install plastic paneling according to manufacturer's written instructions.

B. Panels to be opened and allowed to acclimate for 48 hours prior to installation.

C. Install panels in a full spread of adhesive.

D. Install trim accessories with nails or staples or per manufacturer’s written instructions. Do not fasten through panels.

E. Fill grooves in trim accessories with sealant before installing panels and bed inside corner trim in a bead of sealant.

F. Install base trim to substrate with continuous adhesive per manufacturer’s instructions prior to installing panels.

G. Maintain uniform space between panels and wall fixtures. Provide a minimum 1/8” expansion space to insure proper installation. Fill space with sealant.

H. Remove excess sealant and smears as paneling is installed. Clean with solvent recommended by sealant manufacturer and then wipe with clean dry cloths until no residue remains. Do not use abrasive cleaners.

END OF SECTION 06640

DIVISION 07

SECTION 07161 - CRYSTALLINE WATERPROOFING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes crystalline waterproofing for negative-side application to concrete concealed exterior cast in place walls and columns and elevator walls and pit.

B. Related Sections:

1. Section 033000 "Cast-in-Place Concrete" for waterstops, and finishing concrete walls and slabs to receive waterproofing.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated. Include material descriptions and installation instructions for crystalline waterproofing.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Applicator.

B. Product Certificates: For waterproofing, patching, and plugging materials, from manufacturer.

C. Product Test Reports: Based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified testing agency, for crystalline waterproofing.

D. Field quality-control reports.

1.5 QUALITY ASSURANCE

A. Applicator Qualifications: A firm experienced in applying crystalline waterproofing similar in material, design, and extent to that indicated for this Project, whose work has resulted in applications with a record of successful in-service performance, and that employs workers trained and approved by manufacturer.

B. Mockups: Provide mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Build mockup of typical vertical surfaces10 sq. ft. (0.9 sq. m) in size.

2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
3. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

C. Preinstallation Conference: Conduct conference at Project site.

1.6 PROJECT CONDITIONS

A. Weather Limitations: Proceed with application only when existing and forecasted weather conditions permit crystalline waterproofing to be performed according to manufacturer's written instructions.

B. Proceed with waterproofing work only after pipe sleeves, vents, curbs, inserts, drains, and other projections through the substrate to be waterproofed have been completed. Proceed only after substrate defects, including honeycombs, voids, and cracks, have been repaired to provide a sound substrate free of forming materials, including reveal inserts.

C. Ambient Conditions: Proceed with waterproofing work only if temperature is maintained at 40 deg F (4.4 deg C) or above during work and cure period, and space is well ventilated and kept free of water.

PART 2 - PRODUCTS

2.1 WATERPROOFING MATERIALS

A. Crystalline Waterproofing: Prepackaged, gray-colored proprietary blend of portland cement, specially treated sand, and active chemicals that, when mixed with water and applied, penetrates into concrete and concrete unit masonry and reacts chemically with the byproducts of cement hydration in the presence of water to develop crystalline growth within substrate capillaries to produce an impervious, dense, waterproof substrate; that has VOC content complying with limits of authorities having jurisdiction; with properties meeting or exceeding the criteria specified below.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

   a. American PERMAQUIK Inc.; Super 200.
   b. Anti-Hydro International, Inc.; A-H Hydrocap.
   c. AQUAFIN, Inc.; AQUAFIN-1C.
   d. BASF Building Systems; Tegraproof.
   e. Conproco Corporation; Conpro Super Seal.
   f. Euclid Tamms; [**HEY'DI K-11**] [**HEY'DI POWER X SYSTEM**].
   g. Gemite Products Inc.; Cem-Kote CW Plus.
   h. ICS Penetron International Ltd.; Penetron.
   i. International Chem-Crete, Inc.; Chem-Cretex Cem 600.
   j. IPA Systems, Inc.; Drycon.
   k. Kryton Group of Companies (The); Krystol T1 & T2 Waterproofing System.
   l. Vandex USA LLC; Vandex Super/Super White.
   m. Xypex Chemical Corporation; Xypex.

2. Water Permeability: Maximum zero for water at 30 feet (9 m) when tested according to CE CRD-C 48.
3. Compressive Strength: Minimum 4000 psi (27.6 MPa) at 28 days when tested according to ASTM C 109/C 109M.

2.2 ACCESSORY MATERIALS

A. Patching Compound: Factory-premixed cementitious repair mortar, crack filler, or sealant recommended by waterproofing manufacturer for filling and patching tie holes, honeycombs, reveals, and other imperfections; compatible with substrate and other materials indicated; and VOC content complying with limits of authorities having jurisdiction.

B. Plugging Compound: Factory-premixed cementitious compound with hydrophobic properties and recommended by waterproofing manufacturer; resistant to water and moisture but vapor permeable for all standard applications (vertical, overhead, and horizontal surfaces not exposed to vehicular traffic); compatible with substrate and other materials indicated; and VOC content complying with limits of authorities having jurisdiction.

C. Portland Cement: ASTM C 150, Type I.

D. Sand: ASTM C 144.

E. Polymer Admixture for Protective Topping: Polymer bonding agent and admixture designed to improve adhesion to prepared substrates and not to create a vapor barrier.

F. Water: Potable.

2.3 MIXES

A. Crystalline Waterproofing: Add prepackaged dry ingredients to water according to manufacturer's written instructions. Mix together with mechanical mixer or by hand to required consistency.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Applicator present, for suitable conditions where waterproofing is to be applied.

B. Proceed with application only after unsatisfactory conditions have been corrected.

C. Notify Architect in writing of active leaks or defects that would affect system performance.

3.2 PREPARATION

A. Protect other work from damage caused by cleaning, preparation, and application of waterproofing. Provide temporary enclosure to confine spraying operation and to ensure adequate ambient temperatures and ventilation conditions for application.

B. Do not allow waterproofing, patching, and plugging materials to enter reveals or annular spaces intended for resilient sealants or gaskets, such as joint spaces between pipes and pipe sleeves.

C. Stop active water leaks with plugging compound according to waterproofing manufacturer's written instructions.

D. Repair damaged or unsatisfactory substrate with patching compound according to manufacturer's written instructions.

E. Surface Preparation: Comply with waterproofing manufacturer's written instructions to remove efflorescence, chalk, dust, dirt, mortar spatter, grease, oils, paint, curing compounds, and form-release agents to ensure that waterproofing bonds to surfaces.

1. Clean concrete surfaces according to ASTM D 4258.

    a. Scratch- and Float-Finished Concrete: Etch with 10 percent muriatic (hydrochloric) acid solution according to ASTM D 4260.
    b. Prepare smooth-formed and trowel-finished concrete by mechanical abrading or abrasive-blast cleaning according to ASTM D 4259.

2. Clean concrete unit masonry surfaces according to ASTM D 4261.

    a. Lightweight Concrete Unit Masonry: Etch with 10 percent muriatic (hydrochloric) acid solution or abrade surface by wire brushing. Remove acid residue until pH readings of water after rinse are not more than 1.0 pH lower or 2.0 pH higher than pH of water before rinse.
    b. Medium- and Normal-Weight Concrete Unit Masonry: Sandblast or bushhammer to a depth of 1/16 inch (1.6 mm).

3. Concrete Joints: Clean reveals according to waterproofing manufacturer's written instructions.

3.3 APPLICATION

A. General: Comply with waterproofing manufacturer's written instructions for application and curing.

1. Saturate surface with water for several hours prior to application and maintain damp condition until applying waterproofing. Remove standing water.
2. Apply waterproofing to surfaces indicated on Drawings.
3. Number of Coats: Number required for specified water permeability.
4. Application Method: Spray. Apply to ensure that each coat fills voids and is in full contact with substrate or previous coat.
5. Dampen surface between coats.

B. Final Coat Finish: Smooth.

C. Curing: Moist-cure waterproofing for three days immediately after final coat has set, followed by air drying, unless otherwise recommended in writing by manufacturer.

D. Waterproofing Treatment Extensions: Extend waterproofing treatment as follows:

1. Onto columns integral with treated walls.

2. Onto interior nontreated walls intersecting exterior treated walls, for a distance of 24 inches (600 mm) for cast-in-place concrete.
3. Onto every substrate in areas indicated for treatment, including pipe trenches pipe chases pits sumps and similar offsets and features.

3.4 FIELD QUALITY CONTROL

A. Inspection: Engage manufacturer's representative to inspect completed application and provide a written report that application complies with manufacturer's written instructions.

END OF SECTION 071616

SECTION 07210 - BUILDING INSULATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:
   1. Mineral-wool board insulation.
   2. Glass-fiber blanket insulation.
   3. Spray polyurethane foam insulation.
   4. Foam-plastic board insulation

B. Related Sections:
   1. Division 7 Section “Fluid Applied Membrane Air Barriers” for installation of moisture barriers
   2. Division 7 Section “Styrene–Butadiene-Styrene” (SBS) modified bituminous membrane roofing
   3. Division 7 Section “Fire Resistive Joint Sytems” for insulation installed as part of fire resistive joint system
   4. Division 9 Section “ Non-Load Bearing Steel Framing” for installation of board to “Z” channels

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

1.4 INFORMATIONAL SUBMITTALS

A. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for each product.

1.5 QUALITY ASSURANCE

A. Surface-Burning Characteristics: As determined by testing identical products according to ASTM E 84 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Protect insulation materials from physical damage and from deterioration due to moisture, soiling, and other sources. Store inside and in a dry location. Comply with manufacturer's written instructions for handling, storing, and protecting during installation.

PART 2 - PRODUCTS

2.1 GLASS-FIBER BLANKET INSULATION

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. CertainTeed Corporation.
2. Guardian Building Products, Inc.
3. Johns Manville.
4. Knauf Insulation.
5. Owens Corning.

B. Unfaced, Glass-Fiber Blanket Insulation: ASTM C 665, Type I; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively, per ASTM E 84; passing ASTM E 136 for combustion characteristics.

2.2 MINERAL-WOOL BLANKET INSULATION

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Fibrex Insulations Inc.
2. Owens Corning.
3. Roxul Inc.
4. Thermafiber.

B. Unfaced, Mineral-Wool Blanket Insulation: ASTM C 665, Type I (blankets without membrane facing); consisting of fibers; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively, per ASTM E 84; passing ASTM E 136 for combustion characteristics.

2.3 SPRAY POLYURETHANE FOAM INSULATION

A. Closed-Cell Polyurethane Foam Insulation: ASTM C 1029, Type II, with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, per ASTM E 84.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. BaySystems NorthAmerica, LLC.
   b. or comparable product approved by Architect.

2. Minimum density of 1.5 lb/cu. ft. (24 kg/cu. m), thermal resistivity of 6.2 deg F x h x sq. ft./Btu x in. at 75 deg F (43 K x m/W at 24 deg C).

2.4 FOAM-PLASTIC BOARD INSULATION

A. Extruded-Polystrene Board Insulation: ASTM C 578, of type and minimum compressive strength indicated below, with maximum flame – spread and smoke developed indexes of 75 and 450, respectively, per ASTM E 84

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Divers; foam products
    b. Dow Chemical Company (the)
    c. Owens Corning
    d. Pactiv Building Products

2. Type IV, 25 psi

B. Adhesive for Bonding Insulation: Product with demonstrated capability to bond insulation securely to substrates without demaging insulation and substrates.

2.5 INSULATION FASTENERS

A. Adhesively Attached, Spindle-Type Anchors: Plate welded to projecting spindle; capable of holding insulation of specified thickness securely in position indicated with self-locking washer in place.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

    a. AGM Industries, Inc.; Series T TACTOO Insul-Hangers.
    b. Gemco; Spindle Type.

2. Spindle: Copper-coated, low-carbon steel; fully annealed; 0.105 inch (2.67 mm) in diameter; length to suit depth of insulation indicated.

B. Adhesively Attached, Angle-Shaped, Spindle-Type Anchors: Angle welded to projecting spindle; capable of holding insulation of specified thickness securely in position indicated with self-locking washer in place.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

    a. Gemco; 90-Degree Insulation Hangers.

C. Anchor Adhesive: Product with demonstrated capability to bond insulation anchors securely to substrates indicated without damaging insulation, fasteners, and substrates.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

    a. AGM Industries, Inc.; TACTOO Adhesive.
    b. Gemco; Tuff Bond Hanger Adhesive.

PART 3 - EXECUTION

3.1 PREPARATION

A. Clean substrates of substances that are harmful to insulation or that interfere with insulation attachment.

3.2 INSTALLATION, GENERAL

A. Comply with insulation manufacturer's written instructions applicable to products and applications indicated.

B. Install insulation that is undamaged, dry, and unsoiled and that has not been left exposed to ice, rain, or snow at any time.

C. Extend insulation to envelop entire area to be insulated. Cut and fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.

D. Provide sizes to fit applications indicated and selected from manufacturer's standard thicknesses, widths, and lengths. Apply single layer of insulation units to produce thickness indicated unless multiple layers are otherwise shown or required to make up total thickness.

3.3 INSTALLATION OF INSULATION FOR FRAMED CONSTRUCTION

A. Apply insulation units to substrates by method indicated, complying with manufacturer's written instructions. If no specific method is indicated, bond units to substrate with adhesive or use mechanical anchorage to provide permanent placement and support of units.

B. Foam-Plastic Board Insulation: Seal joints between units by applying adhesive, mastic, or sealant to edges of each unit to form a tight seal as units are shoved into place. Fill voids in completed installation with adhesive, mastic, or sealant as recommended by insulation manufacturer. (Alternate)

C. Glass-Fiber or Mineral-Wool Blanket Insulation: Install in cavities formed by framing members according to the following requirements:

1. Use insulation widths and lengths that fill the cavities formed by framing members. If more than one length is required to fill the cavities, provide lengths that will produce a snug fit between ends.
2. Place insulation in cavities formed by framing members to produce a friction fit between edges of insulation and adjoining framing members.
3. Maintain 3-inch (76-mm) clearance of insulation around recessed lighting fixtures not rated for or protected from contact with insulation.
4. For metal-framed wall cavities where cavity heights exceed 96 inches (2438 mm), support unfaced blankets mechanically and support faced blankets by taping flanges of insulation to flanges of metal studs.

D. Spray-Applied Insulation: Apply spray-applied insulation according to manufacturer's written instructions. Do not apply insulation until installation of pipes, ducts, conduits, wiring, and electrical outlets in walls is completed and windows, electrical boxes, and other items not

indicated to receive insulation are masked. After insulation is applied, make flush with face of studs by using method recommended by insulation manufacturer.

E. Miscellaneous Voids: Install insulation in miscellaneous voids and cavity spaces where required to prevent gaps in insulation using the following materials:
1. Spray Polyurethane Insulation: Apply according to manufacturer's written instructions.

3.4 INSTALLATION OF CAVITY-WALL INSULATION

A. Foam-plastic Board Insulation: Install pads of adhesive approximately 24 inches o.c. both ways on inside face, and as recommended by manufacturer. Fit courses of insulation between wall ties and other obstructions with edges butted tightly in both directions. Press units firmly against inside substrates.

1. Supplement adhesive attachment of insulation by securing boards with two-piece wall ties designed for this purpose and specified in Division 4 Section “Unit Masonry Assemblies”

3.5 INSTALLATION OF INSULATION IN CEILINGS FOR SOUND ATTENUATION

A. Where glass-fiber blankets are indicated for sound attenuation above ceilings, install blanket insulation over entire ceiling area in thicknesses indicated. Extend insulation 48 inches (1219 mm) up either side of partitions.

3.6 PROTECTION

A. Protect installed insulation from damage due to harmful weather exposures, physical abuse, and other causes. Provide temporary coverings or enclosures where insulation is subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.

B. Ignition Barrier: Spray foam insulation requires Intumescent coating for all applications. Bayseal

3.7 INSULATION SCHEDULE

A. Insulation Type 1: Unfaced, glass-fiber blanket insulation.: used for sound attenuation between classrooms and between classrooms and hallways. Also for all bathroom walls.

B. Insulation Type 2: Unfaced, mineral-wool blanket insulation. Used for fire resistance in walls requiring one hour fire separation.

C. Insulation Type 3: Polyurethane spray foam insulation. Used for all exterior walls and underside of roof deck. R-31 for roof (Alternate for exterior steel stud walls) R-19 for walls

D. Insulation Type 4: Extruded-Polystyrene Board Insulation used for Masonry Exterior Walls R-19 for walls.

END OF SECTION 07210

SECTION 07250 - WEATHER BARRIERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Building paper at stud wall sheathing
2. Flexible flashing.

B. Related Requirements:

1. Section 06160 "Sheathing" for sheathing joint and penetration treatment.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. For building paper, include data on air and water-vapor permeance based on testing according to referenced standards.

2. Flexible flashing, include membrane mils, sizes available and limitations

1.4 INFORMATIONAL SUBMITTALS

A. Evaluation Reports: For water-resistive barrier and flexible flashing, from ICC-ES.

PART 2 - PRODUCTS

2.1 WATER-RESISTIVE BARRIER

A. Building Paper: ASTM D 226, Type 1 (No. 15 asphalt-saturated organic felt), unperforated.

B. Building Paper: Water-vapor-permeable, asphalt-saturated kraft building paper.

1. Water vapor transmission not less than 35 g/sq. m x 24 hr per ASTM D 779.
2. Water resistance not less than 1 hour per ASTM F 1249.

C. Building-Wrap Tape: Pressure-sensitive plastic tape recommended by building-wrap manufacturer for sealing joints and penetrations in building wrap.

2.2 MISCELLANEOUS MATERIALS

A. Flexible Flashing: Composite, self-adhesive, flashing product consisting of a pliable, **butyl** rubber or rubberized-asphalt compound, bonded to a high-density polyethylene film, aluminum foil, or spunbonded polyolefin to produce an overall thickness of not less than 0.025 inch (0.64 mm) Retain "Products" Subparagraph and list of manufacturers and products below to require specific products or a comparable product from other manufacturers.

1. Products: Subject to compliance with requirements, provide one of the following:

   a. DuPont (E. I. du Pont de Nemours and Company); DuPont Flashing Tape.
   b. Grace Construction Products, a unit of W. R. Grace & Co. - Conn.; Vycor Butyl Self Adhered Flashing.
   c. Protecto Wrap Company; BT-25 XL.
   d. Raven Industries Inc.; Fortress Flashshield.
   e. Advanced Building Products Inc.; Wind-o-wrap.
   f. Carlisle Coatings & Waterproofing; CCW-705-TWF Thru-Wall Flashing.
   g. Fiberweb, Clark Hammerbeam Corp.; Aquaflash 500.
   h. Fortifiber Building Systems Group; [**Fortiflash 25**] [**Fortiflash 40**].
   i. Grace Construction Products, a unit of W. R. Grace & Co. - Conn.; [**Vycor Plus Self-Adhered Flashing**] [**Vycor V40 Self-Adhered Flashing**].
   j. MFM Building Products Corp.; Window Wrap.
   k. Polyguard Products, Inc.; [**Polyguard JT-20 Tape**] [**Polyguard JT-30 Tape**].
   l. Sandell Manufacturing Co., Inc.; Presto-Seal.
   m.

B. Primer for Flexible Flashing: Product recommended by manufacturer of flexible flashing for substrate.

C. Nails: ASTM F 1667.

PART 3 - EXECUTION

3.1 WATER-RESISTIVE BARRIER INSTALLATION

A. Ensure items which pass through membrane are properly and rigidly installed, substrate is free of projections and irregularities which may be detrimental to proper installation of membrane .

B. Cover exposed exterior surface of sheathing with water-resistive barrier securely fastened to framing immediately after sheathing is installed.

C. Cover sheathing with water-resistive barrier as follows:

1. Cut back barrier 1/2 inch (13 mm) on each side of the break in supporting members at expansion- or control-joint locations.
2. Apply barrier to cover vertical flashing with a minimum 4-inch (100-mm) overlap unless otherwise indicated.

D. Sealing: Seal edges, fasteners and items projecting through barrier

E. Building Paper: Apply horizontally with a 2-inch overlap and a 6-inch end lap; fasten to sheathing with galvanized staples or roofing nails.

F. Inspect and repair membrane prior to application of finished material over membrane; tape tears, perforations and similar damage.

3.2 FLEXIBLE FLASHING INSTALLATION

A. Apply flexible flashing where indicated to comply with manufacturer's written instructions.

1. Prime substrates as recommended by flashing manufacturer.
2. Lap seams and junctures with other materials at least 4 inches except that at flashing flanges of other construction, laps need not exceed flange width.
3. Lap flashing over water-resistive barrier at sides of openings.
4. Lap water-resistive barrier over flashing at heads and sills of openings
5. Lap water-resistive barrier over flashing at through flashing
6. After flashing has been applied, roll surfaces with a hard rubber or metal roller to ensure that flashing is completely adhered to substrates.

B. Protect flashing from damage of other trades or construction materials

C. Cover flashing within 30 days or per manufacturer’s written instructions.

END OF SECTION 07250

SECTION 07272 - FLUID-APPLIED MEMBRANE AIR BARRIERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:
   1. Vapor-permeable, fluid-applied air barriers for the interior of CMU block walls

B. Related Requirements:
   1. Section 042000 “Unit Masonry” for concrete masonry walls
   2. Section 092216 “Non-Structural Metal Framing” for metal and wood stud walls furred at interior side of CMU block walls.

1.3 DEFINITIONS

A. Air-Barrier Material: A primary element that provides a continuous barrier to the movement of air.

B. Air-Barrier Accessory: A transitional component of the air barrier that provides continuity.

C. Air-Barrier Assembly: The collection of air-barrier materials and accessories applied to an opaque wall, including joints and junctions to abutting construction, to control air movement through the wall.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site

   1. Review air-barrier requirements and installation, special details, mockups, air-leakage and bond testing, air-barrier protection, and work scheduling that covers air barriers.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

   1. Include manufacturer's written instructions for evaluating, preparing, and treating each substrate; technical data; wet and dry film thickness; and tested physical and performance properties of products.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Product Certificates: From air-barrier manufacturer, certifying compatibility of air barriers and accessory materials with Project materials that connect to or that come in contact with the barrier.

C. Product Test Reports: For each air-barrier assembly, for tests performed by a qualified testing agency.

1.7 QUALITY ASSURANCE

A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.

1. A company experienced in applying air barrier materials similar in material, design, and extent to those indicated for this Project, whose work has resulted in applications with a record of successful in-service performance.
2. Verification that Installer completed SWR Institute's Validated Air Barrier Training Program and is approved to perform work as herein specified by air and water-resistive barrier system manufacturer.

B. Mockups: Build mockups to set quality standards for materials and execution Keep mock-ups available for inspection throughout project.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Sequence deliveries to avoid delays, and to minimize on-site storage.

B. Remove and replace liquid materials that cannot be applied within their stated shelf life.

C. Deliver materials and products in labeled packages.

D. Store and handle in strict compliance with manufacturer's instructions and recommendations.

E. Protect from damage, weather, excessive temperatures, and construction operations.

F. Remove damaged material from site and dispose of in accordance with applicable regulations.

1.9 FIELD CONDITIONS

A. Environmental Limitations: Apply air barrier within the range of ambient and substrate temperatures recommended in writing by air-barrier manufacturer.

1. Protect substrates from environmental conditions that affect air-barrier performance.
2. Do not apply air barrier to a damp or wet substrate or during snow, rain, fog, or mist.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Source Limitations: Obtain primary air-barrier materials and air-barrier accessories from single source from single manufacturer.

B. VOC Content: 30 g/L or less.

2.2 PERFORMANCE REQUIREMENTS

A. Air-Barrier Performance: Air-barrier assembly and seals with adjacent construction shall be capable of performing as a continuous air barrier. Air-barrier assemblies shall be capable of accommodating substrate movement and of sealing substrate expansion and control joints, construction material changes, penetrations and transitions at perimeter conditions without deterioration and air leakage exceeding specified limits.

B. Air-Barrier Assembly Air Leakage: Maximum 0.04 cfm/sq. ft. of surface area at 1.57 lbf/sq. ft. (0.2 L/s x sq. m of surface area at 75 Pa) , when tested according to ASTM E 2357.

2.3 LOW-BUILD AIR BARRIERS, VAPOR PERMEABLE

A. Low-Build, Vapor-Permeable Air Barrier: Silyl-Terminated-Poly-Ether (STPe**)** material with an installed dry film thickness, according to manufacturer's written instructions, of 6 to 15 mils (1.5 to 0.38 mm) over smooth, void-free substrates.

1. Manufactures: subject to compliance with requirements, available manufacturers offering products that may be incorporated into the work:

   a. PROSOCO Inc.; R-Guard Cat5
   b. Dow Chemical Co.; Dowsil Defunderair 200
   c. GE Silicones; Elemax 2600

2. Physical and Performance Properties:

   a. Air Permeance: Maximum 0.004 cfm/sq. ft. of surface area at 1.57-lbf/sq. ft. (0.02 L/s x sq. m of surface area at 75-Pa) pressure difference; ASTM E 2178.
   b. Vapor Permeance: Minimum 10 perms (580 ng/Pa x s x sq. m); ASTM E 96/E 96M, Desiccant Method, Procedure A.
   c. Adhesion to Substrate: Minimum 16 lbf/sq. in. (110 kPa) when tested according to ASTM D 4541.
   d. Fire Propagation Characteristics: Passes NFPA 285 testing as part of an approved assembly.

2.4 ACCESSORY MATERIALS

A. Requirement: Provide primers, transition strips, termination strips, joint reinforcing fabric and strips, joint sealants, counterflashing strips, flashing sheets and metal termination bars, termination mastic, substrate patching materials, adhesives, tapes, foam sealants, lap sealants, and other accessory materials that are recommended in writing by air-barrier manufacturer to

produce a complete air-barrier assembly and that are compatible with primary air-barrier material and adjacent construction to which they may seal.

1. Liquid-type auxiliary materials shall comply with VOC requirements.
2. Wet-weather accessories compatible with the primary Wet-Weather Fluid Applied Vapor-Permeable Membrane System shall be comprised of Silyl-Terminated-Poly-Ether (STPe).

B. Substrate-Patching Material: Manufacturer's standard substrate filler as recommended for preparation of cracks and overdriven fasteners, as recommended by air barrier manufacturer.

C. Stainless-Steel Sheet: ASTM A 240/A 240M, Type 304, and Series 300 stainless-steel fasteners.

D. Preformed Silicone Extrusion: Manufacturer's standard system consisting of cured low-modulus silicone extrusion, sized to fit opening widths, with a single-component, neutral-curing, Class 100/50 (low-modulus) silicone sealant for bonding extrusions to substrates.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a) PROSOCO, Inc.
b) Dow Chemical
c) GE Silicones

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements and other conditions affecting performance of the Work.

1. Verify that substrates are sound and free of oil, grease, dirt, excess mortar, or other contaminants.
2. Verify that substrates have cured and aged for minimum time recommended in writing by air-barrier manufacturer.
3. Verify that substrates are visibly dry and free of moisture, unless approved by air barrier manufacturer.Test concrete substrates for capillary moisture by plastic sheet method according to ASTM D 4263.
4. Verify that masonry joints are flush and completely filled with mortar.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 SURFACE PREPARATION

A. Clean, prepare, treat, fill, and seal substrate and joints and cracks in substrate according to manufacturer's written instructions and details. Provide clean, dust-free, and dry substrate for air-barrier application.

1. Surfaces to receive fluid-applied, STPe accessory materials may be dry, damp, or wet to the touch. Brush away any standing water present before application. The products will tolerate rain immediately after application.

B. Mask off adjoining surfaces not covered by air barrier to prevent spillage and overspray affecting other construction.

C. Remove film-forming coatings, curing compounds, and form-release agents from concrete, and grease, oil, bitumen, paints, and other contaminants from all substrates.

D. Remove fins, ridges, mortar, and other projections and fill honeycomb, aggregate pockets, holes, and other voids in concrete with substrate-patching material.

E. Remove excess mortar from masonry ties, shelf angles, and other obstructions.

F. At changes in substrate plane, apply sealant or termination mastic beads at sharp corners and edges to form a smooth transition from one plane to another. See STPe product manufacturer's installation guidelines illustrations.

G. Cover gaps in substrate plane and form a smooth transition from one substrate plane to another with stainless-steel sheet mechanically fastened to structural framing to provide continuous support for air barrier.

H. Bridge isolation joints, expansion joints, and discontinuous wall-to-wall, deck-to-wall, and deck-to-deck joints with air-barrier accessory material that accommodates joint movement according to manufacturer's written instructions and details.

I. Apply primer to substrates at required rate and allow it to dry, as recommended by air barrier manufacturer.

3.3 JOINT TREATMENT

A. Concrete and Masonry: Prepare, treat, rout, and fill joints and cracks in substrate according to ASTM C 1193 and air-barrier manufacturer's written instructions. Remove dust and dirt from joints and cracks complying with ASTM D 4258 before coating surfaces.

1. Prepare, treat, rout, and fill joints and cracks in substrate according to ASTM C 1193 and air-barrier manufacturer's written instructions.
2. Remove dust and dirt from joints and cracks complying with ASTM D 4258 before coating surfaces.

3.4 ACCESSORIES INSTALLATION

A. Install accessory materials according to air-barrier manufacturer's written instructions and details to form a seal with adjacent construction and ensure continuity of air and water barrier.

B. Seal masonry reinforcing or ties and penetrations as recommended by air barrier manufacturer.

C. Seal top of through-wall flashings to air barrier as recommended by air barrier manufacturer.

D. Seal exposed edges of strips at seams, cuts, penetrations, and terminations not concealed by metal counterflashings or ending in reglets as recommended by air barrier manufacturer.

E. Repair punctures, voids, and deficient lapped seams in strips and transition strips as recommended by air barrier manufacturer.

3.5 PRIMARY AIR-BARRIER MATERIAL INSTALLATION

A. Apply air-barrier material to form a seal with strips and transition strips and to achieve a continuous air barrier according to air-barrier manufacturer's written instructions and details. Apply air-barrier material within manufacturer's recommended application temperature ranges.

1. Unless manufacturer recommends in writing against priming, apply primer to substrates at required rate and allow it to dry.
2. Where multiple prime coats are needed to achieve required bond, allow adequate drying time between coats.

B. Low-Build Air Barriers: Apply continuous unbroken air-barrier material to substrates according to the following thickness. Apply an increased thickness of air-barrier material in full contact around protrusions such as masonry ties.
1. Vapor-Permeable, Low-Build Air Barrier: Apply dry film thickness as recommended by air barrier manufacturer's literature to comply with performance requirements. Apply additional material as needed to achieve void- and pinhole-free surface, but do not exceed thickness on which required vapor permeability is based.

C. Do not cover air barrier until it has been tested and inspected by testing agency.

D. Correct deficiencies in air barrier that does not comply with requirements; repair substrates and reapply air-barrier components.

3.6 FIELD QUALITY CONTROL

A. ABAA Quality Assurance Program: Perform examinations, preparation, installation, testing, and inspections under ABAA's Quality Assurance Program.

B. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.

C. Inspections: Air-barrier materials, accessories, and installation are subject to inspection for compliance with requirements. Inspections may include the following:

1. Continuity of air-barrier system has been achieved throughout the building envelope with no gaps or holes.
2.
3. Surfaces have been primed, if applicable.
4. Compatible materials have been used.
5. Transitions at changes in direction and structural support at gaps have been provided.
6. Connections between assemblies (air-barrier and sealants) have complied with requirements for cleanliness, surface preparation and priming, structural support, integrity, and continuity of seal.
7. All penetrations have been sealed.

D. Tests: As determined by testing agency from among the following tests:

1. Air-Leakage-Location Testing: Air-barrier assemblies will be tested for evidence of air leakage according to ASTM E 1186, chamber pressurization or depressurization with smoke tracers or ASTM E 1186, chamber depressurization using detection liquids
2. Air-Leakage-Volume Testing: Air-barrier assemblies will be tested for air-leakage rate according to ASTM E 783 or ASTM E 2357.
3. Adhesion Testing: Air-barrier assemblies will be tested for required adhesion to substrate according to ASTM D 4541 for each 600 sq. ft. (56 sq. m) of installed air barrier or part thereof.

E. Air barriers will be considered defective if they do not pass tests and inspections.

1. Apply additional air-barrier material, according to manufacturer's written instructions, where inspection results indicate insufficient thickness.
2. Remove and replace deficient air-barrier components for retesting as specified above.

F. Repair damage to air barriers caused by testing; follow manufacturer's written instructions.

G. Prepare test and inspection reports.

3.7 CLEANING AND PROTECTION

A. Protect air-barrier system from damage during application and remainder of construction period, according to manufacturer's written instructions.

1. Protect air barrier from exposure to UV light and harmful weather exposure as recommended in writing by manufacturer. If exposed to these conditions for longer than recommended, remove and replace air barrier or install additional, full-thickness, air-barrier application after repairing and preparing the overexposed materials according to air-barrier manufacturer's written instructions.
2. Protect air barrier from contact with incompatible materials and sealants not approved by air-barrier manufacturer.

B. Clean spills, stains, and soiling from construction that would be exposed in the completed work using cleaning agents and procedures recommended in writing by manufacturer of affected construction.

C. Remove masking materials after installation.

END OF SECTION 072726

SECTION 07311 - ASPHALT SHINGLES

TIPS:

To view non-printing **Editor's Notes** that provide guidance for editing, click on MasterWorks/Single-File Formatting/Toggle/Editor's Notes.

To read **detailed research, technical information about products and materials, and coordination checklists**, click on MasterWorks/Supporting Information.

Content Requests:

<Double click here to submit questions, comments, or suggested edits to this Section.>

Access Manufacturer-Provided, AIA MasterSpec-Based Sections:

<Double click here for this Section based on specific manufacturer's products set as Basis-of-Design at ProductMasterSpec.com.>

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes: Asphalt Shingle roof at outdoor storage building

1. Glass-fiber-reinforced asphalt shingles.
2. Underlayment materials.
3. Metal flashing and trim.

1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.3 ACTION SUBMITTALS

A. Product Data: For the following:

1. Asphalt shingles.
2. Underlayment materials.
3. Asphalt roofing cement.
4. Elastomeric flashing sealant.

B. Shop Drawings: For metal flashing and trim.

C. Samples: For each exposed product and for each color and blend specified.

1.4 INFORMATIONAL SUBMITTALS

A. Product test reports.

B. Research reports for synthetic underlayment.

C. Sample warranty.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance data.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: An authorized installer who is trained and approved by manufacturer.

1.7 WARRANTY

A. Materials Warranty: Manufacturer agrees to repair or replace asphalt shingles that fail within specified warranty period.

1. Materials Warranty Period: 40 years from date of Substantial Completion, prorated, with first 10 years nonprorated.
2. Wind-Speed Warranty Period: Asphalt shingles will resist blow-off or damage caused by wind speeds of up to 130 mph for 15 years from date of Substantial Completion.
3. Algae-Resistance Warranty Period: Asphalt shingles will not discolor for 10 years from date of Substantial Completion.
4. Workmanship Warranty Period: 25 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Exterior Fire-Test Exposure: Provide asphalt shingles and related roofing materials identical to those of assemblies tested for Class A fire resistance in accordance with ASTM E108 or UL 790 by Underwriters Laboratories or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify products with appropriate markings of applicable testing agency.

B. Wind Resistance: Provide asphalt shingles that comply with requirements of ASTM D3161/D3161M, Class F, and with ASTM D7158/D7158M, Class H.

C. Energy Performance, ENERGY STAR: Provide asphalt shingles that are listed on the DOE's "ENERGY STAR Roof Product List" for steep-slope roof products.

2.2 GLASS-FIBER-REINFORCED ASPHALT SHINGLES

A. Three-Tab-Strip Asphalt Shingles: ASTM D3462/D3462M; glass-fiber reinforced, mineral-granule surfaced, and self-sealing; with tabs regularly spaced.

1. Basis of Design: Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include but not limited to, the following:
   a. GAF
   b. Owen Corning
   c. Cetainteed
2. Strip Size: Manufacturer's standard
3. Algae Resistance: Granules resist algae discoloration.
4. Color and Blends: As selected by Architect from manufacturer's full range

B. Hip and Ridge Shingles: Manufacturer's standard units to match asphalt shingles

2.3 UNDERLAYMENT MATERIALS

A. Organic Felt: Asphalt-saturated organic felts (30 lb. per 100 sq.ft.) , nonperforated and complying with the following:
   1. ASTM D4869/D4869M:Type II

2.4 ACCESSORIES

A. Asphalt Roofing Cement: ASTM D4586/D4586M Type II, asbestos free.

B. Elastomeric Flashing Sealant: ASTM C920, Type S, Grade NS, one-part, non-sag, elastomeric polymer sealant; of class and use classifications required to seal joints and remain watertight; recommended in writing by manufacturer for installation of flashing systems.

Roofing Nails: ASTM F1667, Where nails are in Standard round wire, zinc-coated steel or aluminum; 10 to 12 gauge, smooth, barbed or deformed shank, with heads 3/8 inch (9mm) to 7/16 inch (11mm) in diameter. Length must be sufficient to penetrate into solid wood at least 3/4 inch (19mm) or through plywood board by at least 1/8 inch (3.18mm)

1. contact with metal flashing, use nails made from same metal as flashing.

C. Underlayment Nails: Aluminum, stainless steel, or hot-dip galvanized-steel wire nails with low-profile metal or plastic caps, 1-inch- minimum diameter.

2.5 METAL FLASHING AND TRIM

A. Comply with requirements in Section 07620 "Sheet Metal Flashing and Trim."

1. Sheet Metal: 24 gauge hot-dip galvanized steel sheet, complying with ASTM A 653/A 653M, G90/Z275

B. Fabricate sheet metal flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of the item unless otherwise indicated on Drawings.

1. Vent-Pipe Flashings: ASTM B749, Type L51121, at least 1/16 inch thick. Provide lead sleeve sized to slip over and turn down into pipe, soldered to skirt at slope of roof, and extending at least 4 inches from pipe onto roof.

PART 3 - EXECUTION

3.1 INSTALLATION OF UNDERLAYMENT MATERIALS

A. Comply with asphalt shingle and underlayment manufacturers' written installation instructions and with recommendations in NRCA's "The NRCA Roofing Manual: Steep-Slope Roof Systems" applicable to products and applications indicated unless more stringent requirements are specified in this Section or indicated on Drawings.

B. Asphalt-Saturated Felt: Install on roof deck parallel with and starting at eaves and fasten with underlayment roofing nails.

1. Single-Layer Installation:

    a. Lap sides a minimum of 4 inches over underlying course.
    b. Lap ends a minimum of 4 inches.
    c. Stagger end laps between succeeding courses at least 72 inches

2. Double-Layer Installation:

    a. Install a 19-inch- wide starter course at eaves and completely cover with a 36-inch-wide second course.
    b. Install succeeding 36-inch- wide courses lapping previous courses 19 inches in shingle fashion.
    c. Lap ends a minimum of 4 inches Stagger end laps between succeeding courses at least 72 inches
    d. Apply a continuous layer of asphalt roofing cement over starter course and on felt surface to be concealed by succeeding courses as each felt course is installed. Apply over entire roof

3. Install felt underlayment on roof deck not covered by self-adhering, polymer-modified bitumen sheet unless otherwise specified in this Section or indicated on Drawings.

    a. Lap sides of felt over self-adhering sheet not less than 4 inches in direction that sheds water.
    b. Lap ends of felt not less than 6 inches over self-adhering sheet.

4. Install fasteners in a grid pattern of 12 inches between side laps with 6-inch spacing at side and end laps.
5.

C. Self-Adhering, Polymer-Modified Bitumen Sheet: Install, wrinkle free, on roof deck in locations indicated on Drawings.

1. Comply with low-temperature installation restrictions of underlayment manufacturer.
2. Install lapped in direction that sheds water.

    a. Lap sides not less than 4 inches

b. Lap ends not less than 6 inches , staggered 24 inches between succeeding courses
c. Roll laps with roller.

3. Prime concrete, masonry, and metal surfaces to receive self-adhering sheet.
4. Cover underlayment within seven days.

3.2 INSTALLATION OF METAL FLASHING AND TRIM

A. Install metal flashings and trim to comply with requirements in Section 07620 "Sheet Metal Flashing and Trim."

1. Install metal flashings in accordance with recommendations in ARMA's "Asphalt Roofing Residential Manual - Design and Application Methods" and NRCA's "NRCA Guidelines for Asphalt Shingle Roof Systems."
2. Bed flanges of metal flashings using asphalt roofing cement or elastomeric flashing sealant.

B. Pipe Flashings: Form flashing around pipe penetrations and asphalt shingles. Fasten and seal to asphalt shingles as recommended by manufacturer.

3.3 INSTALLATION OF ASPHALT SHINGLES

A. Install asphalt shingles in accordance with manufacturer's written instructions and recommendations in ARMA's "Asphalt Roofing Residential Manual - Design and Application Methods" and] NRCA's "NRCA Guidelines for Asphalt Shingle Roof Systems."

B. Install starter strip along lowest roof edge, consisting of an asphalt shingle strip with tabs removed at least 7 inches wide with self-sealing strip face up at roof edge.

1. Extend asphalt shingles 3/4 inch over fasciae at eaves and rakes.
2. Install starter strip along rake edge.

C. Install first and remaining courses of laminated asphalt shingles stair-stepping diagonally across roof deck with manufacturer's recommended offset pattern at succeeding courses, maintaining uniform exposure.

D. Install first and remaining courses of three-tab-strip asphalt shingles stair-stepping diagonally across roof deck with manufacturer's recommended offset pattern at succeeding courses, maintaining uniform exposure.

E. Fasten asphalt shingle strips with a minimum of four roofing nails, but not less than the number indicated in manufacturer's written instructions for roof slope and design wind speed indicated on Drawings and for warranty requirements specified in this Section.

F. Hip and Ridge Shingles: Maintain same exposure of cap shingles as roofing-shingle exposure. Lap cap shingles at ridges to shed water away from direction of prevailing winds.

1. Fasten with roofing nails of sufficient length to penetrate sheathing.
2. Fasten ridge cap asphalt shingles to cover ridge vent without obstructing airflow.

END OF SECTION 07311

SECTION 07460 - SIDING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Fiber-cement siding.

B. Related Sections:
1. Section 06160 "Sheathing" for wall sheathing and weather-resistive barriers.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Samples for Initial Selection: For siding and soffit including related accessories.

C. Samples for Verification: For each type, color, texture, and pattern required.

1. 12-inch- (300-mm-) long-by-actual-width Sample of siding.
2. 12-inch- (300-mm-) long-by-actual-width Samples of trim and accessories.

1.4 INFORMATIONAL SUBMITTALS

A. Product Certificates: For each type of siding from manufacturer.

B. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for fiber-cement siding.

C. Research/Evaluation Reports: For each type of siding required, from the ICC .

D. Warranty: Sample of special warranty.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For each type of siding and related accessories to include in maintenance manuals.

1.6 QUALITY ASSURANCE

A. Labeling: Provide fiber-cement siding that is tested and labeled according to ASTM C 1186 by a qualified testing agency acceptable to authorities having jurisdiction.

B. Source Limitations: Obtain each type, color, texture, and pattern of siding and soffit, including related accessories, from single source from single manufacturer.

C. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for fabrication and installation.

1. Build mockup of typical wall area as shown on Drawings.
2. Build mockups for siding including accessories.

    a. Size: 48 inches (1200 mm) long by 60 inches (1800 mm) high .
    b. Include outside corner on one end of mockup and inside corner on other end.

3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
4. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

D. Preinstallation Conference: Conduct conference at Project site .

1.7 DELIVERY, STORAGE, AND HANDLING

A. Store materials in a dry, well-ventilated, weather tight place.

1.8 COORDINATION

A. Coordinate installation with flashings and other adjoining construction to ensure proper sequencing.

1.9 WARRANTY

A. Special Warranty: Standard form in which manufacturer agrees to repair or replace siding that fail(s) in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

    a. Structural failures including cracking, deforming.
    b. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
    c. .
2. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 FIBER-CEMENT SIDING

A. General: ASTM C 1186, Type A, Grade II, fiber-cement board, noncombustible when tested according to ASTM E 136; with a flame-spread index of 25 or less when tested according to ASTM E 84.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. Cemplank.
b. CertainTeed Corp.
c. GAF Materials Corporation.
d. James Hardie.
e. MaxiTile, Inc; a California corporation.
f. Nichiha Fiber Cement.

2. Horizontal Pattern: Boards 5-1/4 inches (133 mm) wide in plain style.

a. Texture: Smooth .

3. Panel Texture: 48-inch- (1200-mm-) wide sheets with texture.

2.2 FIBER-CEMENT SOFFIT

A. General: ASTM C 1186, Type A, Grade II, fiber-cement board, noncombustible when tested according to ASTM E 136; with a flame-spread index of 25 or less when tested according to ASTM E 84.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following the following:

a. Cemplank.
b. CertainTeed Corp.
c. GAF Materials Corporation.
d. James Hardie.
e. Nichiha Fiber Cement>.

B. Pattern: [**12-inch- (300-mm-)**] wide sheets with smooth texture.

C. Ventilation: Provide perforated/vented soffit

D. Factory Priming: Manufacturer's standard acrylic primer.

2.3 ACCESSORIES

A. Siding Accessories, General: Provide starter strips, edge trim, outside and inside corner caps, and other items as recommended by siding manufacturer for building configuration.

1. Provide accessories made from same material as adjacent siding unless otherwise indicated.

B. Decorative Accessories: Provide the following fiber-cement decorative accessories as indicated:
1. Door casings .
2. Fascia.
3. Moldings and trim.
4.

C. Colors for Decorative Accessories: Match adjacent siding.

D. Flashing: Provide aluminum and self adhered flashing complying with Section 07620 "Sheet Metal Flashing and Trim" at window and door heads and where indicated.

1. Finish for Aluminum Flashing: Same as scheduled opening .

E. Fasteners:
1. For fastening to metal, use ribbed bugle-head screws of sufficient length to penetrate a minimum of 1/4 inch (6 mm), or three screw-threads, into substrate.
2. For fastening aluminum, use aluminum fasteners. Where fasteners will be exposed to view, use prefinished aluminum fasteners in color to match item being fastened.
3. For fastening fiber cement, use stainless-steel fasteners.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates for compliance with requirements for installation tolerances and other conditions affecting performance of siding and soffit and related accessories.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Clean substrates of projections and substances detrimental to application.

3.3 INSTALLATION

A. General: Comply with siding and soffit manufacturer's written installation instructions applicable to products and applications indicated unless more stringent requirements apply.

1. Do not install damaged components.
2. Center nails in elongated nailing slots without binding siding to allow for thermal movement.

B. Install fiber-cement siding, soffit and related accessories.

1. Install fasteners no more than 24 inches (600 mm) o.c.

C. Install joint sealants as specified in Section 07920 "Joint Sealants" and to produce a weathertight installation.

D. Where aluminum siding will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or by applying sealant or tape or installing nonconductive spacers as recommended by manufacturer for this purpose.

3.4 ADJUSTING AND CLEANING

A. Remove damaged, improperly installed, or otherwise defective materials and replace with new materials complying with specified requirements.

B. Clean finished surfaces according to manufacturer's written instructions and maintain in a clean condition during construction.

END OF SECTION 07460

SECTION 075216 - SBS MODIFIED BITUMINOUS MEMBRANE ROOFING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Styrene-butadiene-styrene (SBS)-modified bituminous membrane
2. Substrate board.
3. Vapor retarder / air barrier.
4. Roof insulation.
5. Cover board.
6. Walkways.

B. Related Information:

1. Section 070150 "Preparation for Reroofing" for full tearoff of existing roofing system and temporary protection prior to installation of new roofing.
2. Division 07 Section "Manufactured Roof Expansion Joints" for new expansion joint components installed by this Installer and covered under system warranty specified in this Section.
3. Division 07 Section "Joint Sealants" for application requirements for joint sealants required as part of the work of this Section.

1.2 DEFINITIONS

A. Roofing Terminology: Definitions in ASTM D1079 and glossary of NRCA's "The NRCA Roofing Manual: Membrane Roof Systems" apply to Work of this Section.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Roofing Conference: Conduct conference at Project site.

1. Meet with Owner, Architect, Owner's insurer if applicable, testing and inspecting agency representative, roofing Installer, roofing system manufacturer's representative, and installers whose work interfaces with or affects roofing, including installers of roof accessories and roof-mounted equipment.
2. Review methods and procedures related to roofing installation, including manufacturer's written instructions, specifications, drawing details, and referenced details.
3. Review and finalize construction schedule, and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
4. Review structural loading limitations of roof deck during and after roofing.
5. Review base flashings, special roofing details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that affects roofing system.
6. Review governing regulations and requirements for insurance and certificates if applicable.
7. Review temporary protection requirements for roofing system before, during, and after installation.
8. Review roof observation and repair procedures after roofing installation.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: Include plans, sections, details, and attachments to other work, including the following:

1. Layout and thickness of insulation.
2. Base flashings and membrane terminations.
3. Flashing details at penetrations.
4. Tapered insulation, including slopes.
5. Roof plan showing orientation of steel roof deck and orientation of roof membrane, fastening spacings, and patterns for mechanically fastened portions of roofing system.
6. Crickets, saddles, and tapered edge strips, including slopes.
7. Insulation fastening patterns for corner, perimeter, and field-of-roof locations.

C. Samples for Verification: For the following products:

1. Cap Sheet: Samples of specified color.
2. Flashing Sheet: Samples of specified color if different than cap sheet.
3. Walkway Pads or Rolls: Samples of specified color.

D. Wind Uplift Resistance Submittal: For roofing system indicating compliance with wind uplift performance requirements.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Contractor's Product Certificate: Submit notarized certificate, indicating products intended for Work of this Section, including product names and numbers and manufacturers' names, with statement indicating that products to be provided meet the requirements of the Contract Documents.

C. Manufacturer Certificates:

1. Performance Requirement Certificate: Signed by roof membrane manufacturer certifying that roofing system complies with requirements specified in "Performance Requirements" Article.

a. Submit evidence of complying with performance requirements.

2. Special Warranty Certificate: Signed by roof membrane manufacturer, certifying that all materials supplied under this Section are acceptable for special warranty.

D. Field quality-control reports.

E. Sample Warranties: For manufacturer's special warranties.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance Data: For roofing system to include in maintenance manuals.

1.7 QUALITY ASSURANCE

A. Manufacturer Qualifications: A qualified listed manufacturer that is UL listed for roofing system identical to that used for this Project.

B. Installer Qualifications: An employer of workers trained and certified by manufacturer, including a full-time on-site supervisor with a minimum of three years' experience installing products comparable to those specified, able to communicate verbally with Contractor, Architect, and employees, and qualified by the roofing system manufacturer to install manufacturer's product and furnish warranty of type specified.

1. For torch-applied applications, employ workers certified under NRCA's Certified Roofing Torch Applicator (CERTA) program.

C. Roofing Inspector Qualifications: A technical representative of manufacturer not engaged in the sale of products and experienced in the installation and maintenance of the specified roofing system, qualified to perform roofing observation and inspection specified in Field Quality Control Article, to determine Installer’s compliance with the requirements of this Project, and approved by the manufacturer to issue warranty certification. The Roofing Inspector shall be one of the following:

1. An authorized full-time technical employee of the manufacturer.
2. An independent party certified as a Registered Roof Observer by the Roof Consultants Institute, retained by the Contractor or the Manufacturer and approved by the Manufacturer.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Deliver roofing materials to Project site in original containers with seals unbroken and labeled with manufacturer's name, product brand name and type, date of manufacture, approval or listing agency markings, and directions for storing and mixing with other components.

B. Store liquid materials in their original undamaged containers in a clean, dry, protected location and within the temperature range required by roofing system manufacturer.

1. Protect stored liquid material from direct sunlight.
2. Discard and legally dispose of liquid material that cannot be applied within its stated shelf life.

C. Protect roof insulation materials from physical damage and from deterioration by sunlight, moisture, soiling, and other sources.

1. Store in a dry location.
2. Comply with insulation manufacturer's written instructions for handling, storing, and protecting during installation.

D. Handle and store roofing materials, and place equipment in a manner to avoid permanent deflection of deck.

1.9 FIELD CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit roofing system to be installed according to manufacturer's written instructions and warranty requirements.

B. Daily Protection: Coordinate installation of roofing so insulation and other components of roofing system not permanently exposed are not subjected to precipitation or left uncovered at the end of the workday or when rain is forecast.

1. Provide tie-offs at end of each day's work to cover exposed roofing and insulation with a course of roofing sheet securely in place with joints and edges sealed.
2. Complete terminations and base flashings and provide temporary seals to prevent water from entering completed sections of roofing.
3. Remove temporary plugs from roof drains at end of each day.
4. Remove and discard temporary seals before beginning work on adjoining roofing.

1.10 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of roofing system that fail in materials or workmanship within specified warranty period.

1. Special warranty includes roof membrane, base flashings, roof insulation, fasteners, cover boards, substrate board, and other components of roofing system.
2. Warranty Period: 15 years from date of Substantial Completion.

B. Special Project Warranty: Submit roofing Installer's warranty, on warranty form at end of this Section, signed by Installer, covering the Work of this Section, including all components of roofing system such as roof membrane, base flashing, roof insulation, fasteners, cover boards, substrate boards, vapor retarder / air barriers, and walkway products, for the following warranty period:

1. Warranty Period: Two years from date of Substantial Completion.

C. Extended Roof System Warranty: Warranties specified in this Section include the following components and systems specified in other sections supplied by the roofing system Manufacturer, and installed by the roofing system Installer:

1. Sheet metal flashing and trim, including roof penetration flashings.
2. Copings, roof edge, counterflashings, and reglets.
3. Roof and parapet expansion joint assemblies.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. General Performance: Installed roofing system and flashings shall withstand specified uplift pressures, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Roof system and flashings shall remain watertight.

1. Accelerated Weathering: Roof membrane shall withstand 2000 hours of exposure when tested according to ASTM G152, ASTM G154, or ASTM G155.

2. Impact Resistance: Roof membrane shall resist impact damage when tested according to ASTM D3746/D3746M, ASTM D4272/D4272M, or the "Resistance to Foot Traffic Test" in FM Approvals 4470.

B. Material Compatibility: Roofing materials shall be compatible with one another and adjacent materials under conditions of service and application required, as demonstrated by roof membrane manufacturer based on testing and field experience.

C. Wind Uplift Resistance: Provide membrane roofing system that is identical to systems that have been successfully tested by a qualified testing and inspecting agency in accordance with ANSI/FM 4474, UL 580, or UL 1897, and to resist uplift pressures calculated in accordance with ASCE-7 and applicable code.

1. All Zones (Corner, Perimeter, and Field-of-Roof) Uplift Pressures: As indicated on Contractor's approved shop drawings based upon Project design wind speed indicated on Drawings.

D. Flashings: Provide base flashings, perimeter flashings, detail flashings and component materials that comply with requirements and recommendations of the following:

1. FMG 1-49 Loss Prevention Data Sheet for Perimeter Flashings.
2. FMG 1-29 Loss Prevention Data Sheet for Above Deck Roof Components.
3. NRCA Roofing Manual (Sixth Edition) for construction details and recommendations.
4. SMACNA Architectural Sheet Metal Manual (Seventh Edition) for construction details.

E. MANUFACTURERS

F. Basis of Design: Subject to compliance with requirements, provide listed products of Firestone Building Products/HolcimElevate, or comparable products by one of the following:

1. GAF Materials Corporation.
2. Siplast, Inc.

G. Source Limitations: Obtain components for roofing system from roof membrane manufacturer or manufacturer approved by roof membrane manufacturer.

2.2 SBS MODIFIED BITUMINOUS BASE PLY SHEET

A. SBS-Modified Bitumen Type I, Polyester- and Glass-Fiber-Mat Base Sheet, Torch: ASTM D6164/D6164M, Type II, Grade S, SBS-modified asphalt sheet, reinforced with a combination of polyester fabric and glass fibers, smooth surfaced, suitable for torch application method.

1. Basis of Design Product: Firestone/HolcimElevate, SBS Premium Poly Base.

a. Peak Load at 73 deg. F, ASTM D5147: Not less than 70 lbf/in.
b. Tear Strength at 73 deg. F, ASTM D5147: Not less than 70 lbf.

2.3 SBS MODIFIED BITUMINOUS CAP SHEET

A. SBS-Modified Bitumen Type I, Polyester- and Glass-Fiber-Mat, Granule-Surfaced Cap Sheet, Torch: ASTM D6162/D6162M, Type I, Grade G, SBS-modified asphalt sheet, reinforced with a combination of polyester fabric and glass fibers; suitable for torch application method.

1. Basis of Design Product: Firestone/HolcimElevate, SBS Premium FR Torch.

a. Peak Load at 73 deg. F, ASTM D5147: Not less than 50 lbf/in.
b. Tear Strength at 73 deg. F, ASTM D5147: Not less than 50 lbf.

2. Granule Color: White.

2.4 BASE FLASHING SHEET MATERIALS

A. Backer Sheet: ASTM D4601/D4601M, Type I, asphalt-impregnated and -coated, glass-fiber sheet, dusted with fine mineral surfacing on both sides, or use product specified for base ply sheet.

B. Granule-Surfaced Flashing Sheet: ASTM D6164/D6164M, Type II, Grade G, SBS-modified asphalt sheet, reinforced with polyester fabric, granule surfaced, suitable for application method specified, and as follows:

1. Granule Color: Match cap sheet.

2.5 AUXILIARY ROOFING MATERIALS

A. General: Auxiliary materials recommended by roofing system manufacturer for intended use and compatible with other roofing components.

B. Metal Termination Bars: Manufacturer's standard, predrilled stainless-steel or aluminum bars, approximately 1 by 1/8 inch thick; with anchors.

C. Cold-Applied Polymer-Modified Asphalt Adhesive: Roof membrane manufacturer's standard solvent-and asbestos-free, cold-applied adhesive, specially formulated for compatibility and use with specified roof membranes.

D. Asphalt Roofing Cement: ASTM D4586/D4586M, asbestos free, of consistency required by roofing system manufacturer for application.

E. Mastic Sealant: Polyisobutylene, plain or modified bitumen; nonhardening, nonmigrating, nonskinning, and nondrying.

F. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Approvals 4470, designed for fastening roofing components to substrate; tested by manufacturer for required pullout strength, and acceptable to roofing system manufacturer.

G. Miscellaneous Accessories: Provide those recommended by roofing system manufacturer.

2.6 SUBSTRATE BOARDS

A. Substrate Board: ASTM C1177/C1177M, glass-mat, water-resistant gypsum substrate or ASTM C1278/C1278M, fiber-reinforced gypsum board. Use product approved in writing as substrate by roofing membrane manufacturer.

1. Thickness: 1/2 inch.
2. Surface Finish: Factory primed or unprimed as recommended by roofing membrane manufacturer based upon performance requirements.

B. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Approvals 4470, designed for fastening substrate board to roof deck.

2.7 VAPOR RETARDER / AIR BARRIER

A. Self-Adhering-Sheet Vapor retarder / air barrier: ASTM D1970/D1970M, polyethylene film laminated to layer of rubberized asphalt adhesive, minimum 40-mil-total thickness; maximum permeance rating of 0.1 perm; cold applied, with slip-resisting surface and release paper backing. Provide primer when recommended by vapor retarder / air barrier manufacturer.

2.8 ROOF INSULATION

A. General: Preformed roof insulation boards manufactured or approved by PVC roof membrane manufacturer, approved for use in FM Approvals' RoofNav listed roof assemblies.

B. Polyisocyanurate Board Insulation: ASTM C1289, Type II, Class 1, Grade 2, glass-fiber mat facer on both major surfaces.

1. Compressive Strength: 20 psi.

C. Tapered Insulation: Provide factory-tapered insulation boards.

1. Material: Match roof insulation.
2. Minimum Thickness: 1/4 inch.
3. Slope:

a. Roof Field: 1/4 inch per foot unless otherwise indicated on Drawings.
b. Saddles and Crickets: 1/2 inch per foot unless otherwise indicated on Drawings.

2.9 INSULATION ACCESSORIES

A. General: Roof insulation accessories recommended by insulation manufacturer for intended use and compatibility with other roofing system components.

B. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Approvals 4470, designed for fastening roof insulation to substrate, and acceptable to roofing system manufacturer.

C. Insulation Adhesive: Insulation manufacturer's recommended adhesive formulated to attach roof insulation to substrate or to another insulation layer as follows:

1. Bead-applied, low-rise, one-component or multicomponent urethane adhesive.

D. Wood Nailer Strips: Comply with requirements in Section 061053 "Miscellaneous Rough Carpentry."

E. Tapered Edge Strips: ASTM C208, Type II, Grade 1, cellulosic-fiber insulation board.

F. Cover Board: ASTM C1177/C1177M, glass-mat, water-resistant gypsum board or ASTM C1278/C1278M fiber-reinforced gypsum board.

1. Thickness: 1/2 inch.
2. Surface Finish: Factory primed or unprimed as recommended by roofing membrane manufacturer for application.

2.10 WALKWAYS

A. Walkway Pads: Polymer-modified, reconstituted rubber pads with slip-resisting textured surface, manufactured as a traffic pad for foot traffic and acceptable to roofing system manufacturer, 1/2-inch-thick, minimum.

1. Pad Size: Approximately 36 by 60 inches.
2. Color: Contrasting with cap sheet.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements and other conditions affecting performance of the Work.

1. Verify that roof openings and penetrations are in place, curbs are set and braced, and roof-drain bodies are securely clamped in place.
2. Verify that wood cants, blocking, and nailers are securely anchored to roof deck at penetrations and terminations and that nailers match thicknesses of insulation.
3. Verify that deck is securely fastened with no projecting fasteners and with no adjacent units in excess of 1/16 inch out of plane relative to adjoining deck.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Clean substrate of dust, debris, moisture, and other substances detrimental to roofing installation according to roofing system manufacturer's written instructions.

1. Remove sharp projections.

B. Prevent materials from entering and clogging roof drains and conductors and from spilling or migrating onto surfaces of other construction.

1. Remove roof-drain plugs when no work is taking place or when rain is forecast.

3.3 INSTALLATION OF ROOFING, GENERAL

A. Install roofing system according to roofing system manufacturer's written instructions, assembly requirements, and approved shop drawings.

B. Complete terminations and base flashings and provide temporary seals to prevent water from entering completed sections of roofing system at the end of the workday or when rain is forecast.

1. Remove and discard temporary seals before beginning work on adjoining roofing.

C. Install roof membrane and auxiliary materials to tie into existing roofing to maintain weathertightness of transition.

D. Coordinate installation and transition of roofing system component serving as an air barrier with air barrier specified in Section 072726 "Fluid-Applied Membrane Air Barriers."

E. Installation Details: Install roofing system in accordance with applicable NRCA Manual Plates and NRCA recommendations; modify as required to comply with manufacturer's approved details and perimeter fastening requirements of FM Global references if applicable.

3.4 INSTALLATION OF SUBSTRATE BOARD

A. Install substrate board with long joints in continuous straight lines, with end joints staggered not less than 24 inches in adjacent rows.

1. At steel roof decks, install substrate board at right angle to flutes of deck.

a. Locate end joints over crests of steel roof deck.

2. Tightly butt substrate boards together.
3. Cut substrate board to fit tight around penetrations and projections, and to fit tight to intersecting sloping roof decks.
4. Fasten substrate board to top flanges of steel deck to resist uplift pressure at corners, perimeter, and field of roof according to roofing system manufacturers' written instructions.

3.5 INSTALLATION OF VAPOR RETARDER / AIR BARRIER

A. Self-Adhering-Sheet Vapor retarder / air barrier: Prime substrate if required by manufacturer. Install self-adhering-sheet vapor retarder / air barrier over area to receive vapor retarder / air barrier, side and end lapping each sheet a minimum of 3-1/2 and 6 inches, respectively.

1. Extend vertically up parapet walls and projections to a minimum height equal to height of insulation and cover board.
2. Seal laps by rolling.

B. Completely seal vapor retarder / air barrier at terminations, obstructions, and penetrations to prevent air movement into roofing system.

3.6 INSTALLATION OF INSULATION

A. Coordinate installing roofing system components, so insulation is not exposed to precipitation or left exposed at the end of the workday.

B. Comply with roofing system and insulation manufacturer's written instructions for installing roof insulation.

C. Cant Strips: Install and secure cant strips at junctures of roofing system with vertical surfaces or angle changes greater than 45 deg F.

D. Installation Over Metal Decking:

1. Install base layer of insulation with joints staggered not less than 24 inches in adjacent rows end joints staggered not less than 12 inches in adjacent rows and with long joints continuous at right angle to flutes of decking.

    a. Locate end joints over crests of decking.
    b. Trim insulation neatly to fit around penetrations and projections, and to fit tight to intersecting sloping roof decks.
    c. Make joints between adjacent insulation boards not more than 1/4 inch in width.
    d. At internal roof drains, slope insulation to create a square drain sump, with each side equal to the diameter of the drain bowl plus 24 inches.

        1) Trim insulation, so that water flow is unrestricted.

    e. Fill gaps exceeding 1/4 inch with insulation.
    f. Cut and fit insulation within 1/4 inch of nailers, projections, and penetrations.
    g. Mechanically attach base layer of insulation and substrate board using mechanical fasteners specifically designed and sized for fastening specified board-type roof insulation to deck type.

        1) Fasten insulation to resist specified uplift pressure at corners, perimeter, and field of roof.

    h. Adhere base layer of insulation where roof deck is exposed on interior to substrate using adhesive according to manufacturer's written instructions.

        1) Adhere insulation to resist specified uplift pressure at corners, perimeter, and field of roof.

2. Install upper layers of insulation and tapered insulation, with joints of each layer offset not less than 12 inches from previous layer of insulation.

    a. Staggered end joints within each layer not less than 24 inches in adjacent rows.
    b. Install with long joints continuous and with end joints staggered not less than 12 inches in adjacent rows.
    c. Trim insulation neatly to fit around penetrations and projections, and to fit tight to intersecting sloping roof decks.
    d. Make joints between adjacent insulation boards not more than 1/4 inch in width.
    e. At internal roof drains, slope insulation to create a square drain sump, with each side equal to the diameter of the drain bowl plus 24 inches.
    f. Trim insulation, so that water flow is unrestricted.
    g. Fill gaps exceeding 1/4 inch with insulation.
    h. Cut and fit insulation within 1/4 inch of nailers, projections, and penetrations.
    i. Adhere each layer of insulation to substrate using adhesive according to manufacturer's written instructions.

1) Adhere insulation to resist specified uplift pressure at corners, perimeter, and field of roof.

3. Flat Insulation System on Sloped Roof Deck: Install insulation at minimum thickness indicated on Drawings.
4. Tapered Insulation System for Flat Roof Deck: Install insulation at minimum thickness indicated on Drawings.

3.7 INSTALLATION OF COVER BOARDS

A. Install cover boards over insulation with long joints in continuous straight lines with end joints staggered between rows. Offset joints of insulation below a minimum of 6 inches in each direction.

1. Trim cover board neatly to fit around penetrations and projections, and to fit tight to intersecting sloping roof decks.
2. At internal roof drains, conform to slope of drain sump.

a. Trim cover board so that water flow is unrestricted.

3. Cut and fit cover board tight to nailers, projections, and penetrations.

a. Set cover board in ribbons of bead-applied insulation adhesive, firmly pressing and maintaining insulation in place.

3.8 INSTALLATION OF ROOFING MEMBRANE, GENERAL

A. Install roofing system according to roofing system manufacturer's written instructions and applicable recommendations in ARMA/NRCA's "Quality Control Guidelines for the Application of Polymer Modified Bitumen Roofing."

1. Deck Type: Metal deck.

2. Number of Smooth-Surfaced SBS-Modified Asphalt Sheets: One.

a. Adhering Method: Torch.

3. Granular-Surfaced SBS-Modified Asphalt Cap Sheet:

a. Adhering Method: Torch.

B. Start installation of roofing in presence of roofing system manufacturer's technical personnel and Owner's testing and inspection agency.

C. Coordinate installation of roofing system so insulation and other components of the roofing system not permanently exposed are not subjected to precipitation or left uncovered at the end of the workday or when rain is forecast.

1. Provide tie-offs at end of each day's work to cover exposed roofing sheets and insulation with a course of coated felt set in roofing cement or hot roofing asphalt, with joints and edges sealed.

2. Complete terminations and base flashings and provide temporary seals to prevent water from entering completed sections of roofing system.
3. Remove and discard temporary seals before beginning work on adjoining roofing.

3.9 INSTALLATION OF SBS-MODIFIED BASE PLY SHEET

A. Before installing, unroll base sheet, cut into workable lengths, and allow to lie flat for a time period recommended by manufacturer for the ambient temperature.

B. Install base ply sheet according to roofing manufacturer's written instructions, starting at low point of roofing system.

1. Extend roofing sheets over and terminate above cants.
2. Install base ply sheet in a shingle fashion.

a. Torch apply to substrate in accordance with manufacturer's written instructions and NRCA CERTA guidelines.
b. Adhere base ply sheet to resist specified uplift pressure at corners, perimeter, and field of roof.

C. Install base ply sheet without wrinkles, rears, and free from air pockets.

D. Laps: Accurately align roofing sheets, without stretching, and maintain uniform side and end laps.

1. Lap side laps as recommended by roof membrane manufacturer but not less than 3 inches.
2. Lap end laps as recommended by roof membrane manufacturer but not less than 12 inches.
3. Stagger end laps not less than 18 inches.
4. Heat weld or completely bond and seal end and side laps, leaving no voids.
5. Roll laps with a 20-pound roller.

E. Repair tears and voids in laps and lapped seams not completely sealed.

F. Apply pressure to the body of the base sheet according to manufacturer's instructions, to remove air pockets and to result in complete adhesion of base sheet to substrate.

3.10 INSTALLATION OF SBS-MODIFIED BITUMINOUS CAP SHEET

A. Before installing, unroll cap sheet, cut into workable lengths, and allow to lie flat for a time period recommended by manufacturer for the ambient temperature at which cap sheet will be installed.

B. Install modified bituminous roofing cap sheet according to roofing manufacturer's written instructions, starting at low point of roofing system.

1. Extend cap sheet over and terminate above cants.
2. Install cap sheet in a shingle fashion.
3. Install cap sheet as follows:

a. Torch apply to substrate in accordance with manufacturer's written instructions and NRCA CERTA guidelines.

4. Install cap sheet without wrinkles or tears, and free from air pockets.

5. Install cap sheet so side and end laps shed water.

C. Laps: Accurately align roofing sheets, without stretching, and maintain uniform side and end laps.

1. Lap side laps as recommended by roof membrane manufacturer but not less than 3 inches.
2. Lap end laps as recommended by roof membrane manufacturer but not less than 12 inches.
3. Stagger end laps not less than 18 inches.
4. Heat weld laps, leaving no voids.
5. Roll laps with a 20-pound roller.
6. Repair tears and voids in laps and lapped seams not completely sealed.

D. Apply pressure to the body of the cap sheet according to manufacturer's instructions, to remove air pockets and to result in complete adhesion of base sheet to substrate.

E. Apply roofing granules of same color as roof membrane to cover exuded bead at laps while bead is hot, to provide a continuous color appearance.

3.11 INSTALLATION OF FLASHING AND STRIPPING

A. Install base flashing over cant strips and other sloped and vertical surfaces, at roof edges, and at penetrations through roof, and secure to substrates according to roofing system manufacturer's written instructions and as follows:

1. Prime substrates with asphalt primer if required by roofing system manufacturer.
2. Backer Sheet Application:

    a. Adhere backer sheet to substrate in cold-applied adhesive.
    a. Seal all laps.

3. Flashing Sheet Application: Adhere flashing sheet to substrate in cold-applied adhesive at rate required by roofing system manufacturer.

    a. Heat weld laps, leaving no voids.

B. Extend base flashing up walls or parapets a minimum of 8 inches above roofing membrane and 4 inches onto field of roofing membrane.

C. Mechanically fasten top of base flashing securely at terminations and perimeter of roofing using continuous termination bar.

D. Install roofing cap-sheet stripping where metal flanges and edgings are set on roofing according to roofing system manufacturer's written instructions.

E. Roof Drains: Set 30-by-30-inch-4-pound lead flashing in bed of asphaltic adhesive on completed roofing membrane.

1. Cover lead flashing with roofing cap-sheet stripping and extend a minimum of 6 inches beyond edge of metal flashing onto field of roofing membrane.
2. Clamp roofing membrane, metal flashing, and stripping into roof-drain clamping ring.
3. Install stripping according to roofing system manufacturer's written instructions.

3.12 INSTALLATION OF WALKWAYS

A. Walkway Pads: Install walkway pads using units of size indicated or, if not indicated, of manufacturer's standard size, according to walkway pad manufacturer's written instructions.

1. Install walkways at the following locations:

a. Perimeter of each rooftop unit.
b. Between each rooftop unit location, creating a continuous path connecting rooftop unit locations.
c. Between each roof hatch and each rooftop unit location or path connecting rooftop unit locations.
d. Top and bottom of each roof access ladder.
e. Between each roof access ladder and each rooftop unit location or path connecting rooftop unit locations.
f. Additional locations indicated on Drawings and as required by roof membrane manufacturer's warranty requirements.

2. Provide 3-inch clearance between adjoining pads.
3. Heat weld to substrate or adhere walkway products to substrate with compatible adhesive according to roofing system manufacturer's written instructions.

3.13 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified testing agency to inspect substrate conditions, surface preparation, roof membrane application, flashings, protection, and drainage components, and to furnish reports to Architect.

B. Final Roof Inspection: Arrange for roofing system manufacturer's technical personnel to inspect roofing installation on completion, in presence of Architect, and to prepare inspection report.

1. Notify Architect and Owner 48 hours in advance of date and time of inspection.

C. Repair or remove and replace components of roofing system where inspections indicate that they do not comply with specified requirements.

D. Roofing system will be considered defective if it does not pass tests and inspections.

1. Additional testing and inspecting, at Contractor's expense, will be performed to determine if replaced or additional work complies with specified requirements.

3.14 PROTECTING AND CLEANING

A. Protect roofing system from damage and wear during remainder of construction period.

1. When remaining construction does not affect or endanger roofing, inspect roofing system for deterioration and damage, describing its nature and extent in a written report, with copies to Architect and Owner.

B. Correct deficiencies in or remove roofing system that does not comply with requirements, repair substrates, and repair or reinstall roofing system to a condition free of damage and deterioration at time of Substantial Completion and according to warranty requirements.

C. Clean overspray and spillage from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

SECTION CONTINUES

3.15 ROOFING INSTALLER'S WARRANTY

A. WHEREAS _____ of _____, herein called the "Roofing Installer," has performed roofing and associated work ("work") on the following project:

1. Owner: _____.

2. Address: _____.

3. Building Name/Type: _____.

4. Address: _____.

5. Area of Work: _____.

6. Acceptance Date: _____.

7. Warranty Period: _____.

8. Expiration Date: _____.

B. AND WHEREAS Roofing Installer has contracted (either directly with Owner or indirectly as a subcontractor) to warrant said work against leaks and faulty or defective materials and workmanship for designated Warranty Period,

C. NOW THEREFORE Roofing Installer hereby warrants, subject to terms and conditions herein set forth, that during Warranty Period Roofing Installer will, at Roofing Installer's own cost and expense, make or cause to be made such repairs to or replacements of said work as are necessary to correct faulty and defective work and as are necessary to maintain said work in a watertight condition.

D. This Warranty is made subject to the following terms and conditions:

1. Specifically excluded from this Warranty are damages to work and other parts of the building, and to building contents, caused by:

   a. lightning;
   b. peak gust wind speed exceeding 74 MPH;
   c. fire;
   d. failure of roofing system substrate, including cracking, settlement, excessive deflection, deterioration, and decomposition;
   e. faulty construction of parapet walls, copings, chimneys, skylights, vents, equipment supports, and other edge conditions and penetrations of the work.
   f. vapor condensation on bottom of roofing; and
   g. activity on roofing by others, including construction contractors, maintenance personnel, other persons, and animals, whether authorized or unauthorized by Owner.

2. When work has been damaged by any of foregoing causes, Warranty shall be null and void until such damage has been repaired by Roofing Installer and until cost and expense thereof have been paid by Owner or by another responsible party so designated.

3. Roofing Installer is responsible for damage to work covered by this Warranty but is not liable for consequential damages to building or building contents resulting from leaks or faults or defects of work.
4. During Warranty Period, if Owner allows alteration of work by anyone other than Roofing Installer, including cutting, patching, and maintenance in connection with penetrations, attachment of other work, and positioning of anything on roof, this Warranty shall become null and void on date of said alterations, but only to the extent said alterations affect work covered by this Warranty. If Owner engages Roofing Installer to perform said alterations, Warranty shall not become null and void unless Roofing Installer, before starting said work, shall have notified Owner in writing, showing reasonable cause for claim, that said alterations would likely damage or deteriorate work, thereby reasonably justifying a limitation or termination of this Warranty.
5. During Warranty Period, if original use of roof is changed and it becomes used for, but was not originally specified for, a promenade, work deck, spray-cooled surface, flooded basin, or other use or service more severe than originally specified, this Warranty shall become null and void on date of said change, but only to the extent said change affects work covered by this Warranty.
6. Owner shall promptly notify Roofing Installer of observed, known, or suspected leaks, defects, or deterioration and shall afford reasonable opportunity for Roofing Installer to inspect work and to examine evidence of such leaks, defects, or deterioration.
7. This Warranty is recognized to be the only warranty of Roofing Installer on said work and shall not operate to restrict or cut off Owner from other remedies and resources lawfully available to Owner in cases of roofing failure. Specifically, this Warranty shall not operate to relieve Roofing Installer of responsibility for performance of original work according to requirements of the Contract Documents, regardless of whether Contract was a contract directly with Owner or a subcontract with Owner's General Contractor.

E. IN WITNESS THEREOF, this instrument has been duly executed this _____ day of _____, _____.

1. Authorized Signature: _____

2. Name: _____

3. Title: _____

END OF SECTION

SECTION 07610 - SHEET METAL ROOFING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Flat-seam metal roofing, custom fabricated for canopies
2. Standing-seam metal roofing at Stair 2, custom fabricated .

B. Related Sections:

1. Division 7 Section "Building Insulation" for roof insulation and sheet vapor retarders separate from self-adhering underlayments.
2. Division 7 Section "Sheet Metal Flashing and Trim" for gutters, downspouts, fasciae, copings, and flashings that are not part of sheet metal roofing.
3. Division 7 Section "Manufactured Roof Specialties" for manufactured that are not part of sheet metal roofing.
4. Division 7 Section "Roof Accessories" for manufactured roof accessories.
5. Division 7 Section "Joint Sealants" for field-applied sealants adjoining sheet metal roofing.

1.3 PERFORMANCE REQUIREMENTS

A. General Performance: Sheet metal roofing system including, but not limited to, metal roof panels, cleats, clips, anchors and fasteners, sheet metal flashing integral with sheet metal roofing, fascia panels, trim, underlayment, and accessories shall comply with requirements indicated without failure due to defective manufacture, fabrication, installation, or other defects in construction. Sheet metal roofing shall remain watertight.

B. Thermal Movements: Provide sheet metal roofing that allows for thermal movements from ambient and surface temperature changes. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change (Range): 120 deg F, ambient; 180 deg F , material surfaces.

C. Energy Performance: Provide metal roofing with solar reflectance index not less than 29 when calculated according to ASTM E 1980 based on testing identical products by a qualified testing agency.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each manufactured product and accessory.

B. Shop Drawings: Show fabrication and installation layouts of sheet metal roofing, including plans, elevations, expansion joint locations, and keyed details. Distinguish between shop- and field-assembled work. Include the following:

1. Details for forming sheet metal roofing, including seams and dimensions.
2. Details for joining and securing sheet metal roofing, including layout of fasteners, cleats, clips, and other attachments. Include pattern of seams.
3. Details of termination points and assemblies, including fixed points.
4. Details of expansion joints, including showing direction of expansion and contraction.
5. Details of roof penetrations.
6. Details of edge conditions, including eaves, ridges, valleys, rakes, crickets, and counterflashings.
7. Details of special conditions.
8. Details of connections to adjoining work.
9. Detail the following accessory items, at a scale of not less than 3 inches per 12 inches:

    a. Flashing and trim.
    b. Gutters and downspouts as they relate to adjacent sheet metal roofing.
    c. Roof curbs.

C. Samples for Initial Selection: For each type of sheet metal roofing indicated, with factory-applied color finishes.

1. Include similar Samples of trim and accessories involving color selection.

D. Samples for Verification: For each type of exposed finish required, prepared on Samples of size indicated below:

1. Sheet Metal Roofing: 12 inches long by actual width of unit, including finished seam and in required profile. Include fasteners, cleats, clips, and other attachments.
2. Trim and Metal Closures: 12 inches long and in required profile. Include fasteners and other exposed accessories.
3. Other Accessories: 12-inch- long Samples for each type of other accessory.

E. Coordination Drawings: Roof plans drawn to scale with coordinated details for penetrations and roof-mounted items. Show the following:

1. Sheet metal roofing and attachments.
2. Roof-mounted items including roof hatches, equipment supports, pipe supports and penetrations, lighting fixtures, snow guards, and items mounted on roof curbs.

F. Qualification Data: For qualified Installer .

G. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for each product.

H. Maintenance Data: For roofing sheet metals and accessories to include in maintenance manuals.

I. Warranties: Sample of special warranties.

1.5 QUALITY ASSURANCE

A. Custom-Fabricated Sheet Metal Roofing Fabricator Qualifications: Shop that employs skilled workers who custom fabricate sheet metal roofing similar to that required for this Project and whose products have a record of successful in-service performance.

B. Sheet Metal Roofing Standard: Comply with SMACNA's "Architectural Sheet Metal Manual" unless more stringent requirements are specified or shown on Drawings.

C. Preliminary Roofing Conference: Before starting roof sheathing construction, conduct conference at Project site. Comply with requirements for preinstallation conferences in Division 1 Section "Project Management and Coordination."

1. Review methods and procedures related to roof sheathing construction and sheet metal roofing including, but not limited to, items listed for the Preinstallation Conference.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Do not store sheet metal roofing materials in contact with other materials that might cause staining, denting, or other surface damage. Store sheet metal roofing materials away from uncured concrete and masonry.

B. Protect strippable protective covering on sheet metal roofing from exposure to sunlight and high humidity, except to the extent necessary for the period of sheet metal roofing installation.

1.7 COORDINATION

A. Coordinate installation of roof curbs, equipment supports, and roof penetrations, which are specified in other Sections.

B. Coordinate sheet metal roofing with rain drainage work, flashing, trim, and construction of sheathing, parapets, walls, and other adjoining work to provide a leakproof, secure, and noncorrosive installation.

1.8 WARRANTY

A. Special Warranty: Warranty form at the end of this Section in which Installer agrees to repair or replace components of sheet metal roofing that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Structural failures, including but not limited to rupturing, cracking, or puncturing.
b. Wrinkling or buckling.
c. Loose parts.
d. Failure to remain weathertight, including uncontrolled water leakage.
e. Deterioration of metals, metal finishes, and other materials beyond normal weathering, including non-uniformity of color or finish.

f. Galvanic action between sheet metal roofing and dissimilar materials.

2. Warranty Period: Two years from date of Substantial Completion.

B. Special Warranty on Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace sheet metal roofing that shows evidence of deterioration of factory-applied finishes within specified warranty period.

1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:

a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.

2. Finish Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 ROOFING SHEET METALS

A. General: Protect mechanical and other finishes on exposed surfaces from damage by applying a strippable, temporary protective film before shipping.

B. Metallic-Coated Steel Sheet: Restricted flatness steel sheet, metallic coated by the hot-dip process and prepainted by the coil-coating process to comply with ASTM A 755/A 755M.
1. Aluminum-Zinc Alloy-Coated Steel Sheet: ASTM A 792/A 792M, Class AZ50 coating designation, Grade 40; structural quality.
2. Thickness: Nominal 22 ga. unless otherwise indicated.

3. Surface: Embossed.
4. Exposed Coil-Coated Finish:
a. Four-Coat Fluoropolymer: AAMA 621. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat and clear coats. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

5. Color: As selected by Architect from manufacturer's full range .
6. Concealed Finish: Pretreat with manufacturer's standard white or light-colored acrylic or polyester-backer finish, consisting of prime coat and wash coat with a minimum total dry film thickness of 0.5 mil.

2.2 UNDERLAYMENT MATERIALS

A. Self-Adhering, High-Temperature Sheet: Minimum 30 to 40 mils thick, consisting of slip-resisting polyethylene-film top surface laminated to layer of butyl or SBS-modified asphalt adhesive, with release-paper backing; cold applied. Provide primer when recommended by underlayment manufacturer.

1. Thermal Stability: ASTM D 1970; stable after testing at 240 deg F.
2. Low-Temperature Flexibility: ASTM D 1970; passes after testing at minus 20 deg F.
3. Products: Subject to compliance with requirements, provide one of the following :

a. Carlisle Coatings & Waterproofing Inc.; CCW WIP 300HT.
b. Grace Construction Products, a unit of W. R. Grace & Co.; Ultra.
c. Henry Company; Blueskin PE200 HT.
d. Metal-Fab Manufacturing, LLC; MetShield.
e. Owens Corning; WeatherLock Metal High-Temperature Underlayment.

B. Slip Sheet: Building paper, 3-lb/100 sq. ft. minimum, rosin sized.

2.3 MISCELLANEOUS MATERIALS

A. General: Provide materials and types of fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items as required for a complete roofing system and as recommended by fabricator for sheet metal roofing.

B. Snap-On Seams: Provide snap-on seams integrated with panel-edge profile as recommended by portable roll-forming equipment manufacturer to produce sheet metal roofing assemblies that comply with UL 580 for wind-uplift resistance classification specified in "Quality Assurance" Article.

1. General:

a. Exposed Fasteners: Heads matching color of sheet metal roofing using plastic caps or factory-applied coating.
b. Fasteners for Flashing and Trim: Blind fasteners or self-drilling screws, gasketed, with hex-washer head.
c. Blind Fasteners: High-strength aluminum or stainless-steel rivets suitable for metal being fastened.

2. Fasteners for Aluminum-Zinc Alloy-Coated Steel Sheet: Hot-dip galvanized steel according to ASTM A 153/A 153M, ASTM F 2329, or Series 300 stainless steel.

C. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch wide and 1/8 inch thick.

D. Elastomeric Sealant: ASTM C 920, elastomeric polyurethane or silicone polymer sealant ; low modulus; of type, grade, class, and use classifications required to seal joints in sheet metal roofing and remain watertight.

2.4 ACCESSORIES

A. Sheet Metal Accessories: Provide components required for a complete sheet metal roofing assembly including trim, copings, fasciae, corner units, clips, flashings, sealants, gaskets, fillers, metal closures, closure strips, and similar items. Match material and finish of sheet metal roofing unless otherwise indicated.

1. Provide accessories as recommended by portable roll-forming equipment manufacturer to produce sheet metal roofing assemblies that comply with UL 580 for wind-uplift resistance classification specified in "Quality Assurance" Article.
2. Cleats: For mechanically seaming into joints and formed from the following materials:

a. Aluminum Roofing: 0.0250-inch- thick stainless steel.

3. Clips: Minimum 0.0625-inch- thick, stainless-steel panel clips designed to withstand negative-load requirements.
4. Backing Plates: Plates at roofing splices, fabricated from material recommended by SMACNA.
5. Closure Strips: Closed-cell, expanded, cellular, rubber or crosslinked, polyolefin foam or closed-cell laminated polyethylene; minimum 1-inch- thick, flexible-closure strips; cut or premolded to match sheet metal roofing profile. Provide closure strips where indicated or necessary to ensure weathertight construction.
6. Flashing and Trim: Formed from same material and with same finish as sheet metal roofing, minimum 0.018 inch thick.

B. Pipe Flashing: Premolded, EPDM pipe collar with flexible aluminum ring bonded to base.

C. Roof Curbs: Fabricated from same material and finish as sheet metal roofing, minimum thickness matching the sheet metal roofing ; with bottom of skirt profiled to match roof panel profiles; with weatherproof top box and integral full-length cricket. Fabricate curb subframing of nominal 0.062-inch- thick, angle-, C-, or Z-shaped galvanized steel or stainless-steel sheet. Fabricate curb and subframing to withstand indicated loads of size and height indicated. Coordinate dimensions with rough-in information or Shop Drawings of equipment to be supported.

1. Insulate curbs with 1-inch- thick, rigid insulation.
2. Install wood nailers at tops of curbs.

2.5 FABRICATION

A. General: Custom fabricate sheet metal roofing to comply with details shown and recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to the design, dimensions (panel width and seam height), geometry, metal thickness, and other characteristics of installation indicated. Fabricate sheet metal roofing and accessories at the shop to greatest extent possible.

1. Flat-Seam Roofing: Form flat-seam panels from metal sheets 20 by 28 inches with 1/2-inch notched and folded edges.
2. Standing-Seam Roofing: Form standing-seam panels with finished seam height of 1-1/2 inches or as indicated .

B. Fabrication Tolerances: Fabricate sheet metal roofing that is capable of installation to a tolerance of 1/4 inch in 20 feet on slope and location lines as indicated and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.

C. Form exposed sheet metal work to fit substrates without excessive oil canning, buckling, and tool marks; true to line and levels indicated; and with exposed edges folded back to form hems.

1. Lay out sheet metal roofing so transverse seams, if required, are made in direction of flow with higher panels overlapping lower panels.
2. Offset transverse seams from each other 12 inches minimum.
3. Fold and cleat eaves and transverse seams in the shop.
4. Form and fabricate sheets, seams, strips, cleats, valleys, ridges, edge treatments, integral flashings, and other components of metal roofing to profiles, patterns, and drainage arrangements shown on Drawings and as required for leakproof construction.

D. Expansion Provisions: Fabricate sheet metal roofing to allow for expansion in running work sufficient to prevent leakage, damage, and deterioration of the Work. Where lapped expansion provisions cannot be used, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with butyl sealant concealed within joints.

E. Sealant Joints: Where movable, nonexpansion-type joints are indicated or required to produce weathertight seams, form metal to provide for proper installation of elastomeric sealant in compliance with SMACNA standards.

F. Metal Protection: Where dissimilar metals will contact each other, protect against galvanic action by painting contact surfaces with bituminous coating, by applying self-adhering sheet underlayment to each contact surface, or by other permanent separation as recommended by fabricator of sheet metal roofing or manufacturers of the metals in contact.

G. Sheet Metal Accessories: Custom fabricate flashings and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of item indicated. Obtain field measurements for accurate fit before shop fabrication.

1. Form exposed sheet metal accessories without excessive oil canning, buckling, and tool marks and true to line and levels indicated, with exposed edges folded back to form hems.
2. Seams: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with elastomeric sealant unless otherwise recommended by sealant manufacturer for intended use. Rivet joints where necessary for strength.
3. Sealed Joints: Form nonexpansion but movable joints in metal to accommodate elastomeric sealant.
4. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of accessories exposed to view.
5. Fabricate cleats and attachment devices of sizes as recommended by SMACNA's "Architectural Sheet Metal Manual" for application, but not less than thickness of metal being secured.

H. Do not use graphite pencils to mark metal surfaces.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, substrate, and other conditions affecting performance of the Work.

1. Examine solid roof sheathing to verify that sheathing joints are supported by framing or blocking, that tops of fasteners are flush with surface, and that installation is within flatness tolerances required for finished roofing installation.
2. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and completely anchored, and that provision has been made for drainage, flashings, and penetrations through sheet metal roofing.

B. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.

C. Examine roughing-in for components and systems penetrating sheet metal roofing to verify actual locations of penetrations relative to seam locations of sheet metal roofing before installation.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

E. Self-Adhering Sheet Underlayment: Install self-adhering sheet underlayment, wrinkle free, on roof sheathing under sheet metal roofing. Apply primer if required by underlayment manufacturer. Comply with temperature restrictions of underlayment manufacturer for installation; use primer rather than nails for installing underlayment at low temperatures. Apply over entire roof , in shingle fashion to shed water, with end laps of not less than 6 inches staggered 24 inches between courses. Overlap side edges not less than 3-1/2 inches. Roll laps with roller. Cover underlayment within 14 days.

1. Roof perimeter for a distance up from eaves of 36 inches beyond interior wall line.
2. Valleys, from lowest to highest point, for a distance on each side of 18 inches . Overlap ends of sheets not less than 6 inches.
3. Rake edges for a distance of 18 inches .
4. Hips and ridges for a distance on each side of 12 inches .
5. Roof to wall intersections for a distance from wall of 18 inches .
6. Around dormers, chimneys, skylights, and other penetrating elements for a distance from element of 18 inches .

F. Install flashings to cover underlayment to comply with requirements in Division 7 Section "Sheet Metal Flashing and Trim."

G. Apply slip sheet before installing sheet metal roofing.

3.2 INSTALLATION, GENERAL

A. General: Anchor sheet metal roofing and other components of the Work securely in place, with provisions for thermal and structural movement. Install fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items as required for a complete roofing system and as recommended by fabricator for sheet metal roofing.

1. Field cutting of sheet metal roofing by torch is not permitted.
2. Provide metal closures at peaks rake edges rake walls eaves and each side of ridge and hip caps.
3. Flash and seal sheet metal roofing with closure strips at eaves, rakes, and perimeter of all openings. Fasten with self-tapping screws.
4. Locate and space fastenings in uniform vertical and horizontal alignment. Predrill panels for fasteners.
5. Install ridge and hip caps as sheet metal roofing work proceeds.
6. Locate roofing splices over, but not attached to, structural supports. Stagger roofing splices and end laps to avoid a four-panel lap splice condition. Install backing plates at roofing splices.
7. Install sealant tape where indicated.
8. Lap metal flashing over sheet metal roofing to allow moisture to run over and off the material.
9. Do not use graphite pencils to mark metal surfaces.

B. Thermal Movement. Rigidly fasten metal roof panels to structure at only one location for each panel. Allow remainder of panel to move freely for thermal expansion and contraction.

C. Fasteners: Use fasteners of sizes that will penetrate sheathing not less than 1-1/4 inches for nails and not less than 3/4 inch for wood screws .

D. Metal Protection: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating, by applying self-adhering sheet underlayment to each contact surface, or by other permanent separation as recommended by SMACNA.

1. Coat back side of uncoated aluminum sheet metal roofing with bituminous coating where roofing will contact wood, ferrous metal, or cementitious construction.

E. Conceal fasteners and expansion provisions where possible in exposed work and locate to minimize possibility of leakage. Cover and seal fasteners and anchors as required for a tight installation.

F. Fasciae: Align bottom of sheet metal roofing and fasten with blind rivets, bolts, or self-tapping screws. Flash and seal sheet metal roofing with closure strips where fasciae meet soffits, along lower panel edges, and at perimeter of all openings.

3.3 CUSTOM-FABRICATED SHEET METAL ROOFING INSTALLATION

A. Fabricate and install work with lines and corners of exposed units true and accurate. Form exposed faces flat and free of buckles, excessive waves, and avoidable tool marks, considering temper and reflectivity of metal. Provide uniform, neat seams with minimum exposure of solder, welds, and sealant. Fold back sheet metal to form a hem on concealed side of exposed edges unless otherwise indicated.

1. Install cleats to hold sheet metal panels in position. Attach each cleat with two fasteners to prevent rotation.
2. Fasten cleats not more than 12 inches o.c. Bend tabs over fastener head.
3. Provide expansion-type cleats and clips for roof panels that exceed 30 feet in length.

B. Seal joints as shown and as required for watertight construction. For roofing with 3:12 slopes or less, use cleats at transverse seams.

1. Where sealant-filled joints are used, embed hooked flanges of joint members not less than 1 inch into sealant. Form joints to completely conceal sealant. When ambient temperature at time of installation is moderate, between 40 and 70 deg F, set joint members for 50 percent movement each way. Adjust setting proportionately for installation at higher ambient temperatures. Do not install sealant-type joints at temperatures below 40 deg F.
2. Prepare joints and apply sealants to comply with requirements in Division 7 Section "Joint Sealants."

C. Rivets: Rivet joints in where indicated and where necessary for strength.

D. Flat-Seam Roofing: Attach flat-seam metal panels to substrate with cleats, starting at eave and working upward toward ridge. After panels are in place, mallet seams and solder.

1. Attach roofing panels with cleats spaced not more than 24 inches o.c. <**Insert cleat spacing**>. Lock and solder panels to base flashing.

2. Attach edge flashing to face of roof edge with continuous cleat fastened to roof substrate at [**12 inches**] <**Insert cleat spacing**> o.c. Lock panels to edge flashing and [**solder**] [**apply sealant**].

E. Standing-Seam Roofing: Attach standing-seam metal panels to substrate with cleats, double fastened at 12 inches o.c. Install panels reaching from eave to ridge before moving to adjacent panels. Before panels are interlocked, apply continuous bead of sealant to top of flange of lower panel. Lock standing seams by folding over twice so cleat and panel edges are completely engaged.

1. Lock each panel to panel below with sealed transverse seam.
2. Loose-lock panels at eave edges to continuous cleats and flanges at roof edge at gutters.
3. Loose-lock panels at eave edges to continuous edge flashing exposed 24 inches from roof edge. Attach edge flashing to face of roof edge with continuous cleat fastened to roof substrate at 12 inches o.c. Lock panels to edge flashing.
4. Fold over seams after locking at ridges and hips.

3.4 ACCESSORY INSTALLATION

A. General: Install accessories with positive anchorage to building and weathertight mounting and provide for thermal expansion. Coordinate installation with flashings and other components.

1. Install components required for a complete sheet metal roofing assembly including trim, copings, seam covers, flashings, sealants, gaskets, fillers, metal closures, closure strips, and similar items.
2. Install accessories integral to sheet metal roofing that are specified in Division 7 Section "Sheet Metal Flashing and Trim" to comply with that Section's requirements.

B. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.

1. Install flashing and trim as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, eaves, rakes, corners, bases, framed openings, ridges, fasciae, and fillers.
2. Install continuous strip of self-adhering underlayment at edge of continuous flashing overlapping self-adhering underlayment, where "continuous seal strip" is indicated in SMACNA's "Architectural Sheet Metal Manual," and where indicated on Drawings.
3. Install exposed flashing and trim without excessive oil canning, buckling, and tool marks and true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and to result in waterproof and weather-resistant performance.
4. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet with no joints allowed within 24 inches of corner or intersection. Where lapped expansion provisions cannot be used or would not be sufficiently weather resistant and waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, and filled with butyl sealant concealed within joints.

C. Pipe Flashing: Form flashing around pipe penetration and sheet metal roofing. Fasten and seal to sheet metal roofing as recommended by SMACNA.

D. Roof Curbs: Install curbs at locations indicated on Drawings. Install flashing around bases where they meet sheet metal roofing.

3.5 ERECTION TOLERANCES

A. Installation Tolerances: Shim and align sheet metal roofing within installed tolerances specified in MCA's "Guide Specification for Residential Metal Roofing."

3.6 CLEANING AND PROTECTION

A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.

B. Clean off excess sealants.

C. Remove temporary protective coverings and strippable films as sheet metal roofing is installed unless otherwise indicated in manufacturer's written installation instructions. On completion of sheet metal roofing installation, clean finished surfaces as recommended by sheet metal roofing manufacturer. Maintain sheet metal roofing in a clean condition during construction.

D. Replace sheet metal roofing components that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

3.7 ROOFING INSTALLER'S WARRANTY - FORMAT

A. WHEREAS <**Insert name**> of <**Insert address**>, herein called the "Roofing Installer," has performed roofing and associated work ("work") on the following project:

1. Owner: <**Insert name of Owner**>.
2. Address: <**Insert address**>.
3. Building Name/Type: <**Insert information**>.
4. Address: <**Insert address**>.
5. Area of Work: <**Insert information**>.
6. Acceptance Date: <**Insert date**>.
7. Warranty Period: <**Insert time**>.
8. Expiration Date: <**Insert date**>.

B. AND WHEREAS Roofing Installer has contracted (either directly with Owner or indirectly as a subcontractor) to warrant said work against leaks and faulty or defective materials and workmanship for designated Warranty Period,

C. NOW THEREFORE Roofing Installer hereby warrants, subject to terms and conditions herein set forth, that during Warranty Period he will, at his own cost and expense, make or cause to be made such repairs to or replacements of said work as are necessary to correct faulty and defective work and as are necessary to maintain said work in a watertight condition.

D. This Warranty is made subject to the following terms and conditions:

1. Specifically excluded from this Warranty are damages to work and other parts of the building, and to building contents, caused by:

a. Lightning;
b. Peak gust wind speed exceeding 140 mph;
c. Fire;
d. Failure of roofing system substrate, including cracking, settlement, excessive deflection, deterioration, and decomposition;
e. Faulty construction of parapet walls, copings, chimneys, skylights, vents, equipment supports, and other edge conditions and penetrations of the work;
f. Vapor condensation on bottom of roofing; and
g. Activity on roofing by others, including construction contractors, maintenance personnel, other persons, and animals, whether authorized or unauthorized by Owner.

2. When work has been damaged by any of foregoing causes, Warranty shall be null and void until such damage has been repaired by Roofing Installer and until cost and expense thereof have been paid by Owner or by another responsible party so designated.
3. Roofing Installer is responsible for damage to work covered by this Warranty but is not liable for consequential damages to building or building contents resulting from leaks or faults or defects of work.
4. During Warranty Period, if Owner allows alteration of work by anyone other than Roofing Installer, including cutting, patching, and maintenance in connection with penetrations, attachment of other work, and positioning of anything on roof, this Warranty shall become null and void on date of said alterations, but only to the extent said alterations affect work covered by this Warranty. If Owner engages Roofing Installer to perform said alterations, Warranty shall not become null and void unless Roofing Installer, before starting said work, shall have notified Owner in writing, showing reasonable cause for claim, that said alterations would likely damage or deteriorate work, thereby reasonably justifying a limitation or termination of this Warranty.
5. During Warranty Period, if original use of roof is changed and it becomes used for, but was not originally specified for, a promenade, work deck, spray-cooled surface, flooded basin, or other use or service more severe than originally specified, this Warranty shall become null and void on date of said change, but only to the extent said change affects work covered by this Warranty.
6. Owner shall promptly notify Roofing Installer of observed, known, or suspected leaks, defects, or deterioration and shall afford reasonable opportunity for Roofing Installer to inspect work and to examine evidence of such leaks, defects, or deterioration.
7. This Warranty is recognized to be the only warranty of Roofing Installer on said work and shall not operate to restrict or cut off Owner from other remedies and resources lawfully available to Owner in cases of roofing failure. Specifically, this Warranty shall not operate to relieve Roofing Installer of responsibility for performance of original work according to requirements of the Contract Documents, regardless of whether Contract was a contract directly with Owner or a subcontract with Owner's General Contractor.

E. IN WITNESS THEREOF, this instrument has been duly executed this <**Insert day**> day of <**Insert month**>, <**Insert year**>.

1. Authorized Signature: <**Insert signature**>.
2. Name: <**Insert name**>.
3. Title: <**Insert title**>.

END OF SECTION 07610

SECTION 07620 - SHEET METAL FLASHING AND TRIM

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Manufactured Products:

a. Manufactured through-wall flashing and counterflashing].

b. Manufactured reglets and counterflashing.

2. Formed Products:

a. Formed roof drainage sheet metal fabrications.
b. Formed low-slope roof sheet metal fabrications.
c. Formed wall sheet metal fabrications.
d. Formed equipment support flashing.

B. Related Sections:
1. Section 04220 “ Concrete Unit Masonry” for installing through-wall flashing
2. Section 04813 "Brick Masonry Assemblies” for installing through-wall flashing.

3. Section 06105 "Miscellaneous Carpentry" for wood nailers, curbs, and blocking

4. Section 07720 "Roof Accessories" for set-on-type curbs, equipment supports, roof hatches, vents, and other manufactured roof accessory units.

1.3 PERFORMANCE REQUIREMENTS

A. General: Sheet metal flashing and trim assemblies as indicated shall withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Completed sheet metal flashing and trim shall not rattle, leak, or loosen, and shall remain watertight.

B. Fabricate and install copings capable of resisting the following forces according to recommendations in FMG Loss Prevention Data Sheet 1-49:

1. Wind Zone 3: For velocity pressures of 46 to 104 lbf/sq. ft. (2.20 to 4.98 kPa): 208-lbf/sq. ft. (9.96-kPa) perimeter uplift force, 312-lbf/sq. ft. (14.94-kPa) corner uplift force, and 104-lbf/sq. ft. (4.98-kPa) outward force.

C. Thermal Movements: Provide sheet metal flashing and trim that allows for thermal movements from ambient and surface temperature changes.

1. Temperature Change (Range): 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each manufactured product and accessory.

B. Shop Drawings: Show fabrication and installation layouts of sheet metal flashing and trim, including plans, elevations, expansion-joint locations, and keyed details. Distinguish between shop- and field-assembled work. Include the following:

1. Identification of material, thickness, weight, and finish for each item and location in Project.
2. Details for forming sheet metal flashing and trim, including profiles, shapes, seams, and dimensions.
3. Details for joining, supporting, and securing sheet metal flashing and trim, including layout of fasteners, cleats, clips, and other attachments. Include pattern of seams.
4. Details of termination points and assemblies, including fixed points.
5. Details of expansion joints and expansion-joint covers, including showing direction of expansion and contraction.
6. Details of edge conditions, including eaves, ridges, valleys, rakes, crickets, and counterflashings as applicable.
7. Details of special conditions.
8. Details of connections to adjoining work.
9. Detail formed flashing and trim at a scale of not less than 3 inches per 12 inches (1:5).

C. Samples for Verification: For each type of exposed finish required, prepared on Samples of size indicated below:

1. Sheet Metal Flashing: 12 inches (300 mm) long by actual width of unit, including finished seam and in required profile. Include fasteners, cleats, clips, closures, and other attachments.
2. Trim, Metal Closures, Expansion Joints, Joint Intersections, and Miscellaneous Fabrications: 12 inches (300 mm) long and in required profile. Include fasteners and other exposed accessories.
3. Accessories and Miscellaneous Materials: Full-size Sample.
4. Anodized Aluminum Samples: Samples to show full range to be expected for each color required.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified fabricator.

B. Warranty: Sample of special warranty.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance Data: For sheet metal flashing, trim, and accessories to include in maintenance manuals.

1.7 QUALITY ASSURANCE

A. Fabricator Qualifications: Shop that employs skilled workers who custom fabricate sheet metal flashing and trim similar to that required for this Project and whose products have a record of successful in-service performance.

B. Preinstallation Conference: Conduct conference at Project site.

1. Meet with Owner, Architect, Owner's insurer if applicable, Installer, and installers whose work interfaces with or affects sheet metal flashing and trim including installers of roofing materials, roof accessories, unit skylights, and roof-mounted equipment.
2. Review methods and procedures related to sheet metal flashing and trim.
3. Examine substrate conditions for compliance with requirements, including flatness and attachment to structural members.
4. Review special roof details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that will affect sheet metal flashing.
5. Document proceedings, including corrective measures and actions required, and furnish copy of record to each participant.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Do not store sheet metal flashing and trim materials in contact with other materials that might cause staining, denting, or other surface damage. Store sheet metal flashing and trim materials away from uncured concrete and masonry.

B. Protect strippable protective covering on sheet metal flashing and trim from exposure to sunlight and high humidity, except to the extent necessary for the period of sheet metal flashing and trim installation.

1.9 WARRANTY

A. Special Warranty on Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace sheet metal flashing and trim that shows evidence of deterioration of factory-applied finishes within specified warranty period.

1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:

   a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
   b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
   c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.

2. Finish Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 SHEET METALS

A. General: Protect mechanical and other finishes on exposed surfaces from damage by applying a strippable, temporary protective film before shipping.

B. Copper Sheet: ASTM B 370, cold-rolled copper sheet, H00 or H01 temper.

C. Aluminum Sheet: ASTM B 209 (ASTM B 209M), alloy as standard with manufacturer for finish required, with temper as required to suit forming operations and performance required.

1. As-Milled Finish: Standard one-side bright finish.
2. Surface: Smooth, flat.
3. Clear Anodic Finish, Coil Coated: AAMA 611, AA-M12C22A41, Class I, 0.018 mm or thicker.

2.2 UNDERLAYMENT MATERIALS

A. Felt: ASTM D 226, Type II (No. 30), asphalt-saturated organic felt, nonperforated.

B. Self-Adhering, High-Temperature Sheet: Minimum 30 to 40 mils (0.76 to 1.0 mm) thick, consisting of slip-resisting polyethylene-film top surface laminated to layer of butyl or SBS-modified asphalt adhesive, with release-paper backing; cold applied. Provide primer when recommended by underlayment manufacturer.

1. Thermal Stability: ASTM D 1970; stable after testing at 240 deg F (116 deg C).
2. Low-Temperature Flexibility: ASTM D 1970; passes after testing at minus 20 deg F (29 deg C).
3. Products: Subject to compliance with requirements, provide one of the following:

   a. Carlisle Coatings & Waterproofing Inc.; CCW WIP 300HT.
   b. Grace Construction Products, a unit of W. R. Grace & Co.; Ultra.
   c. Owens Corning; WeatherLock Metal High Temperature Underlayment.
   d. or Architect approved other.

C. Slip Sheet: Building paper, 3-lb/100 sq. ft. (0.16-kg/sq. m)minimum, rosin sized.

2.3 MISCELLANEOUS MATERIALS

A. General: Provide materials and types of fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items as required for complete sheet metal flashing and trim installation and recommended by manufacturer of primary sheet metal or manufactured item unless otherwise indicated.

B. Fasteners: Wood screws, annular threaded nails, self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads and recommended by manufacturer of primary sheet metal or manufactured item.

1. General: Blind fasteners or self-drilling screws, gasketed, with hex-washer head.

    a. Exposed Fasteners: Heads matching color of sheet metal using plastic caps or factory-applied coating.
    b. Blind Fasteners: High-strength aluminum or stainless-steel rivets suitable for metal being fastened.
    c. Spikes and Ferrules: Same material as gutter; with spike with ferrule matching internal gutter width.
2. Fasteners for Aluminum Sheet: Aluminum or Series 300 stainless steel.
3. Fasteners for Stainless-Steel Sheet: Series 300 stainless steel.
4. Fasteners for Aluminum-Zinc Alloy-Coated Steel Sheet: Hot-dip galvanized steel according to ASTM A 153/A 153M or ASTM F 2329 or Series 300 stainless steel.
5. Fasteners for Zinc Sheet: Hot-dip galvanized steel according to ASTM A 153/A 153M or ASTM F 2329 or Series 300 stainless steel.

C. Solder:

1. For Copper: ASTM B 32, Grade Sn50, 50 percent tin and 50 percent lead.
2. For Stainless Steel: ASTM B 32, Grade Sn60, with an acid flux of type recommended by stainless-steel sheet manufacturer.
3. For Zinc-Tin Alloy-Coated Stainless Steel: ASTM B 32, 100 percent tin.
4. For Zinc-Coated (Galvanized) Steel: ASTM B 32, Grade Sn50, 50 percent tin and 50 percent lead or Grade Sn60, 60 percent tin and 40 percent lead.
5. For Zinc: ASTM B 32, 40 percent tin and 60 percent lead with low antimony, as recommended by manufacturer.

D. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch (13 mm) wide and 1/8 inch (3 mm) thick.

E. Elastomeric Sealant: ASTM C 920, elastomeric polyurethane or silicone polymer sealant as recommended for compatibility with base metal; low modulus; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.

F. Butyl Sealant: ASTM C 1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for hooked-type expansion joints with limited movement.

G. Epoxy Seam Sealer: Two-part, noncorrosive, aluminum seam-cementing compound, recommended by aluminum manufacturer for exterior nonmoving joints, including riveted joints.

H. Asphalt Roofing Cement: ASTM D 4586, asbestos free, of consistency required for application.

2.4 MANUFACTURED SHEET METAL FLASHING AND TRIM

A. Through-Wall Ribbed Sheet Metal Flashing: Manufacture through-wall sheet metal flashing for embedment in masonry with ribs at 3-inch (75-mm) intervals along length of flashing to provide an integral mortar bond. Manufacture through-wall flashing with snaplock receiver on exterior face to receive counterflashing.

1. Copper: 10 oz. minimum for fully concealed flashing; 16 oz. elsewhere.

a. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

1) Cheney Flashing Company; Cheney Flashing (Dovetail).
2) Cheney Flashing Company; Cheney Flashing (Sawtooth).
3) Hohmann & Barnard, Inc.; STF Sawtooth Flashing.
4) Keystone Flashing Company, Inc.; Keystone Three-Way Interlocking Thruwall Flashing.
5) Sandell Manufacturing Company, Inc.; Pre-Formed Metal Flashing.

2. Stainless Steel: 0.016 inch thick.

a. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

1) Cheney Flashing Company; Cheney Flashing (Dovetail).
2) Cheney Flashing Company; Cheney Flashing (Sawtooth).
3) Hohmann & Barnard, Inc.; STF Sawtooth Flashing.
4) Keystone Flashing Company, Inc.; Keystone Three-Way Interlocking Thruwall Flashing.
5) Sandell Manufacturing Company, Inc.; Pre-Formed Metal Flashing.

B. Reglets: Units of type, material, and profile indicated, formed to provide secure interlocking of separate reglet and counterflashing pieces, and compatible with flashing indicated with factory-mitered and -welded corners and junctions and with interlocking counterflashing on exterior face, of same metal as reglet.

1. Basis-of-Design Product: Subject to compliance with requirements, provide Fry Reglect products or comparable product by one of the following:.
   a. Heckmann Building Products Inc.
   b. Hickman, W. P. Company.
   c. Keystone Flashing Company, Inc.
   d. National Sheet Metal Systems, Inc.

2. Material: Aluminum, 0.024 inch (0.61 mm) thick.
3. Surface-Mounted Type: Provide with slotted holes for fastening to substrate, with neoprene or other suitable weatherproofing washers, and with channel for sealant at top edge.
4. Stucco Type: Provide with upturned fastening flange and extension leg of length to match thickness of applied finish materials.
5. Concrete Type: Provide temporary closure tape to keep reglet free of concrete materials, special fasteners for attaching reglet to concrete forms, and guides to ensure alignment of reglet section ends.
6. Accessories:

   a. Flexible-Flashing Retainer: Provide resilient plastic or rubber accessory to secure flexible flashing in reglet where clearance does not permit use of standard metal counterflashing or where Drawings show reglet without metal counterflashing.
   b. Counterflashing Wind-Restraint Clips: Provide clips to be installed before counterflashing to prevent wind uplift of counterflashing lower edge.

7. Finish: Mill.

2.5 FABRICATION, GENERAL

A. General: Custom fabricate sheet metal flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, geometry, metal thickness, and other characteristics of item indicated. Fabricate items at the shop to greatest extent possible.

   1. Fabricate sheet metal flashing and trim in thickness or weight needed to comply with performance requirements, but not less than that specified for each application and metal.
   2. Obtain field measurements for accurate fit before shop fabrication.
   3. Form sheet metal flashing and trim without excessive oil canning, buckling, and tool marks and true to line and levels indicated, with exposed edges folded back to form hems.
   4. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces exposed to view.

B. Fabrication Tolerances: Fabricate sheet metal flashing and trim that is capable of installation to a tolerance of 1/4 inch in 20 feet on slope and location lines as indicated and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.

C. Fabrication Tolerances: Fabricate sheet metal flashing and trim that is capable of installation to tolerances specified in MCA's "Guide Specification for Residential Metal Roofing."

D. Sealed Joints: Form nonexpansion but movable joints in metal to accommodate elastomeric sealant.

E. Expansion Provisions: Where lapped expansion provisions cannot be used, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with butyl sealant concealed within joints.

F. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal.

G. Fabricate cleats and attachment devices of sizes as recommended by SMACNA's "Architectural Sheet Metal Manual" and by FMG Loss Prevention Data Sheet 1-49 for application, but not less than thickness of metal being secured.

H. Seams for Aluminum: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with epoxy seam sealer. Rivet joints where necessary for strength on roof side only or where they would not be visible from the ground.

I. Do not use graphite pencils to mark metal surfaces.

2.6 ROOF DRAINAGE SHEET METAL FABRICATIONS

A. Downspouts: Fabricate rectangular downspouts complete with mitered elbows. Furnish with metal hangers, from same material as downspouts, and anchors.
   1. Fabricate from the following materials:
      a. Aluminum: 0.024 inch (0.61 mm) thick.

B. Parapet Scuppers: Fabricate scuppers of dimensions required with closure flange trim to exterior, 4-inch- (100-mm-) wide wall flanges to interior, and base extending 4 inches (100 mm) beyond cant or tapered strip into field of roof. Fabricate from the following materials:
   1. Aluminum: 0.032 inch (0.81 mm) thick.

C. Conductor Heads: Fabricate conductor heads with flanged back and stiffened top edge and of dimensions and shape indicated complete with outlet tubes, exterior flange trim, and built-in overflows. Fabricate from the following materials:
   1. Aluminum: 0.032 inch (0.81 mm) thick.

2.7 LOW-SLOPE ROOF SHEET METAL FABRICATIONS

A. Roof and Roof to Wall Transition Expansion-Joint Cover: Fabricate from the following materials:
   1. Aluminum: 0.050 inch thick.

B. Base Flashing: Fabricate from the following materials:
   1. Aluminum: 0.040 inch thick.

C. Counterflashing: Fabricate from the following materials:

   1. Aluminum: 0.032 inch thick.

D. Flashing Receivers: Fabricate from the following materials:
   1. Aluminum: 0.032 inch thick.

E. Roof-Penetration Flashing: Fabricate from the following materials:
   1. Galvanized Steel: 0.028 inch thick.
   2. Aluminum-Zinc Alloy-Coated Steel: 0.028 inch thick.

F. Roof-Drain Flashing: Fabricate from the following materials:

   1. Stainless Steel: 0.016 inch thick.

2.8 WALL SHEET METAL FABRICATIONS

A. Opening Flashings in Frame Construction: Fabricate head, sill, and similar flashings to extend 6 inches. Insert extension beyond wall openings. Form head and sill flashing with 2-inch- high, end dams. Fabricate from the following materials:
   1. Aluminum: 0.032 inch thick.

2.9 MISCELLANEOUS SHEET METAL FABRICATIONS

A. Equipment Support Flashing: Fabricate from the following materials:
   1. Galvanized Steel: 0.028 inch thick.
   2. Aluminum-Zinc Alloy-Coated Steel: 0.028 inch thick.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, to verify actual locations, dimensions and other conditions affecting performance of the Work.

   1. Verify compliance with requirements for installation tolerances of substrates.
   2. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.

B. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 UNDERLAYMENT INSTALLATION

A. General: Install underlayment as indicated on Drawings.

B. Felt Underlayment: Install felt underlayment with adhesive for temporary anchorage to minimize use of mechanical fasteners under sheet metal flashing and trim. Apply in shingle fashion to shed water, with lapped joints of not less than 2 inches.

C. Self-Adhering Sheet Underlayment: Install self-adhering sheet underlayment, wrinkle free. Apply primer if required by underlayment manufacturer. Comply with temperature restrictions of underlayment manufacturer for installation; use primer rather than nails for installing underlayment at low temperatures. Apply in shingle fashion to shed water, with end laps of not less than 6 inches staggered 24 inches between courses. Overlap side edges not less than 3-1/2 inches. Roll laps with roller. Cover underlayment within 14 days.

3.3 INSTALLATION, GENERAL

A. General: Anchor sheet metal flashing and trim and other components of the Work securely in place, with provisions for thermal and structural movement. Use fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items as required to complete sheet metal flashing and trim system.

1. Install sheet metal flashing and trim true to line and levels indicated. Provide uniform, neat seams with minimum exposure of solder, welds, and sealant.
2. Install sheet metal flashing and trim to fit substrates and to result in watertight performance. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.
3. Space cleats not more than 12 inches apart. Anchor each cleat with two fasteners. Bend tabs over fasteners.
4. Install exposed sheet metal flashing and trim without excessive oil canning, buckling, and tool marks.
5. Install sealant tape where indicated.
6. Torch cutting of sheet metal flashing and trim is not permitted.
7. Do not use graphite pencils to mark metal surfaces.

B. Metal Protection: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating or by other permanent separation as recommended by SMACNA.

1. Coat back side of uncoated aluminum sheet metal flashing and trim with bituminous coating where flashing and trim will contact wood, ferrous metal, or cementitious construction.
2. Underlayment: Where installing metal flashing directly on cementitious or wood substrates, install a course of felt underlayment and cover with a slip sheet or install a course of polyethylene sheet.

C. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet with no joints allowed within 24 inches

of corner or intersection. Where lapped expansion provisions cannot be used or would not be sufficiently watertight, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with sealant concealed within joints.

D. Fastener Sizes: Use fasteners of sizes that will penetrate metal decking not less than recommended by fastener manufacturer to achieve maximum pull-out resistance.

E. Seal joints as shown and as required for watertight construction.

1. Where sealant-filled joints are used, embed hooked flanges of joint members not less than 1 inch into sealant. Form joints to completely conceal sealant. When ambient temperature at time of installation is moderate, between 40 and 70 deg F (4 and 21 deg C), set joint members for 50 percent movement each way. Adjust setting proportionately for installation at higher ambient temperatures. Do not install sealant-type joints at temperatures below 40 deg F (4 deg C).
2. Prepare joints and apply sealants to comply with requirements in Section 07920 "Joint Sealants."

F. Soldered Joints: Clean surfaces to be soldered, removing oils and foreign matter. Pre-tin edges of sheets to be soldered to a width of 1-1/2 inches , except reduce pre-tinning where pre-tinned surface would show in completed Work.
1. Do not use torches for soldering. Heat surfaces to receive solder and flow solder into joint. Fill joint completely. Completely remove flux and spatter from exposed surfaces.
2. Stainless-Steel Soldering: Tin edges of uncoated sheets using solder recommended for stainless steel and acid flux. Promptly remove acid flux residue from metal after tinning and soldering. Comply with solder manufacturer's recommended methods for cleaning and neutralization.

G. Rivets: Rivet joints in uncoated aluminum where on roof side only or where they would not be visible from the ground and where necessary for strength.

3.4 ROOF DRAINAGE SYSTEM INSTALLATION

A. General: Install sheet metal roof drainage items to produce complete roof drainage system according to SMACNA recommendations and as indicated. Coordinate installation of roof perimeter flashing with installation of roof drainage system.

B. Downspouts: Join sections with 1-1/2-inch telescoping joints.

1. Provide hangers with fasteners designed to hold downspouts securely to walls. Locate hangers at top and bottom and at approximately 60 inches o.c. in between.
2. Provide elbows at base of downspout to direct water away from building.
3. Connect downspouts to underground drainage system indicated.

C. Parapet Scuppers: Install scuppers where indicated through parapet. Continuously support scupper, set to correct elevation, and seal flanges to interior wall face, over cants or tapered edge strips, and under roofing membrane.

1. Anchor scupper closure trim flange to exterior wall and to scupper.
2. Loosely lock front edge of scupper with conductor head.
3. Seal with elastomeric sealant exterior wall scupper flanges into back of conductor head.

D. Conductor Heads: Anchor securely to wall with elevation of conductor head rim 1 inch below scupper discharge.

3.5 ROOF FLASHING INSTALLATION

A. General: Install sheet metal flashing and trim to comply with performance requirements, sheet metal manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, set units true to line, and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.

B. Retain one of first two paragraphs below for copings. Retain first paragraph if following SMACNA's recommendations; SMACNA does not include fastener spacing for the continuous cleat. Retain second if Project is FMG insured or if FMG requirements will set minimum installation standard. FMG requirements depend on specific coping configurations.

C. Copings: Anchor to resist uplift and outward forces according to recommendations in FMG Loss Prevention Data Sheet 1-49 for specified wind zone and as indicated.

1. Interlock exterior bottom edge of coping with continuous cleat anchored to substrate at the spacing required for Wind Zone 3.
2. Anchor interior leg of coping with screw fasteners and washers at the spaceing required for Wind Zone 3.

D. Pipe or Post Counterflashing: Install counterflashing umbrella with close-fitting collar with top edge flared for elastomeric sealant, extending a minimum of 4 inches (100 mm) over base flashing. Install stainless-steel draw band and tighten.

E. Counterflashing: Coordinate installation of counterflashing with installation of base flashing. Insert counterflashing in reglets or receivers and fit tightly to base flashing. Extend counterflashing 4 inches (100 mm) over base flashing. Lap counterflashing joints a minimum of 4 inches (100 mm) and bed with sealant. Secure in a waterproof manner by means of interlocking folded seam or blind rivets and sealantas indicated on the drawings.

F. Roof-Penetration Flashing: Coordinate installation of roof-penetration flashing with installation of roofing and other items penetrating roof. Seal with elastomeric or butyl sealant that is compatible with the flashing and penetration base material and clamp flashing to pipes that penetrate roof.

3.6 WALL FLASHING INSTALLATION

A. General: Install sheet metal wall flashing to intercept and exclude penetrating moisture according to SMACNA recommendations and as indicated. Coordinate installation of wall flashing with installation of wall-opening components such as windows, doors, and louvers.

B. Through-Wall Flashing: Installation of through-wall flashing is specified in Section 042200 “Concrete Unit Masonry” and Section 04813 “Brick Masonry Assemblies”

C. Reglets: Installation of reglets is specified in Section 04813 "Brick Masonry Assemblies."

D. Opening Flashings in Frame Construction: Install continuous head, sill, and similar flashings to extend 6 inches beyond wall openings.

3.7 MISCELLANEOUS FLASHING INSTALLATION

A. Equipment Support Flashing: Coordinate installation of equipment support flashing with installation of roofing and equipment. Weld or seal flashing with elastomeric sealant to equipment support member.

3.8 ERECTION TOLERANCES

A. Installation Tolerances: Shim and align sheet metal flashing and trim within installed tolerance of 1/4 inch in 20 feet (6 mm in 6 m) on slope and location lines as indicated and within 1/8-inch (3-mm) offset of adjoining faces and of alignment of matching profiles.

3.9 CLEANING AND PROTECTION

A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.

B. Clean and neutralize flux materials. Clean off excess solder.

C. Clean off excess sealants.

D. Remove temporary protective coverings and strippable films as sheet metal flashing and trim are installed unless otherwise indicated in manufacturer's written installation instructions. On completion of installation, remove unused materials and clean finished surfaces. Maintain in a clean condition during construction.

E. Replace sheet metal flashing and trim that have been damaged or that have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 07620

SECTION 07710 - MANUFACTURED ROOF SPECIALTIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:
1. Roof-edge flashings.
2. Roof-edge drainage systems.
3. Reglets and counterflashings.

B. Related Sections:

1. Section 06100 "Rough Carpentry" for wood nailers, curbs, and blocking.
2. Section 07720 "Roof Accessories" for set-on-type curbs, equipment supports, roof hatches, vents, and other manufactured roof accessory units.
3. Section 07920 "Joint Sealants" for field-applied sealants between roof specialties and adjacent materials.

1.3 PERFORMANCE REQUIREMENTS

A. General Performance: Roof specialties shall withstand exposure to weather and resist thermally induced movement without failure, rattling, leaking, or fastener disengagement due to defective manufacture, fabrication, installation, or other defects in construction.

B. FM Approvals' Listing: Manufacture and install copings that are listed in FM Approvals' "RoofNav" and approved for windstorm classification, Class 1-90. Identify materials with FM Approvals' markings.

C. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes to prevent buckling, opening of joints, hole elongation, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Provide clips that resist rotation and avoid shear stress as a result of thermal movements. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change (Range): 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.

B. Shop Drawings: For roof specialties. Include plans, elevations, expansion-joint locations, keyed details, and attachments to other work. Distinguish between plant- and field-assembled work. Include the following:

1. Details for expansion and contraction; locations of expansion joints, including direction of expansion and contraction.
2. Pattern of seams and layout of fasteners, cleats, clips, and other attachments.
3. Details of termination points and assemblies, including fixed points.
4. Details of special conditions.

C. Samples for Verification: For roof-edge drainage systems, reglets, and counterflashings made from 12-inch lengths of full-size components including fasteners, cover joints, accessories, and attachments.

1.5 INFORMATIONAL SUBMITTALS

A. Warranty: Sample of special warranty.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance Data: For roofing specialties to include in maintenance manuals.

1.7 QUALITY ASSURANCE

A. Preinstallation Conference: Conduct conference at Project site.

1. Meet with Owner, Architect, Owner's insurer if applicable, Installer, and installers whose work interfaces with or affects roof specialties including installers of roofing materials and accessories.
2. Examine substrate conditions for compliance with requirements, including flatness and attachment to structural members.
3. Review special roof details, roof drainage, and condition of other construction that will affect roof specialties.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Do not store roof specialties in contact with other materials that might cause staining, denting, or other surface damage. Store roof specialties away from uncured concrete and masonry.

B. Protect strippable protective covering on roof specialties from exposure to sunlight and high humidity, except to extent necessary for the period of roof specialties installation.

1.9 WARRANTY

1. Finish Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 EXPOSED METALS

A. Cold-rolled copper sheet, H00 or H01 temper.

1. Non-Patinated Exposed Finish: Mill.
2. Pre-Patinated Copper-Sheet Finish: Pre-patinated according to ASTM B 882.

B. Aluminum Sheet: ASTM B 209 (ASTM B 209M), alloy as standard with manufacturer for finish required, with temper to suit forming operations and performance required.

1. Surface: Smooth, flat finish.

2. Clear Anodic Finish, Coil Coated: AAMA 611, AA-M12C22A41, Class I, 0.018 mm or thicker.

C. Aluminum Extrusions: ASTM B 221 (ASTM B 221M), alloy and temper recommended by manufacturer for type of use and finish indicated, finished as follows:

1. Clear Anodic Finish, Coil Coated: AAMA 611, AA-M12C22A41, Class I, 0.018 mm or thicker.

2.2 CONCEALED METALS

A. Aluminum Sheet: ASTM B 209 (ASTM B 209M), alloy and temper recommended by manufacturer for type of use and structural performance indicated, mill finished.

B. Aluminum Extrusions: ASTM B 221 (ASTM B 221M), alloy and temper recommended by manufacturer for type of use and structural performance indicated, mill finished.

C. Stainless-Steel Sheet: ASTM A 240/A 240M or ASTM A 666, Type 304.

D. Zinc-Coated (Galvanized) Steel Sheet: ASTM A 653/A 653M, G90 (Z275) coating designation.

2.3 UNDERLAYMENT MATERIALS

A. Felt: ASTM D 226, Type II (No. 30), asphalt-saturated organic felt, nonperforated.

B. Self-Adhering, High-Temperature Sheet: Minimum 30 to 40 mils thick, consisting of slip-resisting polyethylene-film top surface laminated to layer of butyl or SBS-modified asphalt adhesive, with release-paper backing; cold applied. Provide primer when recommended by underlayment manufacturer.

1. Thermal Stability: ASTM D 1970; stable after testing at 240 deg F (116 deg C).
2. Low-Temperature Flexibility: ASTM D 1970; passes after testing at minus 20 deg F (29 deg C).
3. Products: Subject to compliance with requirements, provide one of the following:

    a. Carlisle Coatings & Waterproofing; CCW WIP 300HT.
    b. Grace Construction Products, a unit of W. R. Grace & Co.; Ultra.
    c. Owens Corning; WeatherLock Metal High Temperature Underlayment.
    d. or Architect approved other product.

C. Slip Sheet: Building paper, 3-lb/100 sq. ft. minimum, rosin sized.

2.4 MISCELLANEOUS MATERIALS

A. General: Provide materials and types of fasteners, protective coatings, sealants, and other miscellaneous items required by manufacturer for a complete installation.

B. Fasteners: Manufacturer's recommended fasteners, suitable for application and designed to meet performance requirements. Furnish the following unless otherwise indicated:
1. Fasteners for Aluminum: Aluminum or Series 300 stainless steel.
2. Fasteners for Stainless-Steel Sheet: Series 300 stainless steel.
3. Fasteners for Zinc-Coated (Galvanized) Steel Sheet: Series 300 stainless steel or hot-dip zinc-coated steel according to ASTM A 153/A 153M or ASTM F 2329.

C. Elastomeric Sealant: ASTM C 920, elastomeric polyurethane or silicone polymer sealant of type, grade, class, and use classifications required by roofing-specialty manufacturer for each application.

D. Butyl Sealant: ASTM C 1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for hooked-type expansion joints with limited movement.

E. Bituminous Coating: Cold-applied asphalt emulsion complying with ASTM D 1187.

F. Asphalt Roofing Cement: ASTM D 4586, asbestos free, of consistency required for application.

2.5 ROOF-EDGE DRAINAGE SYSTEMS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Andreas Renner KG.
2. Architectural Products Company.
3. Berger Building Products, Inc.
4. Castle Metal Products.
5. Cheney Flashing Company.
6. Hickman Company, W. P.

7. Klauer Manufacturing Company.
8. Merchant & Evans, Inc.
9. Metal-Era, Inc.
10. Metal-Fab Manufacturing, LLC.
11. National Sheet Metal Systems, Inc.
12. Perimeter Systems; a division of Southern Aluminum Finishing Company, Inc.

B. Downspouts: Plain rectangular complete with mitered elbows, manufactured from the following exposed metal. Furnish with metal hangers, from same material as downspouts, and anchors.
1. Formed Aluminum: 0.040 inch thick.

C. Parapet Scuppers: Manufactured with closure flange trim to exterior, 4-inch- wide wall flanges to interior, and base extending 4 inches beyond cant or tapered strip into field of roof.

1. Fabricate from the following exposed metal:
a. Formed Aluminum: 0.032 inch thick.

D. Conductor Heads: Manufactured conductor heads, each with flanged back and stiffened top edge and of dimensions and shape indicated, complete with outlet tube that nests into upper end of downspout.

1. Fabricate from the following exposed metal:
a. Formed Aluminum: 0.032 inch thick.

2.6 REGLETS AND COUNTERFLASHINGS

A. Basis-of-Design Product: Subject to compliance with requirements, provide Fry Reglect products or comparable product by one of the following:
1. Heckmann Building Products Inc.
2. Hickman Company, W. P.
3. Keystone Flashing Company, Inc.
4. Metal-Era, Inc.
5. Metal-Fab Manufacturing, LLC.
6. National Sheet Metal Systems, Inc.

B. Reglets: Manufactured units formed to provide secure interlocking of separate reglet and counterflashing pieces, from the following exposed metal:
1. Formed Aluminum: 0.050 inch thick.
2. Stainless Steel: 0.025 inch thick.
3. Zinc-Coated Steel: Nominal 0.028-inch thickness.
4. Corners: Factory mitered and continuously welded.
5. Surface-Mounted Type: Provide reglets with slotted holes for fastening to substrate, with neoprene or other suitable weatherproofing washers, and with channel for sealant at top edge.
6. Stucco Type, Embedded: Provide reglets with upturned fastening flange and extension leg of length to match thickness of applied finish materials.

C. Counterflashings: Manufactured units of heights to overlap top edges of base flashings by 4 inches and in lengths not exceeding 12 feet designed to snap into reglets or through-wall-flashing receiver and compress against base flashings with joints lapped, from the following exposed metal:
   1. Formed Aluminum: 0.032 inch thick.
   2. Stainless Steel: 0.025 inch thick.
   3. Zinc-Coated Steel: Nominal 0.028-inch thickness.

D. Accessories:

   1. Flexible-Flashing Retainer: Provide resilient plastic or rubber accessory to secure flexible flashing in reglet where clearance does not permit use of standard metal counterflashing or where reglet is provided separate from metal counterflashing.
   2. Counterflashing Wind-Restraint Clips: Provide clips to be installed before counterflashing to prevent wind uplift of counterflashing lower edge.

   Retain required finish in four paragraphs below. If retaining more than one, indicate locations of each on Drawings or by inserts.

E. Aluminum Finish: Clear anodic.

2.7 GENERAL FINISH REQUIREMENTS

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

C. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, to verify actual locations, dimensions, and other conditions affecting performance of the Work.

B. Examine walls, roof edges, and parapets for suitable conditions for roof specialties.

C. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 UNDERLAYMENT INSTALLATION

A. Felt Underlayment: Install with adhesive for temporary anchorage to minimize use of mechanical fasteners under roof specialties. Apply in shingle fashion to shed water, with lapped joints of not less than 2 inches

B. Self-Adhering Sheet Underlayment: Install wrinkle free. Apply primer if required by underlayment manufacturer. Comply with temperature restrictions of underlayment manufacturer for installation; use primer rather than nails for installing underlayment at low temperatures. Apply in shingle fashion to shed water. Overlap edges not less than 3-1/2 inches. Roll laps with roller. Cover underlayment within 14 days.

C. Slip Sheet: Install with tape or adhesive for temporary anchorage to minimize use of mechanical fasteners under roof specialties. Apply in shingle fashion to shed water, with lapped joints of not less than 2 inches.

3.3 INSTALLATION, GENERAL

A. General: Install roof specialties according to manufacturer's written instructions. Anchor roof specialties securely in place, with provisions for thermal and structural movement. Use fasteners, solder, protective coatings, separators, sealants, and other miscellaneous items as required to complete roof-specialty systems.

1. Install roof specialties level, plumb, true to line and elevation; with limited oil-canning and without warping, jogs in alignment, buckling, or tool marks.
2. Provide uniform, neat seams with minimum exposure of solder and sealant.
3. Install roof specialties to fit substrates and to result in watertight performance. Verify shapes and dimensions of surfaces to be covered before manufacture.
4. Torch cutting of roof specialties is not permitted.
5. Do not use graphite pencils to mark metal surfaces.

B. Metal Protection: Protect metals against galvanic action by separating dissimilar metals from contact with each other or with corrosive substrates by painting contact surfaces with bituminous coating or by other permanent separation as recommended by manufacturer.

1. Coat concealed side of uncoated aluminum roof specialties with bituminous coating where in contact with wood, ferrous metal, or cementitious construction.
2. Underlayment: Where installing metal flashing directly on cementitious or wood substrates, install a course of self-adhering, high-temperature sheet underlayment.
3. Bed flanges in thick coat of asphalt roofing cement where required by manufacturers of roof specialties for waterproof performance.

C. Expansion Provisions: Allow for thermal expansion of exposed roof specialties.

1. Space movement joints at a maximum of with no joints within 18 inches of corners or intersections unless otherwise shown on Drawings.

2. When ambient temperature at time of installation is between 40 and 70 deg F (4 and 21 deg C), set joint members for 50 percent movement each way. Adjust setting proportionately for installation at higher ambient temperatures.

D. Fastener Sizes: Use fasteners of sizes that will penetrate substrate not less than recommended by fastener manufacturer to achieve maximum pull-out resistance.

E. Seal joints with elastomeric or butyl sealant as required by roofing-specialty manufacturer.

F. Seal joints as required for watertight construction. Place sealant to be completely concealed in joint. Do not install sealants at temperatures below 40 deg F (4 deg C).

3.4 ROOF-EDGE DRAINAGE-SYSTEM INSTALLATION

A. General: Install components to produce a complete roof-edge drainage system according to manufacturer's written instructions. Coordinate installation of roof perimeter flashing with installation of roof-edge drainage system.

B. Downspouts: Join sections with manufacturer's standard telescoping joints. Provide hangers with fasteners designed to hold downspouts securely to walls and 1 inch away from walls; locate fasteners at top and bottom and at approximately 60 inches o.c.

1. Provide elbows at base of downspout to direct water away from building.

C. Splash Pans: Install where downspouts discharge on low-slope roofs. Set in elastomeric sealant.

D. Parapet Scuppers: Install scuppers through parapet where indicated. Continuously support scupper, set to correct elevation, and seal flanges to interior wall face, over cants or tapered edge strips, and under roofing membrane.

1. Anchor scupper closure trim flange to exterior wall and seal or solder to scupper.
2. Loosely lock front edge of scupper with conductor head.
3. Seal or solder exterior wall scupper flanges into back of conductor head.

E. Conductor Heads: Anchor securely to wall with elevation of conductor top edge 1 inch (25 mm) below scupper discharge.

3.5 REGLET AND COUNTERFLASHING INSTALLATION

A. Surface-Mounted Reglets: Install reglets to receive flashings where flashing without embedded reglets is indicated on Drawings. Install at height so that inserted counterflashings overlap 4 inches (100 mm) over top edge of base flashings.

B. Counterflashings: Insert counterflashings into reglets or other indicated receivers; ensure that counterflashings overlap 4 inches (100 mm) over top edge of base flashings. Lap counterflashing joints a minimum of 4 inches (100 mm) and bed with elastomeric or butyl sealant. Fit counterflashings tightly to base flashings.

3.6 CLEANING AND PROTECTION

A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.

B. Clean and neutralize flux materials. Clean off excess solder and sealants.

C. Remove temporary protective coverings and strippable films as roof specialties are installed. On completion of installation, clean finished surfaces including removing unused fasteners, metal filings, pop rivet stems, and pieces of flashing. Maintain roof specialties in a clean condition during construction.

D. Replace roof specialties that have been damaged or that cannot be successfully repaired by finish touchup or similar minor repair procedures.

END OF SECTION 07710

SECTION 07720 - ROOF ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Roof curbs.
2. Equipment supports.
3. Pipe supports.
4. Preformed flashing sleeves.

B. Related Sections:

1. Section 05500 "Metal Fabrications" for metal vertical ladders, ships' ladders, and stairs for access to roof hatches.
2. Section 05521 "Pipe and Tube Railings" for safety railing systems not attached to roof-hatch curbs.
3. Section 07620 "Sheet Metal Flashing and Trim" for shop- and field-formed metal flashing, roof-drainage systems, roof expansion-joint covers, and miscellaneous sheet metal trim and accessories.
4. Section 07710 "Manufactured Roof Specialties" for manufactured fasciae, copings, gravel stops, gutters and downspouts, and counterflashing.

1.3 PERFORMANCE REQUIREMENTS

A. General Performance: Roof accessories shall withstand exposure to weather and resist thermally induced movement without failure, rattling, leaking, or fastener disengagement due to defective manufacture, fabrication, installation, or other defects in construction.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of roof accessory indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.

B. Shop Drawings: For roof accessories. Include plans, elevations, keyed details, and attachments to other work. Indicate dimensions, loadings, and special conditions. Distinguish between plant- and field-assembled work.

C. Samples: For each exposed product and for each color and texture specified, prepared on Samples of size to adequately show color.

1.5 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Roof plans, drawn to scale, and coordinating penetrations and roof-mounted items. Show the following:

1. Size and location of roof accessories specified in this Section.
2. Method of attaching roof accessories to roof or building structure.
3. Other roof-mounted items including mechanical and electrical equipment, ductwork, piping, and conduit.
4. Required clearances.

B. Warranty: Sample of special warranty.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For roof accessories to include in operation and maintenance manuals.

1.7 COORDINATION

A. Coordinate layout and installation of roof accessories with roofing membrane and base flashing and interfacing and adjoining construction to provide a leakproof, weathertight, secure, and noncorrosive installation.

B. Coordinate dimensions with rough-in information or Shop Drawings of equipment to be supported.

1.8 WARRANTY

A. Special Warranty on Painted Finishes: Manufacturer's standard form in which manufacturer agrees to repair finishes or replace roof accessories that show evidence of deterioration of factory-applied finishes within specified warranty period.

1. Fluoropolymer Finish: Deterioration includes, but is not limited to, the following:

a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.

2. Finish Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 METAL MATERIALS

A. Zinc-Coated (Galvanized) Steel Sheet: ASTM A 653/A 653M, G90 (Z275) coating designation.
   1. Exposed Coil-Coated Finish: Prepainted by the coil-coating process to comply with ASTM A 755/A 755M. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

      a. Two-Coat Fluoropolymer Finish: AAMA 621. System consisting of primer and fluoropolymer color topcoat containing not less than 70 percent PVDF resin by weight.

   2. Baked-Enamel or Powder-Coat Finish: Immediately after cleaning and pretreating, apply manufacturer's standard two-coat, baked-on finish consisting of prime coat and thermosetting topcoat, with a minimum dry film thickness of 1 mil (0.025 mm) for topcoat. Comply with coating manufacturer's written instructions for applying and baking to achieve a minimum dry film thickness of 2 mils (0.05 mm).
   3. Concealed Finish: Pretreat with manufacturer's standard white or light-colored acrylic or polyester-backer finish consisting of prime coat and wash coat, with a minimum total dry film thickness of 0.5 mil (0.013 mm).

B. Aluminum-Zinc Alloy-Coated Steel Sheet: ASTM A 792/A 792M, AZ50 (AZM150) coated.
   1. Exposed Coil-Coated Finish: Prepainted by the coil-coating process to comply with ASTM A 755/A 755M. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

      a. Two-Coat Fluoropolymer Finish: AAMA 621. System consisting of primer and fluoropolymer color topcoat containing not less than 70 percent PVDF resin by weight.

   2. Baked-Enamel or Powder-Coat Finish: Immediately after cleaning and pretreating, apply manufacturer's standard two-coat, baked-on finish consisting of prime coat and thermosetting topcoat, with a minimum dry film thickness of 1 mil (0.025 mm) for topcoat. Comply with coating manufacturer's written instructions for applying and baking to achieve a minimum dry film thickness of 2 mils (0.05 mm).
   3. Concealed Finish: Pretreat with manufacturer's standard white or light-colored acrylic or polyester-backer finish consisting of prime coat and wash coat, with a minimum total dry film thickness of 0.5 mil (0.013 mm).

C. Aluminum Sheet: ASTM B 209 (ASTM B 209M), manufacturer's standard alloy for finish required, with temper to suit forming operations and performance required.

1. Mill Finish: As manufactured.
2. Factory Prime Coating: Where field painting is indicated, apply pretreatment and white or light-colored, factory-applied, baked-on epoxy primer coat, with a minimum dry film thickness of 0.2 mil (0.005 mm).
3. Clear Anodic Finish: AAMA 611, AA-M12C22A41, Class I, 0.018 mm or thicker.

D. Aluminum Extrusions and Tubes: ASTM B 221 (ASTM B 221M), manufacturer's standard alloy and temper for type of use, finished to match assembly where used, otherwise mill finished.

E. Stainless-Steel Sheet and Shapes: ASTM A 240/A 240M or ASTM A 666, Type 304.

F. Steel Shapes: ASTM A 36/A 36M, hot-dip galvanized according to ASTM A 123/A 123M unless otherwise indicated.

G. Steel Tube: ASTM A 500, round tube.

H. Galvanized-Steel Tube: ASTM A 500, round tube, hot-dip galvanized according to ASTM A 123/A 123M.

I. Steel Pipe: ASTM A 53/A 53M, galvanized.

2.2 MISCELLANEOUS MATERIALS

A. General: Provide materials and types of fasteners, protective coatings, sealants, and other miscellaneous items required by manufacturer for a complete installation.

B. Polyisocyanurate Board Insulation: ASTM C 1289, thickness as indicated.Wood Nailers: Softwood lumber, pressure treated with waterborne preservatives for aboveground use, acceptable to authorities having jurisdiction, containing no arsenic or chromium, and complying with AWPA C2; not less than 1-1/2 inches (38 mm) thick.

C. Underlayment:
1. Polyethylene Sheet: 6-mil- (0.15-mm-) thick polyethylene sheet complying with ASTM D 4397.
2. Slip Sheet: Building paper, 3-lb/100 sq. ft. (0.16-kg/sq. m) minimum, rosin sized.

D. Fasteners: Roof accessory manufacturer's recommended fasteners suitable for application and metals being fastened. Match finish of exposed fasteners with finish of material being fastened. Provide nonremovable fastener heads to exterior exposed fasteners. Furnish the following unless otherwise indicated:

1. Fasteners for Zinc-Coated or Aluminum-Zinc Alloy-Coated Steel: Series 300 stainless steel or hot-dip zinc-coated steel according to ASTM A 153/A 153M or ASTM F 2329.
2. Fasteners for Aluminum Sheet: Aluminum or Series 300 stainless steel.

3. Fasteners for Stainless-Steel Sheet: Series 300 stainless steel.

E. Gaskets: Manufacturer's standard tubular or fingered design of neoprene, EPDM, PVC, or silicone or a flat design of foam rubber, sponge neoprene, or cork.

F. Elastomeric Sealant: ASTM C 920, elastomeric polyurethane or silicone polymer sealant as recommended by roof accessory manufacturer for installation indicated; low modulus; of type, grade, class, and use classifications required to seal joints and remain watertight.

G. Butyl Sealant: ASTM C 1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for expansion joints with limited movement.

H. Asphalt Roofing Cement: ASTM D 4586, asbestos free, of consistency required for application.

2.3 ROOF CURBS

A. Roof Curbs: Internally reinforced roof-curb units with integral spring-type vibration isolators and capable of supporting superimposed live and dead loads, including equipment loads and other construction indicated on Drawings; with welded or mechanically fastened and sealed corner joints, integral metal cant, and integrally formed deck-mounting flange at perimeter bottom.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

    a. AES Industries, Inc.
    b. Curbs Plus, Inc.
    c. Custom Solution Roof and Metal Products.
    d. Greenheck Fan Corporation.
    e. LM Curbs.
    f. Metallic Products Corp.
    g. Milcor Inc.; Commercial Products Group of Hart & Cooley, Inc.
    h. Pate Company (The).
    i. Roof Products, Inc.
    j. Safe Air of Illinois.
    k. Thybar Corporation.
    l. Vent Products Co., Inc.

B. Size: Coordinate dimensions with roughing-in information or Shop Drawings of equipment to be supported.

C. Material: Zinc-coated (galvanized) or Aluminum-zinc alloy-coated steel sheet, 0.079 inch (2.01 mm) thick.

1. Finish: Two-coat fluoropolymer or Baked enamel or powder coat
2. Color: As selected by Architect from manufacturer's full range.

D. Material: Aluminum sheet, 0.090 inch (2.28 mm) thick.

1. Finish: where visible from grade otherwise Baked enamel or powder coat.
2. Color: As indicated by manufacturer's designations.

E. Construction:

1. Insulation: Factory insulated with 1-1/2-inch- (38-mm-) thick glass-fiber board insulation.
2. Liner: Same material as curb, of manufacturer's standard thickness and finish.
3. Factory-installed wood nailer at top of curb, continuous around curb perimeter.
4. On ribbed or fluted metal roofs, form deck-mounting flange at perimeter bottom to conform to roof profile.
5. Fabricate curbs to minimum height of 12 inches (300 mm) unless otherwise indicated.
6. Top Surface: Level around perimeter with roof slope accommodated by sloping the deck-mounting flange.
7. Sloping Roofs: Where roof slope exceeds 1:48, fabricate curb with perimeter curb height tapered to accommodate roof slope so that top surface of perimeter curb is level. Equip unit with water diverter or cricket on side that obstructs water flow.
8. Security Grille: Provide where indicated.

2.4 EQUIPMENT SUPPORTS

A. Equipment Supports: Internally reinforced metal equipment supports capable of supporting superimposed live and dead loads, including equipment loads and other construction indicated on Drawings; with welded or mechanically fastened and sealed corner joints, integral metal cant, and integrally formed deck-mounting flange at perimeter bottom.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. AES Industries, Inc.
b. Curbs Plus, Inc.
c. Custom Solution Roof and Metal Products.
d. Greenheck Fan Corporation.
e. LM Curbs.
f. Milcor Inc.; Commercial Products Group of Hart & Cooley, Inc.
g. Pate Company (The).
h. Roof Products, Inc.
i. Thybar Corporation.
j. Vent Products Co., Inc.

B. Size: Coordinate dimensions with roughing-in information or Shop Drawings of equipment to be supported.

C. Material: Zinc-coated (galvanized) or Aluminum-zinc alloy-coated steel sheet, 0.079 inch (2.01 mm) thick.

1. Finish: Two-coat fluoropolymer or Baked enamel or powder coat.
2. Color: As selected by Architect from manufacturer's full range.

D. Material: Aluminum sheet, 0.090 inch (2.28 mm) thick.

1. Finish: Baked enamel or powder coat.
2. Color: As indicated by manufacturer's designations.

E. Construction:

1. Insulation: Factory insulated with 1-1/2-inch- (38-mm-) thick glass-fiber board insulation.
2. Liner: Same material as equipment support, of manufacturer's standard thickness and finish.
3. Metal Counterflashing: Manufacturer's standard, removable, fabricated of same metal and finish as equipment support.
4. On ribbed or fluted metal roofs, form deck-mounting flange at perimeter bottom to conform to roof profile.
5. Fabricate equipment supports to minimum height of 12 inches (300 mm) unless otherwise indicated.
6. Sloping Roofs: Where roof slope exceeds 1:48, fabricate each support with height to accommodate roof slope so that tops of supports are level with each other. Equip supports with water diverters or crickets on sides that obstruct water flow.
7. Security Grille: Provide where indicated.

2.5 PREFORMED FLASHING SLEEVES

A. Exhaust Vent Flashing: Double-walled metal flashing sleeve or boot, insulation filled, with integral deck flange, 12 inches (300 mm) high, with removable metal hood and slotted metal collar.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

   a. Custom Solution Roof and Metal Products.
   b. Thaler Metal USA Inc.

2. Metal: Aluminum sheet, 0.063 inch (1.60 mm) thick .
3. Diameter: As indicated .
4. Finish: Manufacturer's standard.

B. Vent Stack Flashing: Metal flashing sleeve, uninsulated, with integral deck flange.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

    a. Custom Solution Roof and Metal Products.
    b. Milcor Inc.; Commercial Products Group of Hart & Cooley, Inc.
    c. Thaler Metal USA Inc.

2. Metal: Aluminum sheet, 0.063 inch (1.60 mm) thick .
3. Height: 7 inches (175 mm) .
4. Diameter: As indicated .
5. Finish: Manufacturer's standard.

2.6 GENERAL FINISH REQUIREMENTS

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, to verify actual locations, dimensions, and other conditions affecting performance of the Work.

B. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.

C. Verify dimensions of roof openings for roof accessories.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. General: Install roof accessories according to manufacturer's written instructions.

1. Install roof accessories level, plumb, true to line and elevation, and without warping, jogs in alignment, excessive oil canning, buckling, or tool marks.
2. Anchor roof accessories securely in place so they are capable of resisting indicated loads.
3. Use fasteners, separators, sealants, and other miscellaneous items as required to complete installation of roof accessories and fit them to substrates.

4. Install roof accessories to resist exposure to weather without failing, rattling, leaking, or loosening of fasteners and seals.

B. Metal Protection: Protect metals against galvanic action by separating dissimilar metals from contact with each other or with corrosive substrates by painting contact surfaces with bituminous coating or by other permanent separation as recommended by manufacturer.

1. Coat concealed side of uncoated aluminum roof accessories with bituminous coating where in contact with wood, ferrous metal, or cementitious construction.
2. Underlayment: Where installing roof accessories directly on cementitious or wood substrates, install a course of felt underlayment and cover with a slip sheet, or install a course of polyethylene sheet.
3. Bed flanges in thick coat of asphalt roofing cement where required by manufacturers of roof accessories for waterproof performance.

C. Roof Curb Installation: Install each roof curb so top surface is level.

D. Equipment Support Installation: Install equipment supports so top surfaces are level with each other.

E. Roof Walkway Installation:

1. Verify that locations of access and servicing points for roof-mounted equipment are served by locations of roof walkways.
2. Remove ballast from top surface of low-slope roofing at locations of contact with roof-walkway supports.
3. Install roof walkway support pads prior to placement of roof walkway support stands onto low-slope roofing.
4. Redistribute removed ballast after installation of support pads.

F. Preformed Flashing-Sleeve Installation: Secure flashing sleeve to roof membrane according to flashing-sleeve manufacturer's written instructions.

G. Seal joints with elastomeric or butylsealant as required by roof accessory manufacturer.

3.3 REPAIR AND CLEANING

A. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing according to ASTM A 780.

B. Touch up factory-primed surfaces with compatible primer ready for field painting according to Section 09911 "Exterior Painting" and Section 09912 "Interior Painting."

C. Clean exposed surfaces according to manufacturer's written instructions.

D. Clean off excess sealants.

E. Replace roof accessories that have been damaged or that cannot be successfully repaired by finish touchup or similar minor repair procedures.

END OF SECTION 07720

SECTION 07810 - APPLIED FIREPROOFING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes sprayed fire-resistive materials (SFRM).

B. Related Requirements:

1. Section 07842 "Fire-Resistive Joint Systems"

1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. LEED Submittals:

1. Product Data for Credit EQ 4.2: For paints and coatings, documentation including printed statement of VOC content.
2. Laboratory Test Reports for Credit EQ 4: For paints and coatings used inside the weatherproofing system, documentation indicating that products comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

1.4 INFORMATIONAL SUBMITTALS

A. Product certificates.

B. Evaluation reports.

C. Field quality-control reports.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: A firm or individual certified, licensed, or otherwise qualified by fireproofing manufacturer as experienced and with sufficient trained staff to install manufacturer's products according to specified requirements.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

A. Assemblies: Provide fireproofing, including auxiliary materials, according to requirements of each fire-resistance design and manufacturer's written instructions.

B. Fire-Resistance Design: Indicated on Drawings, tested according to [**ASTM E 119**] [**ASTM E 119 or UL 263**] <**Insert testing requirement**> by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Steel members are to be considered unrestrained unless specifically noted otherwise.

C. VOC Content: Products shall comply with VOC content limits of authorities having jurisdiction[**.**][**and the following VOC limits when calculated according to 40 CFR 59, Subpart D (EPA Method 24):**]

1. Flat Paints and Coatings: 50 g/L.
2. Nonflat Paints and Coatings: 150 g/L.
3. Primers, Sealers, and Undercoaters: 200 g/L.
4. Anticorrosive and Antirust Paints Applied to Ferrous Metals: 250 g/L.

D. Low-Emitting Materials: Fireproofing used within the weatherproofing system shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

E. Asbestos: Provide products containing no detectable asbestos.

2.2 SPRAYED FIRE-RESISTIVE MATERIALS

A. SFRM <**Insert drawing designation**>: Manufacturer's standard, factory-mixed, lightweight, dry formulation, complying with indicated fire-resistance design, and [**mixed with water at Project site to form a slurry or mortar before conveyance and application**] [**or**] [**conveyed in a dry state and mixed with atomized water at place of application**].

1. Products: Subject to compliance with requirements, [**provide the following**] [**provide one of the following**] [**available products that may be incorporated into the Work include, but are not limited to, the following**]:

a. Carboline Company, subsidiary of RPM International, Fireproofing Products Div.; [**AD Southwest Fireproofing Type 5GP**] [**AD Southwest Fireproofing Type 5MD**] [**AD Southwest Fireproofing Type 7GP**] [**AD Southwest Fireproofing Type 7HD**] [**Pyrocrete 40**] [**Pyrocrete 239**] [**Pyrocrete 240 High Yield**] [**Pyrocrete 241**] [**Pyrolite 15**] [**and**] [**Pyrolite 22**] <**Insert product name or designation**>.
b. Grace, W. R. & Co. - Conn.; Grace Construction Products; [**Monokote MK-6 Series**] [**Monokote Z106**] [**Monokote Z106G**] [**Monokote Z106/HY**] [**Monokote Z146**] [**Monokote Z146T**] [**Monokote Z156**] [**Monokote Z156T**] [**and**] [**Retro-Guard**] <**Insert product name or designation**>.
c. Isolatek International; [**Cafco 300**] [**Cafco 300 SB**] [**Cafco 400**] [**Cafco Blaze-Shield II**] [**Cafco Blaze-Shield HP**] [**Fendolite M-II**] [**and**] [**Fendolite TG**] <**Insert product name or designation**>.

d. Pyrok, Inc.; [**Pyrok-HD**] [**and**] [**Pyrok-MD**] <**Insert product name or designation**>.
e. Schundler Company (The); [**Classic 5 LD**] <**Insert product name or designation**>.
f. Southwest Fireproofing Products Co.; [**Type 5EF**] [**Type 5GP**] [**Type 5MD**] [**Type 7GP**] [**and**] [**Type 7HD**] <**Insert product name or designation**>.
g. <**Insert manufacturer's name; product name or designation**>.

2. Application: Designated for exterior use by a qualified testing agency acceptable to authorities having jurisdiction.
3. Bond Strength: Minimum [**150-lbf/sq. ft. (7.18-kPa)**] [**430-lbf/sq. ft. (20.59-kPa)**] [**1000-lbf/sq. ft. (47.88-kPa)**] <**Insert value**> cohesive and adhesive strength based on field testing according to ASTM E 736.
4. Density: Not less than [**15 lb/cu. ft. (240 kg/cu. m) and**] [**22 lb/cu. ft. (350 kg/cu. m) and**] [**40 lb/cu. ft. (640 kg/cu. m) and**] <**Insert requirement**> as specified in the approved fire-resistance design, according to ASTM E 605.
5. Thickness: As required for fire-resistance design indicated, measured according to requirements of fire-resistance design or ASTM E 605, whichever is thicker, but not less than 0.375 inch (9 mm).
6. Combustion Characteristics: ASTM E 136.
7. Surface-Burning Characteristics: Flame-spread and smoke-developed indexes of 10 or less according to ASTM E 84.
8. Compressive Strength: Minimum [**10 lbf/sq. in. (68.9 kPa)**] [**100 lbf/sq. in. (689 kPa)**] [**300 lbf/sq. in. (2068 kPa)**] <**Insert value**> according to ASTM E 761.
9. Corrosion Resistance: No evidence of corrosion according to ASTM E 937.
10. Deflection: No cracking, spalling, or delamination according to ASTM E 759.
11. Effect of Impact on Bonding: No cracking, spalling, or delamination according to ASTM E 760.
12. Air Erosion: Maximum weight loss of 0.025 g/sq. ft. (0.270 g/sq. m) in 24 hours according to ASTM E 859.
13. Fungal Resistance: Treat products with manufacturer's standard antimicrobial formulation to result in no growth on specimens per ASTM G 21 or rating of 10 according to ASTM D 3274 when tested according to ASTM D 3273.

2.3 AUXILIARY MATERIALS

A. General: Provide auxiliary materials that are compatible with fireproofing and substrates and are approved by UL or another testing and inspecting agency acceptable to authorities having jurisdiction for use in fire-resistance designs indicated.

B. Substrate Primers: Primers approved by fireproofing manufacturer.

C. Bonding Agent: Product approved by fireproofing manufacturer

D. Topcoat: Suitable for application over applied fireproofing; of type recommended in writing by fireproofing manufacturer for each fire-resistance design.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for substrates and other conditions affecting performance of the Work and according to each fire-resistance design.

3.2 PREPARATION

A. Cover other work subject to damage from fallout or overspray of fireproofing materials during application.

B. Prime substrates where included in fire-resistance design and where recommended in writing by fireproofing manufacturer unless compatible shop primer has been applied and is in satisfactory condition to receive fireproofing.

3.3 APPLICATION

A. Construct fireproofing assemblies that are identical to fire-resistance design indicated and products as specified, tested, and substantiated by test reports; for thickness, primers, sealers, topcoats, and other materials and procedures affecting fireproofing work.

B. Comply with fireproofing manufacturer's written instructions for mixing materials, application procedures, and types of equipment used to mix, convey, and apply fireproofing; as applicable to particular conditions of installation and as required to achieve fire-resistance ratings indicated.

C. Spray apply fireproofing to maximum extent possible. Following the spraying operation in each area, complete the coverage by trowel application or other placement method recommended in writing by fireproofing manufacturer.

D. Do not install enclosing or concealing construction until after fireproofing has been applied, inspected, and tested and corrections have been made to deficient applications.

3.4 FIELD QUALITY CONTROL

A. Special Inspections: Engage a qualified special inspector to perform the following special inspections:

1. Test and inspect as required by the IBC, 1704.10.

B. Fireproofing will be considered defective if it does not pass tests and inspections.

1. Remove and replace fireproofing that does not pass tests and inspections, and retest.
2. Apply additional fireproofing, per manufacturer's written instructions, where test results indicate insufficient thickness, and retest.

C. Prepare test and inspection reports.

3.5 CLEANING AND REPAIRING

A. Cleaning: Immediately after completing spraying operations in each containable area of Project, remove material overspray and fallout from surfaces of other construction and clean exposed surfaces to remove evidence of soiling.

B. Repair fireproofing damaged by other work before concealing it with other construction.

C. Repair fireproofing by reapplying it using same method as original installation or using manufacturer's recommended trowel-applied product.

END OF SECTION 07810

SECTION 07841 - THROUGH-PENETRATION FIRESTOP SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Penetrations in fire-resistance-rated walls.
2. Penetrations in horizontal assemblies.
3. Penetrations in smoke barriers.

1.2 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Product Schedule: For each penetration firestopping system. Include location and design designation of qualified testing and inspecting agency.

1. Where Project conditions require modification to a qualified testing and inspecting agency's illustration for a particular penetration firestopping condition, submit illustration, with modifications marked, approved by penetration firestopping manufacturer's fire-protection engineer as an engineering judgment or equivalent fire-resistance-rated assembly.

C. Installer Certificates: From Installer indicating penetration firestopping has been installed in compliance with requirements and manufacturer's written recommendations.

D. Product test reports.

1.3 QUALITY ASSURANCE

A. Installer Qualifications: A firm that has been approved by FM Global according to FM Global 4991, "Approval of Firestop Contractors," or been evaluated by UL and found to comply with its "Qualified Firestop Contractor Program Requirements."

B. Fire-Test-Response Characteristics: Penetration firestopping shall comply with the following requirements:

1. Penetration firestopping tests are performed by UL .
2. Penetration firestopping is identical to those tested per testing standard referenced in "Penetration Firestopping" Article. Provide rated systems bearing marking of qualified testing and inspection agency.

C. Preinstallation Conference: Conduct conference at Project site .

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following :
   1. Grace Construction Products.
   2. Hilti, Inc.
   3. Johns Manville.
   4. 3M Fire Protection Products.
   5. Tremco, Inc.; Tremco Fire Protection Systems Group.
   6. USG Corporation.

2.2 PENETRATION FIRESTOPPING

A. Provide penetration firestopping that is produced and installed to resist spread of fire according to requirements indicated, resist passage of smoke and other gases, and maintain original fire-resistance rating of construction penetrated. Penetration firestopping systems shall be compatible with one another, with the substrates forming openings, and with penetrating items if any.

B. Penetrations in Fire-Resistance-Rated Walls: Ratings determined per ASTM E 814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch wg.

   1. F-Rating: Not less than the fire-resistance rating of constructions penetrated.

C. Penetrations in Horizontal Assemblies: Ratings determined per ASTM E 814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch wg.

   1. F-Rating: At least 1 hour, but not less than the fire-resistance rating of constructions penetrated.
   2. T-Rating: At least 1 hour, but not less than the fire-resistance rating of constructions penetrated except for floor penetrations within the cavity of a wall.

D. Penetrations in Smoke Barriers: Provide penetration firestopping with ratings determined per UL 1479.

   1. L-Rating: Not exceeding 5.0 cfm/sq. ft. of penetration opening at 0.30-inch wg at both ambient and elevated temperatures.

E. Exposed Penetration Firestopping: Provide products with flame-spread and smoke-developed indexes of less than 25 and 450, respectively, as determined per ASTM E 84.

F. Accessories: Provide components for each penetration firestopping system that are needed to install fill materials and to maintain ratings required. Use only those components specified by penetration firestopping manufacturer and approved by qualified testing and inspecting agency for firestopping indicated.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements for opening configurations, penetrating items, substrates, and other conditions affecting performance of the Work.

B. Install penetration firestopping to comply with manufacturer's written installation instructions and published drawings for products and applications indicated.

C. Install forming materials and other accessories of types required to support fill materials during their application and in the position needed to produce cross-sectional shapes and depths required to achieve fire ratings indicated.

1. After installing fill materials and allowing them to fully cure, remove combustible forming materials and other accessories not indicated as permanent components of firestopping.

D. Install fill materials for firestopping by proven techniques to produce the following results:

1. Fill voids and cavities formed by openings, forming materials, accessories, and penetrating items as required to achieve fire-resistance ratings indicated.
2. Apply materials so they contact and adhere to substrates formed by openings and penetrating items.
3. For fill materials that will remain exposed after completing the Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

3.2 IDENTIFICATION

A. Identify penetration firestopping with preprinted metal or plastic labels. Attach labels permanently to surfaces adjacent to and within 6 inches of firestopping edge so labels will be visible to anyone seeking to remove penetrating items or firestopping. Use mechanical fasteners or self-adhering-type labels with adhesives capable of permanently bonding labels to surfaces on which labels are placed. Include the following information on labels:

1. The words "Warning - Penetration Firestopping - Do Not Disturb. Notify Building Management of Any Damage."
2. Contractor's name, address, and phone number.
3. Designation of applicable testing and inspecting agency.
4. Date of installation.
5. Manufacturer's name.
6. Installer's name.

3.3 FIELD QUALITY CONTROL

A. Owner will engage a qualified testing agency to perform tests and inspections.

B. Where deficiencies are found or penetration firestopping is damaged or removed because of testing, repair or replace penetration firestopping to comply with requirements.

C. Proceed with enclosing penetration firestopping with other construction only after inspection reports are issued and installations comply with requirements.

3.4 PENETRATION FIRESTOPPING SCHEDULE

A. Where UL-classified systems are indicated, they refer to system numbers in UL's "Fire Resistance Directory" under product Category XHEZ.

B. Firestopping with No Penetrating Items:

1. UL-Classified Systems: C-AJ- F-A- F-C- W-J- W-L- 0001-0999.

C. Firestopping for Metallic Pipes, Conduit, or Tubing:

1. UL-Classified Systems: C-AJ- F-A- F-C- F-E- W-J- W-L- 1001-1999.

D. Firestopping for Nonmetallic Pipe, Conduit, or Tubing:

1. UL-Classified Systems: C-AJ- F-A- F-C- F-E- W-J- W-L- 2001-2999.

E. Firestopping for Electrical Cables:

1. UL-Classified Systems: C-AJ- F-A- F-C- F-E- W-J- W-L- 3001-3999.

F. Firestopping for Cable Trays with Electric Cables:

1. UL-Classified Systems: C-AJ- F-A- F-C- W-J- W-L- 4001-4999.

G. Firestopping for Insulated Pipes:

1. UL-Classified Systems: C-AJ- F-A- F-C- F-E- W-J- W-L- 5001-5999.

H. Firestopping for Miscellaneous Electrical Penetrants:

1. UL-Classified Systems: C-AJ- F-A- W-J- 6001-6999.

I. Firestopping for Miscellaneous Mechanical Penetrants:

1. UL-Classified Systems: C-AJ- F-A- F-C- F-E- W-J- W-L- 7001-7999.

J. Firestopping for Groupings of Penetrants:

1. UL-Classified Systems: C-AJ- F-A- F-C- F-E- W-J- W-L- 8001-8999.

END OF SECTION 07841

SECTION 07842 - FIRE-RESISTIVE JOINT SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Joints in or between fire-resistance-rated constructions.

B. Related Sections:

1. Section 05811 "Architectural Joint Systems" for fire-resistive architectural joint systems.
2. Section 07841 "Through-Penetration Firestop Systems" for penetrations in fire-resistance-rated walls, horizontal assemblies, and smoke barriers.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Product Schedule: For each fire-resistive joint system. Include location and design designation of qualified testing agency.

1. Where Project conditions require modification to a qualified testing agency's illustration for a particular fire-resistive joint system condition, submit illustration, with modifications marked, approved by fire-resistive joint system manufacturer's fire-protection engineer as an engineering judgment or equivalent fire-resistance-rated assembly.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified Installer.

B. Installer Certificates: From Installer indicating fire-resistive joint systems have been installed in compliance with requirements and manufacturer's written recommendations.

C. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for fire-resistive joint systems.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: A firm that has been approved by FM Global according to FM Global 4991, "Approval of Firestop Contractors," or been evaluated by UL and found to comply with UL's "Qualified Firestop Contractor Program Requirements."

B. Fire-Test-Response Characteristics: Fire-resistive joint systems shall comply with the following requirements:
   1. Fire resistive joint system tests are performed by UL

C. Pre-installation conference: Conduct conference at project site

1.6 PROJECT CONDITIONS

A. Environmental Limitations: Do not install fire-resistive joint systems when ambient or substrate temperatures are outside limits permitted by fire-resistive joint system manufacturers or when substrates are wet due to rain, frost, condensation, or other causes.

B. Install and cure fire-resistive joint systems per manufacturer's written instructions using natural means of ventilation or, where this is inadequate, forced-air circulation.

1.7 COORDINATION

A. Coordinate construction of joints to ensure that fire-resistive joint systems are installed according to specified requirements.

B. Coordinate sizing of joints to accommodate fire-resistive joint systems.

PART 2 - PRODUCTS

2.1 FIRE-RESISTIVE JOINT SYSTEMS

A. Where required, provide fire-resistive joint systems that are produced and installed to resist spread of fire according to requirements indicated, resist passage of smoke and other gases, and maintain original fire-resistance rating of assemblies in or between which fire-resistive joint systems are installed. Fire-resistive joint systems shall accommodate building movements without impairing their ability to resist the passage of fire and hot gases.

B. Joints in or between Fire-Resistance-Rated Construction: Provide fire-resistive joint systems with ratings determined per ASTM E 1966 or UL 2079:

   1. Joints include those installed in or between fire-resistance-rated walls floor or floor/ceiling assemblies and roofs or roof/ceiling assemblies.
   2. Fire-Resistance Rating: Equal to or exceeding the fire-resistance rating of construction they will join.
   3. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

      a. A/D Fire Protection Systems Inc.

b. CEMCO.
c. Fire Trak Corp.
d. Grace Construction Products.
e. Hilti, Inc.
f. Nelson Firestop Products.
g. NUCO Inc.
h. Passive Fire Protection Partners.
i. RectorSeal Corporation.
j. Specified Technologies Inc.
k. 3M Fire Protection Products.
l. Tremco, Inc.; Tremco Fire Protection Systems Group.
m. USG Corporation.

C. Accessories: Provide components of fire-resistive joint systems, including primers and forming materials, that are needed to install fill materials and to maintain ratings required. Use only components specified by fire-resistive joint system manufacturer and approved by the qualified testing agency for systems indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements for joint configurations, substrates, and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Cleaning: Clean joints immediately before installing fire-resistive joint systems to comply with fire-resistive joint system manufacturer's written instructions and the following requirements:

1. Remove from surfaces of joint substrates foreign materials that could interfere with adhesion of fill materials.
2. Clean joint substrates to produce clean, sound surfaces capable of developing optimum bond with fill materials. Remove loose particles remaining from cleaning operation.
3. Remove laitance and form-release agents from concrete.

B. Priming: Prime substrates where recommended in writing by fire-resistive joint system manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.

C. Masking Tape: Use masking tape to prevent fill materials of fire-resistive joint system from contacting adjoining surfaces that will remain exposed on completion of the Work and that would otherwise be permanently stained or damaged by such contact or by cleaning methods used to remove stains. Remove tape as soon as possible without disturbing fire-resistive joint system's seal with substrates.

3.3 INSTALLATION

A. General: Install fire-resistive joint systems to comply with manufacturer's written installation instructions and published drawings for products and applications indicated.

B. Install forming materials and other accessories of types required to support fill materials during their application and in position needed to produce cross-sectional shapes and depths required to achieve fire ratings indicated.

1. After installing fill materials and allowing them to fully cure, remove combustible forming materials and other accessories not indicated as permanent components of fire-resistive joint system.

C. Install fill materials for fire-resistive joint systems by proven techniques to produce the following results:

1. Fill voids and cavities formed by joints and forming materials as required to achieve fire-resistance ratings indicated.
2. Apply fill materials so they contact and adhere to substrates formed by joints.
3. For fill materials that will remain exposed after completing the Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

3.4 IDENTIFICATION

3.5 FIELD QUALITY CONTROL

A. Inspecting Agency: Owner will engage a qualified testing agency to perform tests and inspections.

B. Where deficiencies are found or fire-resistive joint systems are damaged or removed due to testing, repair or replace fire-resistive joint systems so they comply with requirements.

C. Proceed with enclosing fire-resistive joint systems with other construction only after inspection reports are issued and installations comply with requirements.

3.6 CLEANING AND PROTECTING

A. Clean off excess fill materials adjacent to joints as the Work progresses by methods and with cleaning materials that are approved in writing by fire-resistive joint system manufacturers and that do not damage materials in which joints occur.

B. Provide final protection and maintain conditions during and after installation that ensure fire-resistive joint systems are without damage or deterioration at time of Substantial Completion. If damage or deterioration occurs despite such protection, cut out and remove damaged or deteriorated fire-resistive joint systems immediately and install new materials to produce fire-resistive joint systems complying with specified requirements.

END OF SECTION 07842

SECTION 07920 - JOINT SEALANTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Silicone joint sealants.
2. Urethane joint sealants.
3. Polysulfide joint sealants.
4. Latex joint sealants.
5. Solvent-release-curing joint sealants.
6. Preformed joint sealants.
7. Acoustical joint sealants.

B. Related Sections:

1. Section 08800 "Glazing" for glazing sealants.
2. Section 08912 "Structural-Sealant-Glazed Curtain Walls" for structural and other glazing sealants.
3. Section 09250 "Gypsum Board" for sealing perimeter joints.
4. Section 09310 "Ceramic Tile" for sealing tile joints.
5. Section 09511 "Acoustical Panel Ceilings" and Section 09512 "Acoustical Tile Ceilings" for sealing edge moldings at perimeters with acoustical sealants.

1.3 ACTION SUBMITTALS

A. Product Data: For each joint-sealant product indicated.

B. Samples for Initial Selection: Manufacturer's color charts consisting of strips of cured sealants showing the full range of colors available for each product exposed to view.

C. Samples for Verification: For each kind and color of joint sealant required, provide Samples with joint sealants in 1/2-inch- (13-mm-) wide joints formed between two 6-inch- (150-mm-) long strips of material matching the appearance of exposed surfaces adjacent to joint sealants.

D. Joint-Sealant Schedule: Include the following information:

1. Joint-sealant application, joint location, and designation.
2. Joint-sealant manufacturer and product name.
3. Joint-sealant formulation.
4. Joint-sealant color.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified Installer.

B. Product Certificates: For each kind of joint sealant and accessory, from manufacturer.

C. Sealant, Waterproofing, and Restoration Institute (SWRI) Validation Certificate: For each sealant specified to be validated by SWRI's Sealant Validation Program.

D. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, indicating that sealants comply with requirements.

E. Field-Adhesion Test Reports: For each sealant application tested.

F. Warranties: Sample of special warranties.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of units required for this Project.

B. Source Limitations: Obtain each kind of joint sealant from single source from single manufacturer.

C. Product Testing: Test joint sealants using a qualified testing agency.

1. Testing Agency Qualifications: An independent testing agency qualified according to ASTM C 1021 to conduct the testing indicated.
2. Test according to SWRI's Sealant Validation Program for compliance with requirements specified by reference to ASTM C 920 for adhesion and cohesion under cyclic movement, adhesion-in-peel, and indentation hardness.

1.6 PROJECT CONDITIONS

A. Do not proceed with installation of joint sealants under the following conditions:

1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer or are below 40 deg F (5 deg C).
2. When joint substrates are wet.
3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.

4. Where contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

1.7 WARRANTY

A. Special Installer's Warranty: Manufacturer's standard form in which Installer agrees to repair or replace joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.

1. Warranty Period: Two years from date of Substantial Completion.

B. Special Manufacturer's Warranty: Manufacturer's standard form in which joint-sealant manufacturer agrees to furnish joint sealants to repair or replace those that do not comply with performance and other requirements specified in this Section within specified warranty period.

1. Warranty Period: two years from date of Substantial Completion.

C. Special warranties specified in this article exclude deterioration or failure of joint sealants from the following:

1. Movement of the structure caused by structural settlement or errors attributable to design or construction resulting in stresses on the sealant exceeding sealant manufacturer's written specifications for sealant elongation and compression.
2. Disintegration of joint substrates from natural causes exceeding design specifications.
3. Mechanical damage caused by individuals, tools, or other outside agents.
4. Changes in sealant appearance caused by accumulation of dirt or other atmospheric contaminants.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint-sealant manufacturer, based on testing and field experience.

B. VOC Content of Interior Sealants: Sealants and sealant primers used inside the weatherproofing system shall comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):

1. Architectural Sealants: 250 g/L.
2. Sealant Primers for Nonporous Substrates: 250 g/L.
3. Sealant Primers for Porous Substrates: 775 g/L.

C. Low-Emitting Interior Sealants: Sealants and sealant primers used inside the weatherproofing system shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

D. Liquid-Applied Joint Sealants: Comply with ASTM C 920 and other requirements indicated for each liquid-applied joint sealant specified, including those referencing ASTM C 920 classifications for type, grade, class, and uses related to exposure and joint substrates.

1. Suitability for Immersion in Liquids. Where sealants are indicated for Use I for joints that will be continuously immersed in liquids, provide products that have undergone testing according to ASTM C 1247. Liquid used for testing sealants is deionized water, unless otherwise indicated.

E. Stain-Test-Response Characteristics: Where sealants are specified to be nonstaining to porous substrates, provide products that have undergone testing according to ASTM C 1248 and have not stained porous joint substrates indicated for Project.

F. Suitability for Contact with Food: Where sealants are indicated for joints that will come in repeated contact with food, provide products that comply with 21 CFR 177.2600.

G. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range.

2.2 SILICONE JOINT SEALANTS

A. Single-Component, Nonsag, Neutral-Curing Silicone Joint Sealant: ASTM C 920, Type S, Grade NS, Class 100/50, for Use NT.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. Dow Corning Corporation; 790.
b. GE Advanced Materials - Silicones; SilPruf LM SCS2700.
c. Tremco Incorporated; Spectrem 1 or Tremsil 600.

2.3 LATEX JOINT SEALANTS

A. Latex Joint Sealant: Acrylic latex or siliconized acrylic latex, ASTM C 834, Type OP, Grade NF.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. BASF Building Systems; Sonolac.
b. Bostik, Inc.; Chem-Calk 600.

c. May National Associates, Inc.; Bondaflex 600.
d. Pecora Corporation; AC-20+.
e. Schnee-Morehead, Inc.; SM 8200.
f. Tremco Incorporated; Tremflex 834.

2.4 ACOUSTICAL JOINT SEALANTS

A. Acoustical Joint Sealant: Manufacturer's standard nonsag, paintable, nonstaining latex sealant complying with ASTM C 834. Product effectively reduces airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. Pecora Corporation; AC-20 FTR.
b. USG Corporation; SHEETROCK Acoustical Sealant.

2.5 JOINT SEALANT BACKING

A. General: Provide sealant backings of material that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.

B. Cylindrical Sealant Backings: ASTM C 1330, Type C (closed-cell material with a surface skin) , and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.

C. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint. Provide self-adhesive tape where applicable.

2.6 MISCELLANEOUS MATERIALS

A. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.

B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants to joint substrates.

C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint-sealant performance.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions and the following requirements:

1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
2. Clean porous joint substrate surfaces by brushing, grinding, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining after cleaning operations above by vacuuming or blowing out joints with oil-free compressed air. Porous joint substrates include the following:

    a. Concrete.
    b. Unglazed surfaces of ceramic tile.

3. Remove laitance and form-release agents from concrete.
4. Clean nonporous joint substrate surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants. Nonporous joint substrates include the following:

    a. Metal.
    b. Glass.
    c. Glazed surfaces of ceramic tile.

B. Joint Priming: Prime joint substrates where recommended by joint-sealant manufacturer or as indicated by preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.

C. Masking Tape: Use masking tape where required to prevent contact of sealant or primer with adjoining surfaces that otherwise would be permanently stained or

damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.3 INSTALLATION OF JOINT SEALANTS

A. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.

B. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.

C. Install sealant backings of kind indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.

1. Do not leave gaps between ends of sealant backings.
2. Do not stretch, twist, puncture, or tear sealant backings.
3. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.

D. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.

E. Install sealants using proven techniques that comply with the following and at the same time backings are installed:

1. Place sealants so they directly contact and fully wet joint substrates.
2. Completely fill recesses in each joint configuration.
3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.

F. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified in subparagraphs below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.

1. Remove excess sealant from surfaces adjacent to joints.
2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
3. Provide flush joint profile where indicated per Figure 8B in ASTM C 1193.

    a. Use masking tape to protect surfaces adjacent to recessed tooled joints.

G. Acoustical Sealant Installation: At sound-rated assemblies and elsewhere as indicated, seal construction at perimeters, behind control joints, and at openings and penetrations with a continuous bead of acoustical sealant. Install acoustical sealant at both faces of partitions at perimeters and through penetrations. Comply with ASTM C 919 and with manufacturer's written recommendations.

3.4 FIELD QUALITY CONTROL

A. Field-Adhesion Testing: Field test joint-sealant adhesion to joint substrates as follows:

1. Extent of Testing: Test completed and cured sealant joints as follows:

   a. Perform 10 tests for the first 50 feet of joint length for each kind of sealant and joint substrate.
   b. Perform 1 test for each 1000 feet (300 m) of joint length thereafter or 1 test per each floor per elevation.

2. Test Method: Test joint sealants according to Method A, Field-Applied Sealant Joint Hand Pull Tab, in Appendix X1 in ASTM C 1193 or Method A, Tail Procedure, in ASTM C 1521.

   a. For joints with dissimilar substrates, verify adhesion to each substrate separately; extend cut along one side, verifying adhesion to opposite side. Repeat procedure for opposite side.

3. Inspect tested joints and report on the following:

   a. Whether sealants filled joint cavities and are free of voids.
   b. Whether sealant dimensions and configurations comply with specified requirements.
   c. Whether sealants in joints connected to pulled-out portion failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each kind of product and joint substrate. Compare these results to determine if adhesion passes sealant manufacturer's field-adhesion hand-pull test criteria.

4. Record test results in a field-adhesion-test log. Include dates when sealants were installed, names of persons who installed sealants, test dates, test locations, whether joints were primed, adhesion results and percent elongations, sealant fill, sealant configuration, and sealant dimensions.
5. Repair sealants pulled from test area by applying new sealants following same procedures used originally to seal joints. Ensure that original sealant surfaces are clean and that new sealant contacts original sealant.

B. Evaluation of Field-Adhesion Test Results: Sealants not evidencing adhesive failure from testing or noncompliance with other indicated requirements will be considered satisfactory. Remove sealants that fail to adhere to joint substrates during testing or to comply with other requirements. Retest failed applications until test results prove sealants comply with indicated requirements.

3.5 CLEANING

A. Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

3.6 PROTECTION

A. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from original work.

3.7 JOINT-SEALANT SCHEDULE

A. Silicone Joint Sealants

1. Joint Locations:

a. Joints between window frame and wall construction
b. Joints in ceramic tile

B. Latex Joint Sealants: exterior joint in vertical and horizontal nontraffic surfaces

1. Joint Locations:

a. Between lapsiding
b. Between cement board and stucco

C. Acoustical Joint Sealant: interior joints in vertical surfaces and horizontal non traffic surfaces

1. Joint Locations:

a. Between acoustical tile ceiling perimeter
b. Continuous at each interior wall stud

END OF SECTION 07920

DIVISION 08

SECTION 08110 - STEEL DOORS AND FRAMES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Standard hollow metal doors and frames.

B. Related Sections

1. Division 4 Section "Unit Masonry Assemblies" for embedding anchors for hollow metal work into masonry construction.
2. Division 8 Section "Door Hardware" for door hardware for hollow metal doors.
3. Division 9 Sections "Exterior Painting" and "Interior Painting" for field painting hollow metal doors and frames.
4. Division 16 Sections for electrical connections including conduit and wiring for door controls and operators.

1.3 DEFINITIONS

A. Minimum Thickness: Minimum thickness of base metal without coatings.

B. Standard Hollow Metal Work: Hollow metal work fabricated according to ANSI/SDI A250.8.

1.4 PERFORMANCE REQUIREMENTS

A. Structural Loads:

1. Wind Loads: .

a. Basic Wind Speed: 130 mph .

B. Uniform Load: A static air design load of 86 psf (4118 Pa) with steel reinforcing (+60 / -65 psf without steel reinforcing) shall be applied in the positive and negative direction in accordance with DCBCCO Protocol PA 202 and ASTM E 330. There shall be no deflection in excess of l/180 of the span of any framing member. At a structural test load equal to 1.5 times the specified design load, no glass breakage or permanent set in the framing members in excess of 0.4% of their clear spans shall occur.

C. Impact Resistance: Large Missile, tested in accordance with DCBCCO Protocols PA 201, PA 203, SBCCI SSTD-12, ANSI A250.13 and ASTM E 1886.

1.5 SUBMITTALS

A. Product Data: For each type of product indicated. Include construction details, material descriptions, core descriptions, fire-resistance rating, and finishes.

B. Shop Drawings: Include the following:

1. Elevations of each door design.
2. Details of doors, including vertical and horizontal edge details and metal thicknesses.
3. Frame details for each frame type, including dimensioned profiles and metal thicknesses.
4. Locations of reinforcement and preparations for hardware.
5. Details of each different wall opening condition.
6. Details of anchorages, joints, field splices, and connections.
7. Details of accessories.
8. Details of moldings, removable stops, and glazing.
9. Details of conduit and preparations for power, signal, and control systems.

C. Other Action Submittals:

1. Schedule: Provide a schedule of hollow metal work prepared by or under the supervision of supplier, using same reference numbers for details and openings as those on Drawings. Coordinate with door hardware schedule.

D. Oversize Construction Certification: For assemblies required to be fire rated and exceeding limitations of labeled assemblies.

E. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for each type of hollow metal door and frame assembly.

1.6 QUALITY ASSURANCE

A. Source Limitations: Obtain hollow metal work from single source from single manufacturer.

B. Fire-Rated Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at positive pressure according to NFPA 252 .

C. Fire-Rated, Borrowed-Light Frame Assemblies: Assemblies complying with NFPA 80 that are listed and labeled, by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated, based on testing according to NFPA 257 or UL 9 . Label each individual glazed lite.

D. Smoke-Control Door Assemblies: Comply with NFPA 105 or UL 1784 .

E. Preinstallation Conference: Conduct conference at Project site .

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver hollow metal work palletized, wrapped, or crated to provide protection during transit and Project-site storage. Do not use nonvented plastic.

1. Provide additional protection to prevent damage to finish of factory-finished units.

B. Deliver welded frames with two removable spreader bars across bottom of frames, tack welded to jambs and mullions.

C. Store hollow metal work under cover at Project site. Place in stacks of five units maximum in a vertical position with heads up, spaced by blocking, on minimum 4-inch- high wood blocking. Do not store in a manner that traps excess humidity.

1. Provide minimum 1/4-inch space between each stacked door to permit air circulation.

1.8 PROJECT CONDITIONS

A. Field Measurements: Verify actual dimensions of openings by field measurements before fabrication.

1.9 COORDINATION

A. Coordinate installation of anchorages for hollow metal frames. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors. Deliver such items to Project site in time for installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis-of-Design Product: Subject to compliance with requirements, provide Ceco Door Products; an Assa Abloy Group company: Marine-Tech door system or comparable product by one of the following:

1. Amweld Building Products, LLC.
2. Benchmark; a division of Therma-Tru Corporation.
3. Curries Company; an Assa Abloy Group company.
4. Deansteel Manufacturing Company, Inc.
5. Firedoor Corporation.
6. Fleming Door Products Ltd.; an Assa Abloy Group company.
7. Habersham Metal Products Company.
8. Karpen Steel Custom Doors & Frames.
9. Kewanee Corporation (The).
10. Mesker Door Inc.
11. Pioneer Industries, Inc.
12. Security Metal Products Corp.
13. Steelcraft; an Ingersoll-Rand company.
14. Windsor Republic Doors.

2.2 MATERIALS

A. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B; with minimum G60 or A60 metallic coating.

B. Frame Anchors: ASTM A 591/A 591M, Commercial Steel (CS), 40Z coating designation; mill phosphatized.

1. For anchors built into exterior walls, steel sheet complying with ASTM A 1008/A 1008M or ASTM A 1011/A 1011M, hot-dip galvanized according to ASTM A 153/A 153M, Class B.

C. Inserts, Bolts, and Fasteners: Hot-dip galvanized according to ASTM A 153/A 153M.

D. Powder-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hollow metal frames of type indicated.

E. Grout: ASTM C 476, except with a maximum slump of 4 inches, as measured according to ASTM C 143/C 143M.

F. Mineral-Fiber Insulation: ASTM C 665, Type I (blankets without membrane facing); consisting of fibers manufactured from slag or rock wool with 6- to 12-lb/cu. ft. density; with maximum flame-spread and smoke-development indexes of 25 and 50, respectively; passing ASTM E 136 for combustion characteristics.

G. Bituminous Coating: Cold-applied asphalt mastic, SSPC-Paint 12, compounded for 15-mil dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.

2.3 STANDARD HOLLOW METAL DOORS

A. General: Provide doors of design indicated, not less than thickness indicated; fabricated with smooth surfaces, without visible joints or seams on exposed faces unless otherwise indicated. Comply with ANSI/SDI A250.8.

1. Design: Flush panel .
2. Core Construction: Manufacturer's standard fiberglass batting with vertical steel-stiffener core.

a. Fire Door Core: As required to provide fire-protection ratings indicated.
b. Thermal-Rated (Insulated) Doors: Where indicated, provide doors fabricated with thermal-resistance value (R-value) of not less than 4.0 deg F x h x sq. ft./Btu when tested according to ASTM C 1363.

1) Locations: Exterior doors .

3. Vertical Edges for Single-Acting Doors: Manufacturer's standard.

a. Beveled Edge: 1/8 inch in 2 inches.

4. Vertical Edges for Double-Acting Doors: Round vertical edges with 2-1/8-inch radius.

5. Top and Bottom Edges: Closed with flush or inverted 0.042-inch- thick, end closures or channels of same material as face sheets.
6. Tolerances: Comply with SDI 117, "Manufacturing Tolerances for Standard Steel Doors and Frames."

B. Exterior Doors: Face sheets fabricated from metallic-coated steel sheet. Provide doors complying with requirements indicated below by referencing ANSI/SDI A250.8 for level and model and ANSI/SDI A250.4 for physical performance level:
1. Level 4 and Physical Performance Level A (Maximum Duty), Model 1 (Full Flush) .

C. Interior Doors: Face sheets fabricated from metallic-coated sheet . Provide doors complying with requirements indicated below by referencing ANSI/SDI A250.8 for level and model and ANSI/SDI A250.4 for physical performance level:
1. Level 4 and Physical Performance Level A (Maximum Duty), Model 1 (Full Flush) .

D. Hardware Reinforcement: Fabricate according to ANSI/SDI A250.6 with reinforcing plates from same material as door face sheets.

E. Fabricate concealed stiffeners and hardware reinforcement from either cold- or hot-rolled steel sheet.

2.4 STANDARD HOLLOW METAL FRAMES

A. General: Comply with ANSI/SDI A250.8 and with details indicated for type and profile.

B. Exterior Frames: Fabricated from metallic-coated steel sheet.

1. Fabricate frames with mitered or coped corners.
2. Fabricate frames as full profile welded unless otherwise indicated.
3. Frames for Level 4 Steel Doors: 0.067-inch- thick steel sheet.

C. Interior Frames: Fabricated from metallic-coated sheet .

1. Fabricate frames with mitered or coped corners.
2. Fabricate frames as full profile welded unless otherwise indicated.
3. Frames for Level 4 Steel Doors: 0.067-inch- thick steel sheet.
4. Frames for Wood Doors: 0.067-inch- thick steel sheet.

D. Hardware Reinforcement: Fabricate according to ANSI/SDI A250.6 with reinforcement plates from same material as frames.

2.5 FRAME ANCHORS

A. Jamb Anchors:

1. Masonry Type: Adjustable strap-and-stirrup or T-shaped anchors to suit frame size, not less than 0.042 inch thick, with corrugated or perforated straps not less than 2 inches wide by 10 inches long; or wire anchors not less than 0.177 inch thick.
2. Stud-Wall Type: Designed to engage stud, welded to back of frames; not less than 0.042 inch thick.
3. Compression Type for Drywall Slip-on Frames: Adjustable compression anchors.

4. Postinstalled Expansion Type for In-Place Concrete or Masonry: Minimum 3/8-inch-diameter bolts with expansion shields or inserts. Provide pipe spacer from frame to wall, with throat reinforcement plate, welded to frame at each anchor location.

B. Floor Anchors: Formed from same material as frames, not less than 0.042 inch thick, and as follows:

1. Monolithic Concrete Slabs: Clip-type anchors, with two holes to receive fasteners.
2. Separate Topping Concrete Slabs: Adjustable-type anchors with extension clips, allowing not less than 2-inch height adjustment. Terminate bottom of frames at finish floor surface.

2.6 HOLLOW METAL PANELS

A. Provide hollow metal panels of same materials, construction, and finish as specified for adjoining hollow metal work.

2.7 LOUVERS

A. Provide louvers for interior doors, where indicated, that comply with SDI 111C, with blades or baffles formed of 0.020-inch- thick, cold-rolled steel sheet set into 0.032-inch- thick steel frame.

1. Sightproof Louver: Stationary louvers constructed with inverted V-shaped or Y-shaped blades.
2. Fire-Rated Automatic Louvers: Louvers constructed with movable blades closed by actuating fusible link, and listed and labeled for use in fire-rated door assemblies of type and fire-resistance rating indicated by same testing and inspecting agency that established fire-resistance rating of door assembly.

2.8 ACCESSORIES

A. Mullions and Transom Bars: Join to adjacent members by welding or rigid mechanical anchors.

B. Ceiling Struts: Minimum 1/4-inch-thick by 1-inch- wide steel.

C. Grout Guards: Formed from same material as frames, not less than 0.016 inch thick.

2.9 FABRICATION

A. Fabricate hollow metal work to be rigid and free of defects, warp, or buckle. Accurately form metal to required sizes and profiles, with minimum radius for thickness of metal. Where practical, fit and assemble units in manufacturer's plant. To ensure proper assembly at Project site, clearly identify work that cannot be permanently factory assembled before shipment.

B. Tolerances: Fabricate hollow metal work to tolerances indicated in ANSI/NAAMM-HMMA 861.

C. Hollow Metal Doors:

1. Exterior Doors: Provide weep-hole openings in bottom of exterior doors to permit moisture to escape. Seal joints in top edges of doors against water penetration.

2. Astragals: Provide overlapping astragal on one leaf of pairs of doors where required by NFPA 80 for fire-performance rating or where indicated. Extend minimum 3/4 inch beyond edge of door on which astragal is mounted.

D. Hollow Metal Frames: Where frames are fabricated in sections due to shipping or handling limitations, provide alignment plates or angles at each joint, fabricated of same thickness metal as frames.

1. Welded Frames: Weld flush face joints continuously; grind, fill, dress, and make smooth, flush, and invisible.
2. Frames: Provide closed tubular members with no visible face seams or joints, fabricated from same material as door frame. Fasten members at crossings and to jambs by butt welding.
3. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.
4. Grout Guards: Weld guards to frame at back of hardware mortises in frames to be grouted.
5. Floor Anchors: Weld anchors to bottom of jambs and mullions with at least four spot welds per anchor.
6. Jamb Anchors: Provide number and spacing of anchors as follows:

    a. Masonry Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c. and as follows:

        1) Two anchors per jamb up to 60 inches high.
        2) Three anchors per jamb from 60 to 90 inches high.
        3) Four anchors per jamb from 90 to 120 inches high.
        4) Four anchors per jamb plus 1 additional anchor per jamb for each 24 inches or fraction thereof above 120 inches high.

    b. Stud-Wall Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c. and as follows:

        1) Three anchors per jamb up to 60 inches high.
        2) Four anchors per jamb from 60 to 90 inches high.
        3) Five anchors per jamb from 90 to 96 inches high.
        4) Five anchors per jamb plus 1 additional anchor per jamb for each 24 inches or fraction thereof above 96 inches high.
        5) Two anchors per head for frames above 42 inches wide and mounted in metal-stud partitions.

    c. Compression Type: Not less than two anchors in each jamb.
    d. Postinstalled Expansion Type: Locate anchors not more than 6 inches from top and bottom of frame. Space anchors not more than 26 inches o.c.

7. Door Silencers: Except on weather-stripped doors, drill stops to receive door silencers as follows. Keep holes clear during construction.

    a. Single-Door Frames: Drill stop in strike jamb to receive three door silencers.
    b. Double-Door Frames: Drill stop in head jamb to receive two door silencers.

E. Fabricate concealed stiffeners, edge channels, and hardware reinforcement from either cold- or hot-rolled steel sheet.

F. Hardware Preparation: Factory prepare hollow metal work to receive templated mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping according to the Door Hardware Schedule and templates furnished as specified in Division 8 Section "Door Hardware."

1. Locate hardware as indicated, or if not indicated, according to ANSI/SDI A250.8 .
2. Reinforce doors and frames to receive nontemplated, mortised and surface-mounted door hardware.
3. Comply with applicable requirements in ANSI/SDI A250.6 and ANSI/DHI A115 Series specifications for preparation of hollow metal work for hardware.
4. Coordinate locations of conduit and wiring boxes for electrical connections with Division 16 Sections.

2.10 STEEL FINISHES

A. Prime Finish: Apply manufacturer's standard primer immediately after cleaning and pretreating.

1. Shop Primer: Manufacturer's standard, fast-curing, lead- and chromate-free primer complying with ANSI/SDI A250.10 acceptance criteria; recommended by primer manufacturer for substrate; compatible with substrate and field-applied coatings despite prolonged exposure.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Examine roughing-in for embedded and built-in anchors to verify actual locations before frame installation.

C. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Remove welded-in shipping spreaders installed at factory. Restore exposed finish by grinding, filling, and dressing, as required to make repaired area smooth, flush, and invisible on exposed faces.

B. Prior to installation, adjust and securely brace welded hollow metal frames for squareness, alignment, twist, and plumbness to the following tolerances:

1. Squareness: Plus or minus 1/16 inch, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
2. Alignment: Plus or minus 1/16 inch, measured at jambs on a horizontal line parallel to plane of wall.

3. Twist: Plus or minus 1/16 inch, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
4. Plumbness: Plus or minus 1/16 inch, measured at jambs on a perpendicular line from head to floor.

C. Drill and tap doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.

3.3 INSTALLATION

A. General: Install hollow metal work plumb, rigid, properly aligned, and securely fastened in place; comply with Drawings and manufacturer's written instructions.

B. Hollow Metal Frames: Install hollow metal frames of size and profile indicated. Comply with ANSI/SDI A250.11 .

1. Set frames accurately in position, plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces, leaving surfaces smooth and undamaged.

    a. At fire-protection-rated openings, install frames according to NFPA 80.
    b. Where frames are fabricated in sections because of shipping or handling limitations, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces.
    c. Install frames with removable glazing stops located on secure side of opening.
    d. Install door silencers in frames before grouting.
    e. Remove temporary braces necessary for installation only after frames have been properly set and secured.
    f. Check plumbness, squareness, and twist of frames as walls are constructed. Shim as necessary to comply with installation tolerances.
    g. Field apply bituminous coating to backs of frames that are filled with grout containing antifreezing agents.

2. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor, and secure with postinstalled expansion anchors.

    a. Floor anchors may be set with powder-actuated fasteners instead of postinstalled expansion anchors if so indicated and approved on Shop Drawings.

3. Metal-Stud Partitions: Solidly pack mineral-fiber insulation behind frames.
4. Masonry Walls: Coordinate installation of frames to allow for solidly filling space between frames and masonry with grout.
5. Concrete Walls: Solidly fill space between frames and concrete with grout. Take precautions, including bracing frames, to ensure that frames are not deformed or damaged by grout forces.
6. In-Place Concrete or Masonry Construction: Secure frames in place with postinstalled expansion anchors. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.
7. In-Place Gypsum Board Partitions: Secure frames in place with postinstalled expansion anchors through floor anchors at each jamb. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.
8. Ceiling Struts: Extend struts vertically from top of frame at each jamb to overhead structural supports or substrates above frame unless frame is anchored to masonry or to

other structural support at each jamb. Bend top of struts to provide flush contact for securing to supporting construction. Provide adjustable wedged or bolted anchorage to frame jamb members.

9. Installation Tolerances: Adjust hollow metal door frames for squareness, alignment, twist, and plumb to the following tolerances:

    a. Squareness: Plus or minus 1/16 inch, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
    b. Alignment: Plus or minus 1/16 inch, measured at jambs on a horizontal line parallel to plane of wall.
    c. Twist: Plus or minus 1/16 inch, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
    d. Plumbness: Plus or minus 1/16 inch, measured at jambs at floor.

C. Hollow Metal Doors: Fit hollow metal doors accurately in frames, within clearances specified below. Shim as necessary.

1. Non-Fire-Rated Standard Steel Doors:

    a. Jambs and Head: 1/8 inch plus or minus 1/16 inch.
    b. Between Edges of Pairs of Doors: 1/8 inch plus or minus 1/16 inch.
    c. Between Bottom of Door and Top of Threshold: Maximum 3/8 inch.
    d. Between Bottom of Door and Top of Finish Floor (No Threshold): Maximum 3/4 inch.

2. Fire-Rated Doors: Install doors with clearances according to NFPA 80.
3. Smoke-Control Doors: Install doors according to NFPA 105 .

3.4 ADJUSTING AND CLEANING

A. Final Adjustments: Check and readjust operating hardware items immediately before final inspection. Leave work in complete and proper operating condition. Remove and replace defective work, including hollow metal work that is warped, bowed, or otherwise unacceptable.

B. Remove grout and other bonding material from hollow metal work immediately after installation.

C. Prime-Coat Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touchup of compatible air-drying, rust-inhibitive primer.

D. Metallic-Coated Surfaces: Clean abraded areas and repair with galvanizing repair paint according to manufacturer's written instructions.

END OF SECTION 08110

SECTION 08121 - HOLLOW METAL FRAMES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes hollow-metal frames and sound control frames

B. Related Requirements:
   1. Section 081416 "Flush Wood Doors" for wood doors installed in hollow-metal frames.
   2. Section 08800 “Glazing” for glazing in hollow metal frame sidelights and interior windows

1.3 DEFINITIONS

A. Minimum Thickness: Minimum thickness of base metal without coatings according to NAAMM-HMMA 803 or SDI A250.8.

1.4 COORDINATION

A. Coordinate anchorage installation for hollow-metal frames. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors. Deliver such items to Project site in time for installation.

1.5 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.6 ACTION SUBMITTALS

A. Product Data: For each type of product.

   1. Include construction details, material descriptions, fire-resistance ratings, and finishes.

B. Shop Drawings: Include the following:

1. Frame details for each frame type, including dimensioned profiles and metal thicknesses.
2. Locations of reinforcement and preparations for hardware.
3. Details of each different wall opening condition.
4. Details of anchorages, joints, field splices, and connections.
5. Details of moldings, removable stops, and glazing.
6. Details of conduit and preparations for power, signal, and control systems.

C. Schedule: Provide a schedule of hollow-metal work prepared by or under the supervision of supplier, using same reference numbers for details and openings as those on Drawings. Coordinate with final Door Hardware Schedule.

1.7 QUALITY ASSURANCE

A. STC Rating: Not less than as scheduled and as determined by ASTM E 413 when tested in an operable condition according to ASTM E 90 and ASTM E 1408. Manufacturer shall have testing lab documentation of STC rating.

1.8 INFORMATIONAL SUBMITTALS

A. Product Test Reports: For each type of frame assembly, for tests performed by a qualified testing agency.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Deliver hollow-metal work palletized, packaged, or crated to provide protection during transit and Project-site storage. Do not use nonvented plastic.

1. Provide additional protection to prevent damage to factory-finished units.

B. Deliver welded frames with two removable spreader bars across bottom of frames, tack welded to jambs and mullions.

C. Store hollow-metal work vertically under cover at Project site with head up. Place on minimum 4-inch- (102-mm-) high wood blocking. Provide minimum 1/4-inch (6-mm) space between each unit to permit air circulation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Amweld International, LLC.
2. Apex Industries, Inc.
3. Ceco Door Products; an Assa Abloy Group company.
4. Curries Company; an Assa Abloy Group company.
5. Custom Metal Products.
6. DKS Steel Door & Frame Sys. Inc.
7. Fleming-Baron Door Products.
8. J/R Metal Frames Manufacturing, Inc.
9. MPI Group, LLC (The).
10. North American Door Corp.
11. Philipp Manufacturing Co (The).
12. Premier Products, Inc.
13. Republic Doors and Frames.
14. Steelcraft; an Ingersoll-Rand company.

B. Sound Control Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. AMBICO Limited
2. Eggers Industries
3. Krieger Specialty Products Company
4. Marshfield DoorSystems, Inc.
5. Overly Door Company

C. Source Limitations: Obtain hollow-metal work from single source from single manufacturer. Sound Control Doors and Frames are to be obtained from single source from single manufacturer.

2.2 REGULATORY REQUIREMENTS

A. Fire-Rated Assemblies: Complying with NFPA 80 and listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction for fire-protection ratings and temperature-rise limits indicated, based on testing at positive pressure according to NFPA 252 or UL 10C.

1. Smoke- and Draft-Control Assemblies: Provide an assembly with gaskets listed and labeled for smoke and draft control by a qualified testing agency acceptable to authorities having jurisdiction, based on testing according to UL 1784 and installed in compliance with NFPA 105.

2.3 INTERIOR FRAMES

A. Construct interior frames to comply with the standards indicated for materials, fabrication, hardware locations, hardware reinforcement, tolerances, and clearances, and as specified.

B. Standard-Duty Frames: SDI A250.8, Level 1. Closets (not including janitor's closet) and interior windows.

1. Physical Performance: Level C according to SDI A250.4.
2. Materials: Uncoated, cold-rolled steel sheet, minimum thickness of 0.042 inch (1.0 mm).
3. Construction: Full profile welded.
4. Exposed Finish: Prime.

C. Heavy-Duty Frames: SDI A250.8, Level 2. at all other locations.

1. Physical Performance: Level B according to SDI A250.4.
2. Materials: Uncoated steel sheet, minimum thickness of 0.053 inch (1.3 mm).
3. Construction: Full profile welded.
4. Exposed Finish: Prime.

D. Sound-Control Frames
1. Description Fabricate sound-control door frames with corners mitered, reinforced, and continuously welded full depth and width of frame. Fabricate according to ANSI/NAAMM-HMMA 865.
   a. Weld frames according to NAAMM-HMMA 820.
   b. Exterior Frames: Fabricate from metallic-coated steel sheet 0.079-inch (2.01-mm) nominal thickness, or thicker as required to provide STC rating indicated.
   c. Interior Frames: Fabricate from cold-rolled steel sheet unless otherwise indicated, 0.075-inch (1.90-mm) nominal thickness, or thicker as required to provide STC rating indicated.
   d. Hardware Reinforcement: Fabricate according to ANSI/NAAMM-HMMA 865 of same material as face sheets.

2.4 FRAME ANCHORS

A. Jamb Anchors:
1. Stud-Wall Type: Designed to engage stud, welded to back of frames; not less than 0.042 inch (1.0 mm) thick.

B. Floor Anchors: Formed from same material as frames, minimum thickness of 0.042 inch (1.0 mm), and as follows:

1. Monolithic Concrete Slabs: Clip-type anchors, with two holes to receive fasteners.

2. Separate Topping Concrete Slabs: Adjustable-type anchors with extension clips, allowing not less than 2-inch (51-mm) height adjustment. Terminate bottom of frames at finish floor surface.

2.5 MATERIALS

A. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B; suitable for exposed applications.

B. Hot-Rolled Steel Sheet: ASTM A 1011/A 1011M, Commercial Steel (CS), Type B; free of scale, pitting, or surface defects; pickled and oiled.

C. Sound Control Frames: Materials

1. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B, suitable for exposed applications.
2. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B, with G60 (Z180) zinc (galvanized) or A40 (ZF120) zinc-iron-alloy (galvannealed) coating designation.
3. Mineral-Fiber Insulation: Insulation composed of rock-wool fibers, slag-wool fibers, or glass fibers.

D. Frame Anchors: ASTM A 879/A 879M, Commercial Steel (CS), 04Z (12G) coating designation; mill phosphatized.

1. For anchors built into exterior walls, steel sheet complying with ASTM A 1008/A 1008M or ASTM A 1011/A 1011M, hot-dip galvanized according to ASTM A 153/A 153M, Class B.

E. Inserts, Bolts, and Fasteners: Hot-dip galvanized according to ASTM A 153/A 153M.

F. Power-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hollow-metal frames of type indicated.

G. Grout: ASTM C 476, except with a maximum slump of 4 inches (102 mm), as measured according to ASTM C 143/C 143M.

H. Mineral-Fiber Insulation: ASTM C 665, Type I (blankets without membrane facing); consisting of fibers manufactured from slag or rock wool with 6- to 12-lb/cu. ft. (96- to 192-kg/cu. m) density; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively; passing ASTM E 136 for combustion characteristics.

I. Glazing: Comply with requirements in Section 088000 "Glazing."

2.6 FABRICATION

A. Fabricate hollow-metal work to be rigid and free of defects, warp, or buckle. Accurately form metal to required sizes and profiles, with minimum radius for metal thickness. Where practical, fit and assemble units in manufacturer's plant. To ensure proper assembly at Project site, clearly identify work that cannot be permanently factory assembled before shipment.

B. Sound-Control Steel Door Fabrication:

1. Seamless Edge Construction: Fabricate doors with faces joined at vertical edges by welding; welds shall be ground, filled, and dressed to make them invisible and to provide a smooth, flush surface.
2. Exterior Doors: Close top edges flush and seal joints against water penetration. Provide weep-hole openings in bottom of exterior doors to permit moisture to escape.
3. Glazed Lites: Factory install glazed lites according to requirements of tested assembly to achieve STC rating indicated. Provide fixed stops and moldings welded on secure side of door.
4. Hardware Preparation: Factory prepare sound-control doors to receive templated mortised hardware, according to the Door Hardware Schedule and templates furnished as specified in Section 08710 "Door Hardware”

    a. Reinforce doors to receive nontemplated mortised and surface-mounted door hardware.
    b. Locate door hardware as indicated, or if not indicated, according to NAAMM-HMMA 831, "Recommended Hardware Locations for Custom Hollow Metal Doors and Frames."

5. Tolerances: Fabricate doors to tolerances indicated in ANSI/NAAMM-HMMA 865.

C. Hollow-Metal Frames: Where frames are fabricated in sections due to shipping or handling limitations, provide alignment plates or angles at each joint, fabricated of same thickness metal as frames.

1. Sidelight Frames: Provide closed tubular members with no visible face seams or joints, fabricated from same material as door frame. Fasten members at crossings and to jambs by butt welding.
2. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.
3. Grout Guards: Weld guards to frame at back of hardware mortises in frames to be grouted.
4. Floor Anchors: Weld anchors to bottoms of jambs with at least four spot welds per anchor; however, for slip-on drywall frames, provide anchor clips or countersunk holes at bottoms of jambs.
5. Jamb Anchors: Provide number and spacing of anchors as follows:

a. Stud-Wall Type: Locate anchors not more than 18 inches (457 mm) from top and bottom of frame. Space anchors not more than 32 inches (813 mm) o.c. and as follows:

1) Three anchors per jamb up to 60 inches (1524 mm) high.
2) Four anchors per jamb from 60 to 90 inches (1524 to 2286 mm) high.
3) Five anchors per jamb from 90 to 96 inches (2286 to 2438 mm) high.
4) Five anchors per jamb plus one additional anchor per jamb for each 24 inches (610 mm) or fraction thereof above 96 inches (2438 mm) high.

b. Compression Type: Not less than two anchors in each frame.
c. Postinstalled Expansion Type: Locate anchors not more than 6 inches (152 mm) from top and bottom of frame. Space anchors not more than 26 inches (660 mm) o.c.

6. Head Anchors: Two anchors per head for frames more than 42 inches (1067 mm) wide and mounted in metal-stud partitions.
7. Door Silencers: Except on weather-stripped frames, drill stops to receive door silencers as follows. Keep holes clear during construction.

a. Single-Door Frames: Drill stop in strike jamb to receive three door silencers.
b. Double-Door Frames: Drill stop in head jamb to receive two door silencers.

D. Hardware Preparation: Factory prepare hollow-metal work to receive templated mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping according to SDI A250.6, the Door Hardware Schedule, and templates.

1. Reinforce frames to receive nontemplated, mortised, and surface-mounted hardware.
2. Comply with applicable requirements in SDI A250.6 and BHMA A156.115 for preparation of hollow-metal work for hardware.

E. Stops and Moldings: Provide stops and moldings around glazed lites and louvers where indicated. Form corners of stops and moldings with miteredhairline joints.

1. Single Glazed Lites: Provide fixed stops and moldings welded on secure side of hollow-metal work.
2. Multiple Glazed Lites: Provide fixed and removable stops and moldings so that each glazed lite is capable of being removed independently.
3. Provide fixed frame moldings on outside of exterior and on secure side of interior frames.
4. Provide loose stops and moldings on inside of hollow-metal work.
5. Coordinate rabbet width between fixed and removable stops with glazing and installation types indicated.

2.7 STEEL FINISHES

A. Prime Finish: Clean, pretreat, and apply manufacturer's standard primer.

1. Shop Primer: Manufacturer's standard, fast-curing, lead- and chromate-free primer complying with SDI A250.10; recommended by primer manufacturer for substrate; compatible with substrate and field-applied coatings despite prolonged exposure.

B. Sound Control Frame Finishes:

1. Prime Finish: Apply manufacturer's standard primer complying with ANSI/SDI A250.10.
2. Factory-Applied Paint Finish: Manufacturer's standard primer and finish coats, complying with ANSI/SDI A250.3.

a. Color and Gloss: As selected by Architect from manufacturer's full range.

2.8 ACCESSORIES

A. Mullions and Transom Bars: Join to adjacent members by welding or rigid mechanical anchors.

B. Grout Guards: Formed from same material as frames, not less than 0.016 inch (0.4 mm) thick.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Examine roughing-in for embedded and built-in anchors to verify actual locations before frame installation.

C. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Remove welded-in shipping spreaders installed at factory. Restore exposed finish by grinding, filling, and dressing, as required to make repaired area smooth, flush, and invisible on exposed faces.

B. Drill and tap frames to receive nontemplated, mortised, and surface-mounted hardware.

3.3 INSTALLATION

A. General: Install hollow-metal work plumb, rigid, properly aligned, and securely fastened in place. Comply with Drawings and manufacturer's written instructions.

B. Hollow-Metal Frames: Install hollow-metal frames of size and profile indicated. Comply with SDI A250.11 or NAAMM-HMMA 840 as required by standards specified.

1. Set frames accurately in position; plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces, leaving surfaces smooth and undamaged.

    a. At fire-rated openings, install frames according to NFPA 80.
    b. Where frames are fabricated in sections because of shipping or handling limitations, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces.
    c. Install frames with removable stops located on secure side of opening.
    d. Install door silencers in frames before grouting.
    e. Remove temporary braces necessary for installation only after frames have been properly set and secured.
    f. Check plumb, square, and twist of frames as walls are constructed. Shim as necessary to comply with installation tolerances.

2. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor, and secure with postinstalled expansion anchors.

    a. Floor anchors may be set with power-actuated fasteners instead of postinstalled expansion anchors if so indicated and approved on Shop Drawings.

3. Metal-Stud Partitions: Solidly pack mineral-fiber insulation inside frames.
4. Installation Tolerances: Adjust hollow-metal door frames for squareness, alignment, twist, and plumb to the following tolerances:

    a. Squareness: Plus or minus 1/16 inch (1.6 mm), measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
    b. Alignment: Plus or minus 1/16 inch (1.6 mm), measured at jambs on a horizontal line parallel to plane of wall.

c. Twist: Plus or minus 1/16 inch (1.6 mm), measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
d. Plumbness: Plus or minus 1/16 inch (1.6 mm), measured at jambs at floor.

C. Sound Control Frames: Install sound-control door frames in sizes and profiles indicated.

1. Set frames accurately in position; plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces, leaving surfaces smooth and undamaged.

   a. Where frames are fabricated in sections due to shipping or handling limitations, field splice at approved locations by welding face joint continuously; grind, fill, and dress; make splice smooth, flush, and invisible on exposed faces.
   b. Install sound-control frames with removable glazing stops located on secure side of opening.
   c. Remove temporary braces only after frames or bucks have been properly set and secured.
   d. Check squareness, twist, and plumbness of frames as walls are constructed. Shim as necessary to comply with installation tolerances.

2. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor and secure with postinstalled expansion anchors or powder-actuated fasteners.
3. Metal-Stud Partitions: Solidly pack mineral-fiber insulation behind frames.
4. In-Place Gypsum Board Partitions: Secure frames in place with postinstalled expansion anchors through floor anchors at each jamb. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.
5. Ceiling Struts: Extend struts vertically from top of frame at each jamb to supporting construction above, unless frame is anchored to masonry or to other structural support at each jamb. Bend top of struts to provide flush contact for securing to supporting construction above. Provide adjustable wedged or bolted anchorage to frame jamb members.
6. Installation Tolerances: Adjust sound-control door frames for squareness, alignment, twist, and plumbness as indicated in ANSI/NAAMM-HMMA 865.
7.

D. Glazing: Comply with installation requirements in Section 08800 "Glazing" and with hollow-metal manufacturer's written instructions.

1. Secure stops with countersunk flat- or oval-head machine screws spaced uniformly not more than 9 inches (230 mm) o.c. and not more than 2 inches (51 mm) o.c. from each corner.

2. For Sound Control Door Assemblies comply with installation requirements in Section 08800 "Glazing" and with manufacturer's written instructions

3.4 ADJUSTING AND CLEANING

A. Final Adjustments: Remove and replace defective work, including hollow-metal work that is warped, bowed, or otherwise unacceptable.

B. Remove grout and other bonding material from hollow-metal work immediately after installation.

C. Prime-Coat Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touchup of compatible air-drying, rust-inhibitive primer.

D. Touchup Painting: Cleaning and touchup painting of abraded areas of paint are specified in painting Sections.

END OF SECTION 08121

SECTION 08211 - FLUSH WOOD DOORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Solid-core doors with wood-veneer faces.

2. Sound Control Doors
3. Factory finishing flush wood doors.
4. Factory machining for hardware.

B. Related Sections:
1. Section 08110 “Hollow metal frames” for metal door frames that are to receive flush wood doors.
2. Section 0871 “Door Hardware” for door hardware.
3. Section 08800 "Glazing" for glass view panels in flush wood doors.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of door indicated. Include details of core and edge construction, louvers, and trim for openings.

B. Shop Drawings: Indicate location, size, and hand of each door; elevation of each kind of door; construction details not covered in Product Data; location and extent of hardware blocking; and other pertinent data.

1. Indicate dimensions and locations of mortises and holes for hardware.
2. Indicate dimensions and locations of cutouts.
3. Indicate requirements for veneer matching.
4. Indicate doors to be factory finished and finish requirements.
5. Indicate fire-protection ratings for fire-rated doors.
6. Indicate sound control doors including details, seals, anchorages and accessories

C. Samples for Initial Selection: For factory-finished doors.

1.4 INFORMATIONAL SUBMITTALS

A. Warranty: Sample of special warranty.

1.5 QUALITY ASSURANCE

A. Source Limitations: Obtain flush wood doors from single manufacturer.

B. Quality Standard: In addition to requirements specified, comply with AWI's "Architectural Woodwork Quality Standards Illustrated."

1. Provide AWI Quality Certification Labels or an AWI letter of licensing for Project indicating that doors comply with requirements of grades specified.

C. Fire-Rated Wood Doors: Doors complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at positive pressure according to NFPA 252 or UL 10C.

D. STC Rating: Not less than as scheduled and as determined by ASTM E 413 when tested in an operable condition according to ASTM E 90 and ASTM E 1408. Manufacturer shall have testing lab documentation of STC rating.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Comply with requirements of referenced standard and manufacturer's written instructions.

B. Package doors individually in plastic bags or cardboard cartons.

C. Mark each door on bottom rail with opening number used on Shop Drawings.

1.7 PROJECT CONDITIONS

A. Environmental Limitations: Do not deliver or install doors until spaces are enclosed and weathertight, wet work in spaces is complete and dry, and HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.

1.8 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace doors that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

   a. Warping (bow, cup, or twist) more than 1/4 inch (6.4 mm) in a 42-by-84-inch (1067-by-2134-mm) section.
   b. Telegraphing of core construction in face veneers exceeding 0.01 inch in a 3-inch (0.25 mm in a 76.2-mm) span.

2. Warranty shall also include installation and finishing that may be required due to repair or replacement of defective doors.
3. Warranty Period for Solid-Core Interior Doors: Life of installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Algoma Hardwoods, Inc.
2. Chappell Door Co.
3. Eagle Plywood & Door Manufacturing, Inc .
4. Eggers Industries.
5. Graham; an Assa A bloy Group company.
6. Haley Brothers, Inc.
7. Ideal Architectural Doors & Plywood.
8. Marlite.
9. Marshfield Door Systems, Inc.
10. Mohawk Flush Doors, Inc.; a Masonite company.
11. Oshkosh Architectural Door Company.
12. Poncraft Door Company.
13. VT Industries Inc.

B. Sound Control Doors Manufacturer: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. AMBICO Limited
2. Eggers Industries
3. Krieger Specialty Products Company
4. Marshfield DoorSystems, Inc.
5. Overly Door Company

C. Source Limitations: Sound Control Doors and Frames are to be obtained from single source from single manufacturer.

2.2 DOOR CONSTRUCTION, GENERAL

A. WDMA I.S.1-A Performance Grade:

1. Heavy Duty unless otherwise indicated.
2. Extra Heavy Duty: Classrooms, public toilets janitor's closets, exits.
3. Standard Duty: Closets (not including janitor's closets).

B. Structural-Composite-Lumber-Core Doors:

1. Structural Composite Lumber: WDMA I.S.10.

   a. Screw Withdrawal, Face: 700 lbf (3100 N).
   b. Screw Withdrawal, Edge: 400 lbf (1780 N).

C. Sound Control Doors: Where scheduled: Solid core wood doors constructed as described in this section, except as required to provide acoustical rating identical to listed manufacturer’s door tested per ASTM E90 using scheduled door gasket and door bottom.

1. Counseling Room Doors: STC rating no less than 46
2. Daycare Classroom Entry Doors: STC rating no less than 45
3. Daycare Restroom Doors: STC rating no less than 45
4. Daycare Infant Classroom Doors: STC rating no less 46
5. Training Rooms: STC rating no less than 45
6. Design: Flush panel.
7. Core Construction: Manufacturer's standard sound control door core construction designed and tested for the specified STC rating.
   a. Fire Door Core: As required to provide fire-protection level specified.
8. Vertical Edges: Beveled both edges, 1/8 inch in 2 inches (3 mm in 50 mm).

D. Glazing in Sound Control Doors: Vision panels to be designed and tested by the Manufacturer to meet the specified STC rating and comply with requirements in Division 08 Section “Glazing”

E. Fire-Protection-Rated Doors: Provide core specified or mineral core as needed to provide fire-protection rating indicated.

1. Edge Construction: Provide edge construction with intumescent seals concealed by outer stile. Comply with specified requirements for exposed edges.
2. Pairs: Provide fire-retardant stiles that are listed and labeled for applications indicated without formed-steel edges and astragals. Provide stiles with concealed intumescent seals. Comply with specified requirements for exposed edges.

F. Mineral-Core Doors:

1. Core: Noncombustible mineral product complying with requirements of referenced quality standard and testing and inspecting agency for fire-protection rating indicated.
2. Blocking: Provide composite blocking with improved screw-holding capability approved for use in doors of fire-protection ratings indicated as needed to eliminate through-bolting hardware.

3. Edge Construction: At hinge stiles, provide laminated-edge construction with improved screw-holding capability and split resistance. Comply with specified requirements for exposed edges.

2.3 VENEERED-FACED DOORS FOR TRANSPARENT FINISH

A. Interior Solid-Core Doors:

1. Grade: Premium, with Grade A faces.
2. Species: White oak.
3. Cut: Quarter sliced.
4. Match between Veneer Leaves: Slip match.
5. Assembly of Veneer Leaves on Door Faces: Balance match.
6. Pair and Set Match: Provide for doors hung in same opening or separated only by mullions.
7. Room Match: Match door faces within each separate room or area of building. Corridor-door faces do not need to match where they are separated by 20 feet (6 m) or more.
8. Room Match: Provide door faces of compatible color and grain within each separate room or area of building.

9. Core: Either glued wood stave or structural composite lumber.
10. Construction: Five or seven plies. Stiles and rails are bonded to core, then entire unit abrasive planed before veneering.
11. Construction: Seven plies, either bonded or nonbonded construction.
12. WDMA I.S.1-A Performance Grade: As indicated.

2.4 LOUVERS AND LIGHT FRAMES

A. Wood Louvers: Door manufacturer's standard solid-wood louvers unless otherwise indicated.

1. Wood Species: Same species as door faces.

B. Metal Louvers:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. Air Louvers Inc.

b. Anemostat; a Mestek company.
c. Hiawatha Incorporated.
d. L & L Louvers, Inc.
e. LL Building Products, Inc.; a division of GAF Materials Corporation.
f. Louvers & Dampers, Inc.; a Mestek company.
g. McGill Architectural Products.

2. Blade Type: Vision-proof, inverted V.
3. Metal and Finish: Extruded aluminum with Class II, clear anodic finish, AA-M12C22A31.

C. Louvers for Fire-Rated Doors: Metal louvers with fusible link and closing device, listed and labeled for use in doors with fire-protection rating of 1-1/2 hours and less.

1. Manufacturers: Subject to compliance with requirements, [**provide products by one of the following**] [**available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following**]:

a. Air Louvers Inc.
b. Anemostat; a Mestek company.
c. Hiawatha Incorporated.
d. L & L Louvers, Inc.
e. LL Building Products, Inc.; a division of GAF Materials Corporation.
f. Louvers & Dampers, Inc.; a Mestek company.
g. McGill Architectural Products.

2. Metal and Finish: Hot-dip galvanized steel, 0.040 inch (1.0 mm) thick, with baked-enamel- or powder-coated finish.

D. Wood Beads for Light Openings in Wood Doors: Provide manufacturer's standard wood beads as follows unless otherwise indicated.

1. Wood Species: Same species as door faces.
2. Profile: Flush rectangular beads.
3. At wood-core doors with 20-minute fire-protection ratings, provide wood beads and metal glazing clips approved for such use.

E. Wood-Veneered Beads for Light Openings in Fire-Rated Doors: Manufacturer's standard wood-veneered noncombustible beads matching veneer species of door faces and approved for use in doors of fire-protection rating indicated. Include concealed metal glazing clips where required for opening size and fire-protection rating indicated.

2.5 FABRICATION

A. Factory fit doors to suit frame-opening sizes indicated. Comply with clearance requirements of referenced quality standard for fitting unless otherwise indicated.

1. Comply with requirements in NFPA 80 for fire-rated doors.

B. Factory machine doors for hardware that is not surface applied. Locate hardware to comply with DHI-WDHS-3. Comply with final hardware schedules, door frame Shop Drawings, DHI A115-W series standards, and hardware templates.

1. Coordinate with hardware mortises in metal frames to verify dimensions and alignment before factory machining.

C. Openings: Cut and trim openings through doors in factory.

1. Light Openings: Trim openings with moldings of material and profile indicated.
2. Glazing: Factory install glazing in doors indicated to be factory finished. Comply with applicable requirements in Section 08800 "Glazing."
3. Louvers: Factory install louvers in prepared openings.

D. Sound-Control Door Fabrication

1. Glazed Lites; Factory install glazed lites according to requirements of tested assembly to achieve STC rating indicated. Provide fixed stops and moldings welded on secure side of door. Doors with factory installed glass to include all of the required glazing material and allow for independent removal of each pane of glass.

2. Locate door hardware as indicated, or it not indicated, according to DHI WDHS.3, “Recommended Locations for Architectural Hardware for Wood Flush Doors.”

2.6 FACTORY FINISHING

A. General: Comply with referenced quality standard for factory finishing. Complete fabrication, including fitting doors for openings and machining for hardware that is not surface applied, before finishing.

1. Finish faces, all four edges, edges of cutouts, and mortises. Stains and fillers may be omitted on top and bottom edges, edges of cutouts, and mortises.

B. Finish doors at factory.

C. Transparent Finish:

1. Grade: Premium.
2. Finish: AWI conversion varnish or catalyzed polyurethane system.
3. Effect: Semifilled finish, produced by applying an additional finish coat to partially fill the wood pores.
4. Sheen: Satin.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine doors and installed door frames before hanging doors.

1. Verify that frames comply with indicated requirements for type, size, location, and swing characteristics and have been installed with level heads and plumb jambs.
2. Reject doors with defects.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Hardware: For installation, see Section 08710 "Door Hardware" and Section 08712 "Door Hardware (Descriptive Specification)."

B. Fit sound-control doors accurately in frames, within clearances as indicated in ANSI/NAAMM-HMMA 865

C. Installation Instructions: Install doors to comply with manufacturer's written instructions and the referenced quality standard, and as indicated.

1. Install fire-rated doors in corresponding fire-rated frames according to NFPA 80.

D. Job-Fitted Doors: Align and fit doors in frames with uniform clearances and bevels as indicated below; do not trim stiles and rails in excess of limits set by manufacturer or permitted for fire-rated doors. Machine doors for hardware. Seal edges of doors, edges of cutouts, and mortises after fitting and machining.

1. Clearances: Provide 1/8 inch (3.2 mm) at heads, jambs, and between pairs of doors. Provide 1/8 inch (3.2 mm) from bottom of door to top of decorative floor finish or covering unless otherwise indicated. Where threshold is shown or scheduled, provide 1/4 inch (6.4 mm) from bottom of door to top of threshold unless otherwise indicated.

a. Comply with NFPA 80 for fire-rated doors.

E. Factory-Finished Doors: Restore finish before installation if fitting or machining is required at Project site.

3.3 ADJUSTING

A. Operation: Rehang or replace doors that do not swing or operate freely.

B. Finished Doors: Replace doors that are damaged or that do not comply with requirements. Doors may be repaired or refinished if work complies with requirements and shows no evidence of repair or refinishing.

END OF SECTION 08211

SECTION 08311 ACCESS DOORS AND FRAMES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Access doors and frames for walls and ceilings.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, materials, individual components and profiles, and finishes.

B. Shop Drawings:

1. Include plans, elevations, sections, details, and attachments to other work.

2. Detail fabrication and installation of access doors and frames for each type of substrate.

PART 2 - PRODUCTS

2.1 ACCESS DOORS AND FRAMES FOR WALLS AND CEILINGS

A. Manufacturers: Subject to compliance with requirements, available manufactures offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Acudor Products, Inc.

2. Babcock-Davis.

3. Jensen Industries; Div. of Broan-Nutone, LLC.

4. Karp Associates, Inc.

5. MIFAB, Inc.

6. Milcor Inc.

7. Williams Bros. Corporation of America (The).

B. Source Limitations: Obtain access doors and frame from single source from single manufacturer.

C. Flush Access Doors with Concealed Flanges:

1. Assembly Description: Fabricate door to fit flush to frame. Provide frame with gypsum board or plaster beads as required for concealed flange installation.

2. Locations: Wall and ceiling.

3. Size: As indicated on Drawings and required for access to concealed spaces and building systems.

4. Metallic Coated Steel Sheet for Door: Nominal 0.060 inch, 16 gage.

a. Finish: Factory prime

5. Frame Material: Same material and thickness as door.

6. Hinges: Manufacturer's standard.

7. Hardware: Lock.

D. Hardware:

1. Lock: As indicated by Architect

a. Lock Preparation: Prepare door panel to accept cylinder specified in Division 08 Section "Door Hardware."

2.2 MATERIALS

A. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B; with minimum G60 or A 60 metallic coating.

B. Frame Anchors: Same type as door face.

C. Inserts, Bolts, and Anchor Fasteners: Hot-dip galvanized steel according to ASTM A 153/A 153M or ASTM F 2329.

2.3 FABRICATION

A. General: Provide access door and frame assemblies manufactured as integral units ready for installation.

B. Metal Surfaces: For metal surfaces exposed to view in the completed Work, provide materials with smooth, flat surfaces without blemishes. Do not use materials with exposed pitting, seam marks, roller marks, rolled trade names, or roughness.

C. Door and Frames: Grind exposed welds smooth and flush adjacent surfaces. Furnish attachment devices and fasteners of type required to secure access doors to types of supports indicated.

1. For concealed flanges with drywall bead, provide edge trim for gypsum board and gypsum base securely attached to perimeter of frames.

2. Provide mounting holes in frames for attachment of units to metal or wood framing.

D. Latching Mechanisms: Furnish number required to hold doors in flush, smooth plane when closed.

1. For cylinder locks, furnish two keys per lock and key all locks alike.

2. For recessed panel doors, provide access sleeves for each locking device. Furnish plastic grommets and install in holes cut through finish.

2.4 FINISHES

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

C. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

D. Metallic-Coated-Steel Finishes:

1. Factory Prime: Apply manufacturer's standard, fast-curing, lead- and chromate-free, universal primer immediately after surface preparation and pretreatment.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates for compliance with requirements for installation tolerances and other conditions affecting performances of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Comply with manufacturer's written instructions for installing access doors and frames.

B. Install doors flush with adjacent finish surfaces or recessed to receive finish material.

3.3 ADJUSTING

A. Adjust doors and hardware, after installation, for proper operation.

B. Remove and replace doors and frames that are warped, bowed, or otherwise damaged.

END OF SECTION

SECTION 08331 – COILING OVERHEAD COUNTER DOOR

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:
   1. Fire-rated coiling counter doors.

B. Related Sections:

   1. Section 05501 "Metal Fabrications" for miscellaneous steel supports.
   2. Section 09911 "Exterior Painting" and Section 09912 "Interior Painting" for finish painting of factory-primed doors.

1.3 PERFORMANCE REQUIREMENTS

A. Delegated Design: Design overhead coiling doors, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

   1. Deflection Limits: Design overhead coiling doors to withstand design wind load without evidencing permanent deformation or disengagement of door components.

B. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified Operation Cycles: Provide overhead coiling door components and operators capable of operating for not less than number of cycles indicated for each door. One operation cycle is complete when a door is opened from the closed position to the fully open position and returned to the closed position.

C. Fire Door Construction: Conform to UL 10B

D. Installed Fire Door Assembly: Conform to NFPA 80

1.4 ACTION SUBMITTALS

A. Product Data: For each type and size of overhead coiling door and accessory. Include the following:

   1. Construction details, material descriptions, dimensions of individual components, profiles for slats, and finishes.
   2. Rated capacities, operating characteristics, electrical characteristics, and furnished accessories.

3. For fire-rated doors, description of fire-release system including testing and resetting instructions.

B. Shop Drawings: For each installation and for special components not dimensioned or detailed in manufacturer's product data. Include plans, elevations, sections, details, and attachments to other work.

1. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
2. Show locations of replaceable fusible links.
3. Wiring Diagrams: For power, signal, and control wiring.

C. Samples for Initial Selection: Manufacturer's finish charts showing full range of colors and textures available for units with factory-applied finishes.

1. Include similar Samples of accessories involving color selection.

D. Samples for Verification: For each type of exposed finish required, prepared on Samples of size indicated below.

1. Curtain Slats: 12 inches (305 mm) long[**, including vision window secured to slat**].
2. Bottom Bar: 6 inches (150 mm) long[**with sensor edge**].
3. Guides: 6 inches (150 mm) long.
4. Brackets: 6 inches (150 mm) square.
5. Hood: 6 inches (150 mm) square.
6. Laminate-Clad Counter Panel Product: 6 inches (150 mm) square; for each type, color, pattern, and surface finish; laminated to core.

E. Delegated-Design Submittal: For overhead coiling doors indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1. Detail fabrication and assembly of seismic restraints.
2. Summary of forces and loads on walls and jambs.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified Installer.

B. Oversize Construction Certification: For door assemblies required to be fire-rated and that exceed size limitations of labeled assemblies.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance Data: For overhead coiling doors to include in maintenance manuals.

1.7 QUALITY ASSURANCE

A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for both installation and maintenance of units required for this Project.

B. Manufacturer Qualifications: Manufacturer shall provide a coiling door system capable of withstanding positive and negative design loads as required by local building code for 20,000 cycles.

C. Source Limitations: Obtain overhead coiling doors from single source from single manufacturer.

1. Obtain operators and controls from overhead coiling door manufacturer.

D. Fire-Rated Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at as close to neutral pressure as possible according to [**NFPA 252**] [**UBC Standard 7-2**] [**or**] [**UL 10B**].

1. Oversize Fire-Rated Door Assemblies: For units exceeding sizes of tested assemblies, provide certification by a qualified testing agency that doors comply with standard construction requirements for tested and labeled fire-rated door assemblies except for size.
2. Temperature-Rise Limit: [**Where indicated**] [**At vertical exit enclosures and exit passageways**], provide doors that have a maximum transmitted temperature end point of not more than 450 deg F (250 deg C) above ambient after 30 minutes of standard fire-test exposure.
3. Smoke Control: [**In corridors and smoke barriers**, provide doors that are listed and labeled with the letter "S" on the fire-rating label by a qualified testing agency for smoke- and draft-control based on testing according to [**UBC Standard 7-2**] [**UL 1784**]; with maximum air-leakage rate of 3.0 cfm/sq. ft. (0.01524 cu. m/s x sq. m) of door opening at 0.10 inch wg (24.9 Pa) for both ambient and elevated temperature tests.

E. Sound-Control Doors: Assemblies that have been fabricated and tested to control the passage of sound and have minimum certified STC rating according to ASTM E 413.

F. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

G. Regulatory Requirements: Comply with applicable provisions in [**the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines**] [**and**] [**ICC/ANSI A117.1**].

1.8 WARRANTY

A. Provide an original of the manufacturer’s limited warranty against manufacturing defects and product workmanship
1. Rolling Steel Door Warranty: 5 years

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis of Design: Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work includes, but are not limited to the following:
1. C.H.I Overhead Doors 7500
2. Cornell Counter Fire Door

B. Construction:
   1. Guides: Bolted together to form guide channel and mounting surface.
   2. End Locks: Galvanized malleable iron, attached to every other slat providing a wearing surface and preventing movement.
   3. Head Plate: Rectangular steel plate, with precision sealed ball bearings supporting drive side axle.
   4. Barrel Assembly: Steel pipe, sized for maximum deflection, with threaded rings or lugs welded to barrel assembly for curtain attachment.
   5. Springs: Counterbalanced torsion springs, grease packed and mounted on steel torsion shafts, designed for minimum 20,000 cycles

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates areas and conditions, with Installer present, for compliance with requirements for substrate construction and other conditions affecting performance of the Work.

B. Examine locations of electrical connections.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install overhead coiling doors and operating equipment complete with necessary hardware, anchors, inserts, hangers, and equipment supports; according to manufacturer's written instructions and as specified.

B. Install overhead coiling doors, hoods, and operators at the mounting locations indicated for each door.

C. Accessibility: Install overhead coiling doors, switches, and controls along accessible routes in compliance with regulatory requirements for accessibility.

D. Fire-Rated Doors: Install according to NFPA 80.

E. Smoke-Control Doors: Install according to NFPA 80 and NFPA 105.

3.3 STARTUP SERVICE

A. Engage a factory-authorized service representative to perform startup service.

   1. Perform installation and startup checks according to manufacturer's written instructions.
   2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
   3. Test door closing when activated by detector or alarm-connected fire-release system. Reset door-closing mechanism after successful test.

3.4 ADJUSTING

A. Adjust hardware and moving parts to function smoothly so that doors operate easily, free of warp, twist, or distortion.

B. Lubricate bearings and sliding parts as recommended by manufacturer.

C. Adjust seals to provide weathertight fit around entire perimeter.

3.5 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain overhead coiling doors.

END OF SECTION 08331

SECTION 08334 - OVERHEAD COILING FABRIC FIRE BARRIERS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

Smoke detector-activated, overhead coiling fabric fire barrier:

1. Section 05501 “Metal Fabrications” for misc. steel supports
2. Section 08311 “Access Doors & Frames” for access doors for fire and smoke curtain
3. Section 16 Sections for 120 V and control circuit power including conduit, boxes, conductors, wiring devices and emergency power
4. Section 15 Sections for provision of smoke detectors

1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site

1.3 COORDINATION

A. Coordinate fire- and smoke-protective curtain assemblies with power, signal, fire-alarm, and smoke-detection systems specified in Division 15 and Division 16.

B. Coordinate smoke-protective curtain assemblies with ceilings for operational clearances and maintenance access requirements.

C. Coordinate smoke-protective curtain assemblies with walls for support requirements, rating continuity above ceilings, and recessed wall switches.

D. Coordinate requirements for metal supports required for fire- and smoke-protective curtain assemblies.

1.4 ACTION SUBMITTALS

A. Product Data: For each type and size of overhead coiling fabric fire barrier and accessory.

B. Shop Drawings: for each installation and special components not dimensioned or detailed in manufacturers product data.

1. Include points of attachment and their corresponding static and dynamic loads imposed on structure
2. Detail fabrication and assembly of fire-protective curtain assemblies.
3. Show locations of controls, locking devices,, detectors or replaceable fusible links, and other accessories.
4. Include diagrams for power, signal, and control wiring.

1.5 INFORMATIONAL SUBMITTALS

A. Evaluation Reports: For curtain assemblies, from ICC-ES.

B. Field quality-control reports.

C. Sample warranty.

1.6 CLOSEOUT SUBMITTALS

A. Operation and maintenance data

1.7 QUALITY ASSURANCE

A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer for both installation and maintenance of units required for this Project.

B. Fire-Door Assembly: Assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at as close to neutral pressure as possible according to NFPA 252 or UL10B

C. Smoke Control: Where indicated, provide doors that are listed and labeled with the letter “S” on the fire-rating label by a qualified testing agency for smoke-and draft-control based on testing according to UL1784; with air-leakage rate of 3.0 cfm/sq. ft of door opening at 0.10-inch wg for both ambient and elevated temperature tests

1.8 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of curtain assemblies that fail in materials or workmanship within specified warranty period.

1. Warranty Period: Two years from date of Substantial Completion.

2. Warranty shall also include installation that may be required due to repair or replacement of defective overhead coiling fabric fire barrier.

3. Extended Maintenance Agreement: Perform minimum semi-annual inspection, testing and maintenance on each smoke containment system as required by the manufacturer’s warranty, code agency evaluation reports, and as required by local authorities having jurisdiction.
   a. Backup battery: tested per manufacturer’s operation and Maintenance Manual
   b. Provide written report of inspection, testing and maintenance

PART 2 - PRODUCTS

2.1 MANUFACTURERS, GENERAL

A. Source Limitations: Obtain fire-protective barrier from single source from single manufacturer.

1. Obtain operators and controls from fire-protective curtain manufacturer.

2. Basis of Design: Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work includes, but are not limited to the following:
   a. Smoke Guard Fire and Smoke Systems
   b. Stoebick Fire Curtain
   c. Cornell Smokeshield

2.2 OVERHEAD COILING FABRIC FIRE AND SMOKE BARRIER ASSEMBLY

A. Fire-Rated Fire Barrier Assembly: Overhead fire-rated coiling fabric assembly formed with curtain of fire barrier material with egress door, side guide assembly, rewind motor, and controls

B. Operation Cycles: Door components and operators capable of operating for not less that 10,000.

C. Fire Rating: UL10D, 120 minute.

D. Fabric Fire Barrier Material: Glass filament fabrics of glass fibers material coated on one side with a polyester polyurethane latex, with steel wire reinforcement, with manufacturer's standard bottom bar.

E. Casing: Manufacturer's standard , with fixed bearing curtain tube, mounted above ceiling to secondary supports specified in Section 05501 "Metal Fabrications"

F. Side Guide Assembly: Manufacturer's standard galvanized guides of configuration suitable for application; primed for field finishing

2.3 ELECTRIC DOOR OPERATORS

A. General: Electric door operator assembly of size and capacity recommended and provided by door manufacturer for curtain and operations-cycles requirement specified, with electric motor and factory-prewired motor controls, starter, gear-reduction unit, solenoid-operated brake, clutch, control stations, control devices, and accessories required for proper operation:
   1. Comply with NFPA

B. Electric Door Operator:
   1. Electric components, devices, and accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application
   2. Safety: Listed according to UL 325 by a qualified testing agency for commercial or industrial use.
   3. Rewind motor: Tubular type, fail safe operation;120V AC
   4. Motor Exposure: Interior
   5. Control Station(s): Interior mounted; UL Standard No. 864; located as directed by Architect
   6. Control equipment complying with NEMA ICS 1, NEMA ICS2, and NEMA ICS 6, with NFPA 70 Class 2 control circuit, maximum 24-V ac or dc

2.4 CURTAIN

A. Smoke Seals: Equip each fire-rated door with replaceable smoke-seal perimeter gaskets or brushes for smoke and draft control as required for door listing and labeling by a qualified testing agency

B. Automatic-Closing Device for Fire-Rated Fabric Fire Barrier: Equip each fire-rated curtain with an automatic-closing device complying with NFPA 80 and an easily tested and reset release mechanism. Automatic-closing device shall be designed for activation by the following:
   1. Manufacturer's standard UL-labeled smoke detector and door-holder-release device
   2. Manufacturer's standard UL-labeled heat detector ad door holder-release devices
   3. Building fire-detection, smoke-detection, and alarm system.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates upon which work will be installed
   1. Verify that related work performed under other sections are complete and in accordance with Shop Drawingss
   2. Verify all wall surfaces are acceptable for installation of smoke containment system components.

B. Coordinate with responsible entity to perform corrective work on unsatisfactory substrates

C. Coordinate electrical interface and connection with Division 16

D. Coordinate interface and connection with fire alarm system

E. Commencement of work by installer is acceptance of substrate

3.2 INSTALLATION

A. Examine locations of electrical connections.

B. Install overhead coiling fabric fire barriers and operating equipment complete with necessary hardware, anchors, inserts, hangers, and equipment supports; according to manufacturer's written instructions and as specified.

C. Fire-Rated Doors: Install according to NFPA 80

D. Smoke-Control Doors: Install according to NFPA 80 and NFPA 105

E. Power-Operated Doors: Install according to UL 325

F. Install anchorage devices to securely fasten assembly to substrate and building framing without distortion or stress.

G. Securely brace components suspended from structure.

H. Fit and align assembly, including vertical guides, level and plumb, to provide smooth operation.

I. Adjust fire-protective curtain assemblies to function smoothly, as recommended by manufacturer.

J. Adjust hardware and moving parts to function smoothly so that doors operate easily, free of warp, twist, or distortion. Lubricate bearings and sliding parts as recommended by manufacturer. Adjust seals to provide tight fit around entire perimeter.

3.3 FIELD QUALITY CONTROL

A. Field Test: Follow manufacturer's cycle test procedures.
   1. Notify Owner's Representative, local Fire Marshal and alarm sub-contractor minimum one week in advance of scheduled testing
   2. Complete maintenance service record.

3.4 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain overhead coiling smoke curtains.

B. Screen Replacement Notice: Inform Owner's Representative that smoke containment screen requires replacement following exposure to temperatures exceeding 200 degrees

3.5 MAINTENANCE

A. Engage a manufacturer's authorized service representative to test, adjust, and maintain the fire-protective assemblies once per year as required by NFPA 80.

END OF SECTION 083344

SECTION 08411 - ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Exterior and interior storefront framing.
2. Storefront framing for punched openings.
3. Exterior and interior manual-swing entrance doors.
4. Sun Control Devices

B. Related Sections:
1. Section 08911 "Glazed Aluminum Curtain Walls" for curtain-wall systems that mechanically retain glazing on four sides.

1.3 DEFINITIONS

A. ADA/ABA Accessibility Guidelines: U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disability Act (ADA) and Architectural Barriers Act (ABA) Accessibility Guidelines for Buildings and Facilities."

1.4 PERFORMANCE REQUIREMENTS

A. General Performance: Aluminum-framed systems shall withstand the effects of the following performance requirements without exceeding performance criteria or failure due to defective manufacture, fabrication, installation, or other defects in construction:

1. Movements of supporting structure indicated on Drawings including, but not limited to, story drift and deflection from uniformly distributed and concentrated live loads.
2. Dimensional tolerances of building frame and other adjacent construction.
3. Failure includes the following:

a. Deflection exceeding specified limits.
b. Thermal stresses transferring to building structure.
c. Framing members transferring stresses, including those caused by thermal and structural movements to glazing.

d. Noise or vibration created by wind and by thermal and structural movements.
e. Loosening or weakening of fasteners, attachments, and other components.
f. Sealant failure.
g. Failure of operating units.

B. Delegated Design: Design aluminum-framed systems, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

C. Structural Loads:

1. Wind Loads: As indicated on Drawings..

a. Basic Wind Speed: as indicated on drawings130 mph.
b. Importance Factor: as indicated on drawings1.0.
c. Exposure Category: B

D. Deflection of Framing Members:

1. Deflection Normal to Wall Plane: Limited to edge of glass in a direction perpendicular to glass plane shall not exceed L/175 of the glass edge length for each individual glazing lite or an amount that restricts edge deflection of individual glazing lites to 3/4 inch (19 mm), whichever is less.
2. Deflection Parallel to Glazing Plane: Limited to L/360 of clear span or 1/8 inch (3.2 mm), whichever is smaller Insert deflection limit.

E. Structural-Test Performance: Provide aluminum-framed systems tested according to ASTM E 330 as follows:

1. When tested at positive and negative wind-load design pressures, systems do not evidence deflection exceeding specified limits.
2. When tested at 150 percent of positive and negative wind-load design pressures, systems, including anchorage, do not evidence material failures, structural distress, and permanent deformation of main framing members exceeding 0.2 percent of span.
3. Test Durations: As required by design wind velocity, but not fewer than 10 seconds.

F. Windborne-Debris-Impact-Resistance Performance: Provide aluminum-framed systems that pass missile-impact and cyclic-pressure tests when tested according to ASTM E 1886 and testing information in ASTM E 1996.

1. Large-Missile Impact: For aluminum-framed systems located within 30 feet (9.1 m) of grade.

G. Air Infiltration: Provide aluminum-framed systems with maximum air leakage through fixed glazing and framing areas of 0.06 cfm/sq. ft. (0.03 L/s per sq. m) of fixed wall area when tested according to ASTM E 283 at a minimum static-air-pressure difference of 1.57 lbf/sq. ft. (75 Pa).

H. Water Penetration under Static Pressure: Provide aluminum-framed systems that do not evidence water penetration through fixed glazing and framing areas when tested according to ASTM E 331 at a minimum static-air-pressure difference of 20 percent of positive wind-load design pressure, but not less than 6.24 lbf/sq. ft. (300 Pa).

I. Thermal Movements: Provide aluminum-framed systems that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change (Range): 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.
2. Test Performance: No buckling; stress on glass; sealant failure; excess stress on framing, anchors, and fasteners; or reduction of performance when tested according to AAMA 501.5.

    a. High Exterior Ambient-Air Temperature: That which produces an exterior metal-surface temperature of 180 deg F (82 deg C).
    b. Low Exterior Ambient-Air Temperature: 0 deg F (minus 18 deg C).

3. Interior Ambient-Air Temperature: 75 deg F (24 deg C).

J. Condensation Resistance: Provide aluminum-framed systems with fixed glazing and framing areas having condensation-resistance factor (CRF) of not less than 45 when tested according to AAMA 1503.

K. Thermal Conductance: Provide aluminum-framed systems with fixed glazing and framing areas having an average U-factor of not more than 0.57 Btu/sq. ft. x h x deg F (3.23 W/sq. m x K) when tested according to AAMA 1503.

L. Sound Transmission: Provide aluminum-framed systems with fixed glazing and framing areas having the following sound-transmission characteristics:

1. Sound Transmission Class (STC): Minimum 26 STC when tested for laboratory sound transmission loss according to ASTM E 90 and determined by ASTM E 413.

M. Structural Sealant: Capable of withstanding tensile and shear stresses imposed by aluminum-framed systems without failing adhesively or cohesively. When tested for preconstruction adhesion and compatibility, cohesive failure of sealant shall occur before adhesive failure.

1. Adhesive failure occurs when sealant pulls away from substrate cleanly, leaving no sealant material behind.
2. Cohesive failure occurs when sealant breaks or tears within itself but does not separate from each substrate because sealant-to-substrate bond strength exceeds sealant's internal strength.

N. Structural-Sealant Joints: Designed to produce tensile or shear stress of less than 20 psi (138 kPa).

O. Sun Control Devices:
1. Combined load on sunshade configurations to be determined in accordance with ASCE 7 or applicable code requirements. Combined load consists of wind, snow and ice loads.
2. Design sunshade configurations to withstand stresses due to combined load. Stresses resulting from thermal expansion/contraction, shall not cause permanent deformation of sunshade assemblies or disengagement from the glazed system.
3. The assembled sunshade shall be capable of supporting the specified combined load without damage, permanent deformation, or disengagement from the glazed system mullion.
4. Blade deflection shall not exceed L/120 of span length.
5. Submit test reports verifying compliance with each test requirement required by the project.
6. Shading Performance: Design of standard configurations will allow for negligible direct sunlight to show through the blades based on project location, latitude, altitude, building orientation, surrounding conditions, and aesthetic requirements, except for round, diamond and square louver styles.
7. Thermal Movement: Allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures:
a. Temperature Change (Range): 120 deg F (49 deg C), ambient; 180 deg F (82 deg C), material surfaces.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for aluminum-framed systems.

B. Shop Drawings: For aluminum-framed systems. Include plans, elevations, sections, details, and attachments to other work.

1. Include details of provisions for system expansion and contraction and for drainage of moisture in the system to the exterior.
2. For entrance doors, include hardware schedule and indicate operating hardware types, functions, quantities, and locations.

C. Samples for Initial Selection: For units with factory-applied color finishes.

D. Samples for Verification: For each type of exposed finish required, in manufacturer's standard sizes.

E. Other Action Submittals:

1. Entrance Door Hardware Schedule: Prepared by or under the supervision of supplier, detailing fabrication and assembly of entrance door hardware, as well as procedures and diagrams. Coordinate final entrance door hardware schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of entrance door hardware.

F. Delegated-Design Submittal: For aluminum-framed systems indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1. Detail fabrication and assembly of aluminum-framed systems.
2. Include design calculations.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified Installer and testing agency.

B. Welding certificates.

C. Preconstruction Test Reports: For sealant.

D. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for aluminum-framed systems, indicating compliance with performance requirements.

E. Source quality-control reports.

F. Quality-Control Program for Structural-Sealant-Glazed System: Include reports.

G. Field quality-control reports.

H. Warranties: Sample of special warranties.

1.7 CLOSEOUT SUBMITTALS

A. Maintenance Data: For aluminum-framed systems to include in maintenance manuals.

1.8 QUALITY ASSURANCE

A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of units required for this Project.

B. Manufacturer Qualifications: A manufacturer capable of fabricating exterior sunshades, and glazed aluminum curtain wall and storefront systems that meet or exceed performance requirments.

C. Testing Agency Qualifications: Qualified according to ASTM E 699 for testing indicated.

D. Engineering Responsibility: Prepare data for aluminum-framed systems, including Shop Drawings, based on testing and engineering analysis of manufacturer's standard units in systems similar to those indicated for this Project.

E. Quality-Control Program for Structural-Sealant-Glazed System: Develop quality control program specifically for Project. Document quality-control procedures and verify results for aluminum-framed systems. Comply with ASTM C 1401 recommendations including, but not limited to, system material-qualification procedures, preconstruction sealant-testing program, procedures for system fabrication and installation, and intervals of reviews and checks.

F. Product Options: Information on Drawings and in Specifications establishes requirements for systems' aesthetic effects and performance characteristics. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction. Performance characteristics are indicated by criteria subject to verification by one or more methods including preconstruction testing, field testing, and in-service performance.

1. Do not revise intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If revisions are proposed, submit comprehensive explanatory data to Architect for review.

G. Preconstruction Sealant Testing: For structural-sealant-glazed systems, perform sealant manufacturer's standard tests for compatibility with and adhesion of each material that will come in contact with sealants and each condition required by aluminum-framed systems.

1. Test a minimum five samples each of metal, glazing, and other material.
2. Prepare samples using techniques and primers required for installed systems.
3. For materials that fail tests, determine corrective measures necessary to prepare each material to ensure compatibility with and adhesion of sealants including, but not limited to, specially formulated primers. After performing these corrective measures on the minimum number of samples required for each material, retest materials.

H. Accessible Entrances: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines and ICC/ANSI A117.1.

I. Source Limitations for Aluminum-Framed Systems and Sun Control Devices: Obtain from single source from single manufacturer.

J. Structural-Sealant Glazing: Comply with ASTM C 1401, "Guide for Structural Sealant Glazing" for design and installation of structural-sealant-glazed systems.

K. Structural-Sealant Joints: Design reviewed and approved by structural-sealant manufacturer.

L. Welding Qualifications: Qualify procedures and personnel according to AWS D1.2, "Structural Welding Code - Aluminum."

M. Mock-ups: Build Mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution

1. Build mockups for type(s) of sunshade elevation with storefront system indicated, in location(s) as shown on Drawings. Mock up should be considered a true representation of actual installation.

1.9 PROJECT CONDITIONS

A. Field Measurements: Verify actual locations of structural supports for aluminum-framed systems by field measurements before fabrication and indicate measurements on Shop Drawings.

1.10 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of aluminum-framed systems that do not comply with requirements or that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

   a. Structural failures including, but not limited to, excessive deflection.
   b. Noise or vibration caused by thermal movements.
   c. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
   d. Adhesive or cohesive sealant failures.
   e. Water leakage through fixed glazing and framing areas.
   f. Failure of operating components.

2. Warranty Period: Five years from date of Substantial Completion.

B. Special Finish Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components on which finishes do not comply with requirements or that fail in materials or workmanship within specified warranty period. Warranty does not include normal weathering.

1. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Storefront System Basis-of-Design Product: Subject to compliance with requirements, provide Kawneer North America System IR 501 or comparable product by one of the following:

1. Arcadia, Inc.
2. Arch Aluminum & Glass Co., Inc.
3. CMI ArchitecturalCommercial Architectural Products, Inc.

4. EFCO Corporation.
5. Kawneer North America; an Alcoa company.
6. Leed Himmel Industries, Inc.
7. Pittco Architectural Metals, Inc.
8. TRACO.
9. Tubelite.
10. United States Aluminum.
11. Vistawall Architectural Products; The Vistawall Group; a Bluescope Steel company.
12. YKK AP America Inc.

B. Sun Control Device Basis-of-Design Product: Subject to compliance with requirements, provide Kawneer North America System Versoliel SunShade Outrigger System or comparable product by one of the following:

1. Arcadia, Inc.
2. Arch Aluminum & Glass Co., Inc.
3. CMI ArchitecturalCommercial Architectural Products, Inc.
4. EFCO Corporation.
5. Kawneer North America; an Alcoa company.
6. Leed Himmel Industries, Inc.
7. Pittco Architectural Metals, Inc.
8. TRACO.
9. Tubelite.
10. United States Aluminum.

2.2 MATERIALS

A. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.

1. Sheet and Plate: ASTM B 209 (ASTM B 209M).
2. Extruded Bars, Rods, Profiles, and Tubes: ASTM B 221 (ASTM B 221M).
3. Extruded Structural Pipe and Tubes: ASTM B 429.
4. Structural Profiles: ASTM B 308/B 308M.
5. Welding Rods and Bare Electrodes: AWS A5.10/A5.10M.

B. Steel Reinforcement: Manufacturer's standard zinc-rich, corrosion-resistant primer, complying with SSPC-PS Guide No. 12.00; applied immediately after surface preparation and pretreatment. Select surface preparation methods according to recommendations in SSPC-SP COM and prepare surfaces according to applicable SSPC standard.

1. Structural Shapes, Plates, and Bars: ASTM A 36/A 36M.
2. Cold-Rolled Sheet and Strip: ASTM A 1008/A 1008M.

3. Hot-Rolled Sheet and Strip: ASTM A 1011/A 1011M.

2.3 SUN CONTROL DEVICES MATERIAL

A. Aluminum Extrusions: Alloy and temper recommended by glazed aluminum curtain wall and storefront system manufacturer for strength, corrosion resistance, and application of required finish and not less than 0.070” wall thickness at any location for the main frame and complying with ASTM B 221: 6063-T6, 6105-T5, or 6061-T6 alloy and temper.

B. Thermal Barrier: When applied on a thermally broken captured system, sunshade shall be thermally isolated from the interior aluminum mullions by a nominal 0.25” thick low conductance material.

C. Aluminum sheet alloy: Shall meet the requirements of ASTM B209.

D. Sealant: For sealants required within fabricated sunshade system, provide permanently elastic, non-shrinking, and non-migrating type recommended by sealant manufacturer for joint size and movement.

E. Tolerances: Reference to tolerances for wall thickness and other cross-sectional dimensions of glazed curtain wall and storefront members members are nominal and in compliance with AA Aluminum Standards and Data.

2.4 FRAMING SYSTEMS

A. Framing Members: Manufacturer's standard extruded-aluminum framing members of thickness required and reinforced as required to support imposed loads.

1. Construction: Thermally broken .
2. Glazing System: Retained by structural sealant at vertical edges and mechanically with gaskets at horizontal edges.
3. Glazing Plane: As indicated by manufacturer .

B. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with nonstaining, nonferrous shims for aligning system components.

C. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding fasteners and accessories compatible with adjacent materials.

1. Use self-locking devices where fasteners are subject to loosening or turning out from thermal and structural movements, wind loads, or vibration.
2. Reinforce members as required to receive fastener threads.
3. Use exposed fasteners with countersunk Phillips screw heads, finished to match framing system.

D. Concealed Flashing: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding flashing compatible with adjacent materials.

E. Framing System Gaskets and Sealants: Manufacturer's standard, recommended by manufacturer for joint type.

2.5 GLAZING SYSTEMS

A. Glazing: As specified in Section 08800 "Glazing."

B. Glazing Gaskets: Manufacturer's standard compression types; replaceable, molded or extruded, of profile and hardness required to maintain watertight seal.

C. Spacers and Setting Blocks: Manufacturer's standard elastomeric type.

D. Bond-Breaker Tape: Manufacturer's standard TFE-fluorocarbon or polyethylene material to which sealants will not develop adhesion.

E. Glazing Sealants: For structural-sealant-glazed systems, as recommended by manufacturer for joint type, and as follows:

1. Structural Sealant: ASTM C 1184, single-component neutral-curing silicone formulation that is compatible with system components with which it comes in contact, specifically formulated and tested for use as structural sealant and approved by a structural-sealant manufacturer for use in aluminum-framed systems indicated.
   a. Color: Black.

2. Weatherseal Sealant: ASTM C 920 for Type S, Grade NS, Class 25, Uses NT, G, A, and O; single-component neutral-curing formulation that is compatible with structural sealant and other system components with which it comes in contact; recommended by structural-sealant, weatherseal-sealant, and aluminum-framed-system manufacturers for this use.
   a. Color: Matching structural sealant.

2.6 ENTRANCE DOOR SYSTEMS

A. Entrance Doors: Manufacturer's standard glazed entrance doors for manual-swing operation.

1. Door Construction: 1-3/4-inch (44.5-mm) overall thickness, with minimum 0.125-inch- (3.2-mm-) thick, extruded-aluminum tubular rail and stile members. Mechanically fasten corners with reinforcing brackets that are deeply penetrated and fillet welded or that incorporate concealed tie rods.

   a. Thermal Construction: High-performance plastic connectors separate aluminum members exposed to the exterior from members exposed to the interior.

2. Door Design: Medium stile; 3 1/2-inch nominal width.

a. Accessible Doors: Smooth surfaced for width of door in area within 10 inches (255 mm) above floor or ground plane.

3. Glazing Stops and Gaskets: Beveled, snap-on, extruded-aluminum stops and preformed gaskets.

a. Provide nonremovable glazing stops on outside of door.

2.7 ENTRANCE DOOR HARDWARE

A. General: Provide entrance door hardware and entrance door hardware sets indicated in door and frame schedule for each entrance door to comply with requirements in this Section.

1. Entrance Door Hardware Sets: Provide quantity, item, size, finish or color indicated, and named manufacturers' products .
2. Sequence of Operation: Provide electrified door hardware function, sequence of operation, and interface with other building control systems indicated.
3. Opening-Force Requirements:

a. Egress Doors: Not more than 15 lbf (67 N) to release the latch and not more than 30 lbf (133 N)to set the door in motion and not more than 15 lbf (67 N) to open the door to its minimum required width.
b. Accessible Interior Doors: Not more than 5 lbf (22.2 N) to fully open door.

B. Designations: Requirements for design, grade, function, finish, size, and other distinctive qualities of each type of entrance door hardware are indicated in "Entrance Door Hardware Sets" Article. Products are identified by using entrance door hardware designations as follows:

C. Opening-Force Requirements:
1. Latches and Exit Devices: Not more than 15 lbf (67 N) required to release latch.

D. Pivot Hinges: BHMA A156.4, Grade 1.

1. Offset-Pivot Hinges: Provide top, bottom, and intermediate offset pivots at each door leaf.

E. Butt Hinges: BHMA A156.1, Grade 1, radius corner.

1. Nonremovable Pins: Provide set screw in hinge barrel that, when tightened into a groove in hinge pin, prevents removal of pin while entrance door is closed.
2. Exterior Hinges: Stainless steel, with stainless-steel pin.
3. Quantities:

a. For doors up to 87 inches (2210 mm) high, provide 3 hinges per leaf.
b. For doors more than 87 and up to 120 inches (2210 and up to 3048 mm) high, provide 4 hinges per leaf.

F. Mortise Auxiliary Locks: BHMA A156.5, Grade 1.

G. Panic Exit Devices: BHMA A156.3, Grade 1, listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for panic protection, based on testing according to UL 305.

H. Cylinders: As specified in Section 08710 "Door Hardware."

1. Keying: Master key system. Permanently inscribe each key with a visual key control number and include notation "DO NOT DUPLICATE".

I. Strikes: Provide strike with black-plastic dust box for each latch or lock bolt; fabricated for aluminum framing.

J. Operating Trim: BHMA A156.6.

K. Removable Mullions: BHMA A156.3, extruded aluminum.

1. When used with panic exit devices, provide removable mullions listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for panic protection, based on testing according to UL 305. Use only mullions that have been tested with exit devices to be used.

L. Closers: BHMA A156.4, Grade 1, with accessories required for a complete installation, sized as required by door size, exposure to weather, and anticipated frequency of use; adjustable to meet field conditions and requirements for opening force.

M. Concealed Overhead Holders: BHMA A156.8, Grade 1.

N. Door Stops: BHMA A156.16, Grade 1, floor or wall mounted, as appropriate for door location indicated, with integral rubber bumper.

O. Weather Stripping: Manufacturer's standard replaceable components.

1. Compression Type: Made of ASTM D 2000, molded neoprene, or ASTM D 2287, molded PVC.
2. Sliding Type: AAMA 701, made of wool, polypropylene, or nylon woven pile with nylon-fabric or aluminum-strip backing.

P. Weather Sweeps: Manufacturer's standard exterior-door bottom sweep with concealed fasteners on mounting strip.

Q. Silencers: BHMA A156.16, Grade 1.

R. Thresholds: BHMA A156.21, raised thresholds beveled with a slope of not more than 1:2, with maximum height of 1/2 inch (13 mm).

S. Finger Guards: Manufacturer's standard collapsible neoprene or PVC gasket anchored to frame hinge-jamb at center-pivoted doors.

2.8 SUNSHADES

A. Sun Shade Members: Manufacturer's standard extruded or formed-aluminum framing members of thickness required and reinforced as required to support imposed loads.

B. Fasteners and accessories: Nonmagnetic stainless steel to be non-corrosive and compatible with aluminum members, anchors, and other components

C. Perimeter anchors: When steel anchors are used, provide insulation between steel material and aluminum material to prevent galvanic action

2.9 ACCESSORY MATERIALS

A. Joint Sealants: For installation at perimeter of aluminum-framed systems, as specified in Section 07920 "Joint Sealants."

B. Bituminous Paint for Sunshade: Cold-applied asphalt-mastic paint complying with SSPC-Paint 12 requirements except containing no asbestos, formulated for 30-mil thickness per coat.

2.10 FABRICATION

A. Form or extrude aluminum shapes before finishing.

B. Weld in concealed locations to greatest extent possible to minimize distortion or discoloration of finish. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.

C. Framing Members, General: Fabricate components that, when assembled, have the following characteristics:

1. Profiles that are sharp, straight, and free of defects or deformations.
2. Accurately fitted joints with ends coped or mitered.
3. Means to drain water passing joints, condensation within framing members, and moisture migrating within the system to exterior.
4. Physical and thermal isolation of glazing from framing members.
5. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.
6. Provisions for field replacement of glazing from exterior.
7. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.

D. Mechanically Glazed Framing Members: Fabricate for flush glazing without projecting stops.

E. Structural-Sealant-Glazed Framing Members: Include accommodations for using temporary support device to retain glazing in place while structural sealant cures.

F. Entrance Door Frames: Reinforce as required to support loads imposed by door operation and for installing entrance door hardware.

1. At exterior doors, provide compression weather stripping at fixed stops.
2. At interior doors, provide silencers at stops to prevent metal-to-metal contact. Install three silencers on strike jamb of single-door frames and two silencers on head of frames for pairs of doors.

G. Entrance Doors: Reinforce doors as required for installing entrance door hardware.

1. At pairs of exterior doors, provide sliding-type weather stripping retained in adjustable strip and mortised into door edge.
2. At exterior doors, provide weather sweeps applied to door bottoms.

H. Entrance Door Hardware Installation: Factory install entrance door hardware to the greatest extent possible. Cut, drill, and tap for factory-installed entrance door hardware before applying finishes.

I. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.

2.11 ALUMINUM FINISHES

A. Clear Anodic Finish: AAMA 611, AA-M12C22A41, Class I, 0.018 mm or thicker.

2.12 SOURCE QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to evaluate structural-sealant-glazed systems.

B. Structural-Sealant-Glazed Systems: Perform quality-control procedures complying with ASTM C 1401 recommendations, including, but not limited to, system material-qualification procedures, sealant testing, and system fabrication reviews and checks.

C. Structural-sealant-glazed system will be considered defective if it does not pass tests and inspections.

D. Prepare test and inspection reports.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. General:

1. Comply with manufacturer's written instructions.
2. Do not install damaged components.
3. Fit joints to produce hairline joints free of burrs and distortion.
4. Rigidly secure nonmovement joints.
5. Install anchors with separators and isolators to prevent metal corrosion and electrolytic deterioration.
6. Seal joints watertight unless otherwise indicated.

B. Metal Protection:

1. Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or applying sealant or tape, or by installing nonconductive spacers as recommended by manufacturer for this purpose.
2. Where aluminum will contact concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.

C. Install components to drain water passing joints, condensation occurring within framing members, and moisture migrating within the system to exterior.

D. Set continuous sill members and flashing in full sealant bed as specified in Section 07920 "Joint Sealants" to produce weathertight installation.

E. Install components plumb and true in alignment with established lines and grades, and without warp or rack.

F. Install glazing as specified in Section 08800 "Glazing."

1. Structural-Sealant Glazing:

a. Prepare surfaces that will contact structural sealant according to sealant manufacturer's written instructions to ensure compatibility and adhesion. Preparation includes, but is not limited to, cleaning and priming surfaces.
b. Install weatherseal sealant according to Section 07920 "Joint Sealants" and according to sealant manufacturer's written instructions to produce

weatherproof joints. Install joint filler behind sealant as recommended by sealant manufacturer.

G. Entrance Doors: Install doors to produce smooth operation and tight fit at contact points.

1. Exterior Doors: Install to produce weathertight enclosure and tight fit at weather stripping.
2. Field-Installed Entrance Door Hardware: Install surface-mounted entrance door hardware according to entrance door hardware manufacturers' written instructions using concealed fasteners to greatest extent possible.

H. Install perimeter joint sealants as specified in Section 07920 "Joint Sealants" to produce weathertight installation.

3.3 ERECTION TOLERANCES

A. Install aluminum-framed systems to comply with the following maximum erection tolerances:

1. Location and Plane: Limit variation from true location and plane to 1/8 inch in 12 feet (3 mm in 3.7 m); 1/4 inch (6 mm) over total length.
2. Alignment:

a. Where surfaces abut in line, limit offset from true alignment to 1/16 inch (1.5 mm).
b. Where surfaces meet at corners, limit offset from true alignment to 1/32 inch (0.8 mm).

B. Diagonal Measurements: Limit difference between diagonal measurements to 1/8 inch (3 mm).

3.4 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified independent testing and inspecting agency to perform field tests and inspections.

B. Testing Services: Testing and inspecting of representative areas to determine compliance of installed systems with specified requirements shall take place as follows and in successive phases as indicated on Drawings. Do not proceed with installation of the next area until test results for previously completed areas show compliance with requirements.

1. Structural-Sealant Compatibility and Adhesion: Structural sealant shall be tested according to recommendations in ASTM C 1401.

a. Destructive Test Method A, "Hand Pull Tab (Destructive)," in ASTM C 1401, Appendix X2, shall be used.

1) A minimum of six areas on each building face shall be tested.
2) Repair installation areas damaged by testing.

2. Structural-Sealant Glazing Inspection: After installation of aluminum-framed systems is complete, structural-sealant glazing shall be inspected and evaluated according to recommendations in ASTM C 1401.
3. Air Infiltration: Areas shall be tested for air leakage of 1.5 times the rate specified for laboratory testing under "Performance Requirements" Article, but not more than 0.09 cfm/sq. ft. (0.03 L/s per sq. m), of fixed wall area when tested according to ASTM E 783 at a minimum static-air-pressure difference of 1.57 lbf/sq. ft. (75 Pa) .
4. Water Penetration: Areas shall be tested according to ASTM E 1105 at a minimum uniform static-air-pressure difference of 0.67 times the static-air-pressure difference specified for laboratory testing under "Performance Requirements" Article, but not less than 4.18 lbf/sq. ft. (200 Pa), and shall not evidence water penetration.
5. Water Spray Test: Before installation of interior finishes has begun, a minimum area of 75 feet (23 m) by 1 story of aluminum-framed systems designated by Architect shall be tested according to AAMA 501.2 and shall not evidence water penetration.

C. Repair or remove work if test results and inspections indicate that it does not comply with specified requirements.

D. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

E. Aluminum-framed assemblies will be considered defective if they do not pass tests and inspections.

F. Prepare test and inspection reports.

3.5 ADJUSTING

A. Adjust operating entrance door hardware to function smoothly as recommended by manufacturer.

1. For entrance doors accessible to people with disabilities, adjust closers to provide a 3-second closer sweep period for doors to move from a 70-degree open position to 3 inches (75 mm) from the latch, measured to the leading door edge.

END OF SECTION 08411

SECTION 08520 - ALUMINUM WINDOWS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes aluminum windows for exterior locations.

B. Related Requirements:

1. Section 08411 "Aluminum-Framed Entrances and Storefronts" for coordinating finish among aluminum fenestration units.

2. Section 07920 “Joint Sealants” for watertight installation of Units

3. Section 08800 “ Glazing” for glazing requirements

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site

1. Review, discuss and coordinate the interrelationship of aluminum windows with other exterior wall components. Include provisions for anchorage, flashing, sealing perimeters and protecting finishes.

2. Review and discuss the sequence of work required to construct a watertight and weathertight exterior building envelope.

3. Inspect and discuss the condition of substrate and other preparatory work performed by other trades.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, glazing and fabrication methods, dimensions of individual components and profiles, hardware, and finishes for aluminum windows.

B. Shop Drawings: Include plans, elevations, sections, hardware, accessories, insect screens, operational clearances, and details of installation, including anchor, flashing, and sealant installation.

C. Samples: For each exposed product and for each color specified, 2 by 4 inches in size.

D. Samples for Verification: For aluminum windows and components required, showing full range of color variations for finishes, and prepared on Samples of size indicated below:

1. Exposed Finishes: 2 by 4 inches

2. Exposed Hardware: Full-size units.

E. Product Schedule: For aluminum windows. Use same designations indicated on Drawings.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For manufacturer and Installer.

B. Product Test Reports: For each type of aluminum window, for tests performed by a qualified testing agency.

C. Field quality-control reports.

D. Sample Warranties: For manufacturer's warranties.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: A manufacturer capable of fabricating aluminum windows that meet or exceed performance requirements indicated and of documenting this performance by test reports, and calculations.

B. Installer Qualifications: An installer acceptable to aluminum window manufacturer for installation of units required for this Project.

C. Mockups: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Build mockup of typical wall area as shown on Drawings.
2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.

1.7 WARRANTY

A. Manufacturer's Warranty: Manufacturer agrees to repair or replace aluminum windows that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Failure to meet performance requirements.
b. Structural failures including excessive deflection, water leakage, condensation, and air infiltration.
c. Faulty operation of movable sash and hardware.
d. Deterioration of materials and finishes beyond normal weathering.
e. Failure of insulating glass.

2. Warranty Period:

a. Window: 5 years from date of Substantial Completion.
b. Glazing Units: Five years from date of Substantial Completion.
c. Aluminum Finish: **10** years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis-of-Design Product - Fixed and Horizontal SlidingWindow: Subject to compliance with requirements, provide Kawneer North America Window Isolock 8225TL/8430 or comparable product by one of the following:

1. All Seasons Window & Door Mfg., Inc.; All Seasons Commercial Division, Inc.
2. Boyd Aluminum Manufacturing.
3. Custom Window Company.
4. DeSCo Architectural IncEFCO Corporation; a Pella company.
5. EXTECH Exterior Technologies, Inc.
6. Fleetwood Windows & Doors.
7. Gerkin Windows and Doors.
8. Graham Architectural Products Corp.
9. Mannix Exterior Wall Systems, Inc.
10. Peerless Products Inc.
11. Quaker Windows Products Co.Thermal Windows, IncTRACO.
12. Wausau Window and Wall Systems.
13. Winco.
14. YKK AP America Inc.

B. Casement and Projected Window – Basis of Design Product: Subject to compliance with requirements, provide Kawneer North America Window Isolock 8225TLor comparable product by one of the following:

1. All Seasons Window & Door Mfg., Inc.; All Seasons Commercial Division, Inc.
2. Boyd Aluminum Manufacturing.
3. Custom Window Company.
4. DeSCo Architectural Inc.EFCO Corporation; a Pella company.
5. EXTECH Exterior Technologies, Inc.
6. Fleetwood Windows & Doors.
7. Gerkin Windows and Doors.
8. Graham Architectural Products Corp.
9. Mannix Exterior Wall Systems, Inc.
10. Peerless Products Inc.
11. Quaker Windows Products Co.Thermal Windows, Inc.
12. TRACO.
13. Wausau Window and Wall Systems.
14. Winco.
15. YKK AP America Inc.

C. Source Limitations: Obtain aluminum windows from single source from single manufacturer.

2.2 WINDOW PERFORMANCE REQUIREMENTS

A. Product Standard: Comply with AAMA/WDMA/CSA 101/I.S.2/A440 for definitions and minimum standards of performance, materials, components, accessories, and fabrication unless more stringent requirements are indicated.

1. Window Certification: AMMA certified with label attached to each window.

B. Performance Class and Grade: AAMA/WDMA/CSA 101/I.S.2/A440-05 as follows:

1. Minimum Performance Class: HC (Heavy Commercial)AAMA/WDMA/CSA 101/I.S.2/A440 establishes a gateway Performance Grade for windows to qualify for each Performance Class. The gateway Performance Grade is 15 for Class R, 25 for Class LC, 30 for Class CW, and 40 for Class HC. For a particular project, the minimum Performance Grade for windows is typically based on the design pressure.
2. Minimum Performance Grade: 70

C. Thermal Transmittance: NFRC 100 maximum whole-window U-factor of.70 Btu/hr/sf/deg F

D. Solar Heat-Gain Coefficient (SHGC): NFRC 200 maximum whole-window SHGC of **0.30**

E. Condensation-Resistance Factor (CRF): Provide aluminum windows tested for thermal performance according to AAMA 1503, showing a CRF not less than 49.

F. Thermal Movements: Provide aluminum windows, including anchorage, that allow for thermal movements resulting from the following maximum change (range) in ambient

and surface temperatures by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

G. Sound Transmission Class (STC): Rated for not less than 34 STC when tested for laboratory sound transmission loss according to ASTM E 90 and determined by ASTM E 413.

H. Windborne-Debris Resistance: Capable of resisting impact from windborne debris based on testing glazed windows identical to those specified, according to ASTM D 1886 and testing information in ASTM D 1996 Miami Dade County, and requirements of authorities having jurisdiction. Provide aluminum windows which have been manufactured, fabricated and installed to withstand required uniform loads and maintain (manufacturer's performance criteria) without defects, damage , or failure

I. Forced Entry Resistance: Windows shall conform to ASTM F588, Performance Level 10, or AAMA 1302.5

2.3 ALUMINUM WINDOWS

A. Operating Types: Provide the following operating types in locations indicated on Drawings:

1. Casement: Project **out**Awning: Project out.

2. Horizontal sliding.
3. Horizontal slidingFixed.

B. Frames and Sashes: Aluminum extrusions complying with AAMA/WDMA/CSA 101/I.S.2/A440.

1. Material Standard: ASTM B221, G.S. 10A-T5; 6063-T5 alloy and temper

2. Frame Depth: Not less than 4" (101.6 mm)

3. Member Wall Thickness:
   a. Master Frame member: wall thickness not less than .070"
   b. Sash Member: wall thickness not less than .070". Horizontal sash members shall be tubular construction.
   c. Meeting rail shall have continuous interlock with double weather stripping

4. Dimensions: Reference to dimensions for wall thickness and other cross-sectional dimensions of window members are nominal and in compliance with ANSI H35.2-1990

5. Mullions and Cover Plates: Extruded aluminum of 6063-T5 alloy and temper of profile and dimensions indicated on drawings. Mullions shall provide shall provide structural properties to resist wind pressure required by performance criteria and standards.

6. Thermal Barrier:
   a. Frame thermal barrier and seal shall be installed per the manufacturer's written instructions
   b. Sash thermal barrier and seal shall be installed per manufacturer's written instructions

C. Insulating-Glass Units: ASTM E 774**,** certified through IGCC as complying with requirements of IGCC. Glass thickness and type shall be in accordance with manufacturer's recommendations for prescribed design pressure. Factory glazing shall be in accordance with manufacturer's standard requirements.

1. Glass: ASTM C 1036, Type 1, Class 1, q3.

   a. Tint: Gray
   b. Kind: Fully tempered where indicated on Drawings and at Hazardous locations: ASTM C1048

2. Lites: Single
3. Filling: Fill space between glass lites with air
4. Low-E Coating: magnetic sputtered vacuum deposition process
5. Manufacturer's Standards: Glazing Method shall be a wet/dry type glazed in accordance with manufacturer's standards. Exterior glazing shall be pre-shimmed glazing tape. Interior glazing shall be snap-in type 0.062" glazing beads and a compression gasket of dense elastomer in accordance with ASTM C864

D. Hardware, General: Provide manufacturer's standard hardware fabricated from aluminum, stainless steel, carbon steel complying with AAMA 907, or other corrosion-resistant material compatible with adjacent materials; designed to smoothly operate, tightly close, and securely lock windows, and sized to accommodate sash weight and dimensions.

1. Exposed Hardware Color and Finish: As selected by Architect from manufacturer's full range .

E. Projected Window Hardware:

1. Gear-Type Rotary Operators: Complying with AAMA 901 when tested according to ASTM E 405, Method A. Provide operators that function without requiring the removal of interior screens or using screen wickets.

   a. Type and Style: As selected by Architect from manufacturer's full range of types and styles

2. Hinges: [Non-friction type, not less than two per sash]
3. Lock: [**Lift-type throw, cam-action lock with keeper**] [**Lever handle and cam-action lock with keeper**] [**Dual lever handles, tie rod, and cam-action lock with keepers**] [**Key-operated custodial lock with keeper and removable handle**] [**Concealed multipoint lock operated by single lever handle or lift-type throw**] <**Insert requirements**>.

F. Horizontal-Sliding Window Hardware:

1. Sill Cap/Track: Extruded-aluminum track with natural anodized finish, or Manufacturer's standard of dimensions and profile indicated; designed to comply with performance requirements indicated and to drain to the exterior.
2. Locks and Latches: Allow unobstructed movement of the sash across adjacent sash in direction indicated and operated from the inside only. Provide custodial locks.
3. Roller Assemblies: Low-friction design.
4.

G. Weather Stripping: Provide full-perimeter weather stripping for each operable sash unless otherwise indicated.

H. Fasteners: Noncorrosive and compatible with window members, trim, hardware, anchors, and other components.

1. Exposed Fasteners: Do not use exposed fasteners to the greatest extent possible. For application of hardware, use fasteners that match finish hardware being fastened.

2.4 ACCESSORIES

A. Integral Ventilating System/Device: Where indicated, provide weather-stripped, adjustable, horizontal fresh-air vent, with a free airflow slot, full width of window sash as recommended by the manufacturer when open, complying with AAMA/WDMA/CSA 101/I.S.2/A440. Equip vent bar with an integral insect screen, removable for cleaning.

B. Subsills: Thermally broken extruded-aluminum subsills in configurations indicated on Drawings.

C. Column Covers: Extruded-aluminum profiles in sizes and configurations indicated on Drawings.

D. Interior Trim: Extruded-aluminum profiles in sizes and configurations indicated on Drawings.

E. Panning Trim: Extruded-aluminum profiles in sizes and configurations indicated on Drawings.

F. Receptor System: Two-piece, snap-together, thermally broken, extruded-aluminum receptor system that anchors windows in place.

2.5 INSECT SCREENS

A. General: Fabricate insect screens to integrate with window frame. Provide screen for each operable exterior sash. Screen wickets are not permitted.

1. Type and Location: [**Full, inside for project-out**] [**Full, outside for project-in**] [**Full, outside for double-hung**] [Half, outside for single-hung] [**Full, outside for sliding**] [**Half, outside for sliding**] sashes.

B. Aluminum Frames: Manufacturer's standard aluminum alloy complying with SMA 1004 or SMA 1201. Fabricate frames with mitered or coped joints or corner extrusions, concealed fasteners, and removable PVC spline/anchor concealing edge of frame.

1. Tubular Framing Sections and Cross Braces: Roll formed from aluminum sheet.

C. Glass-Fiber Mesh Fabric: [**18-by-14 (1.1-by-1.4-mm) or 18-by-16 (1.0-by-1.1-mm)**] [**20-by-20 (0.85-by-0.85-mm) or 20-by-30 (0.85-by-0.42-mm)**] <**Insert type**> mesh of PVC-coated, glass-fiber threads; woven and fused to form a fabric mesh resistant to corrosion, shrinkage, stretch, impact damage, and weather deterioration. Comply with ASTM D 3656.

1. Mesh Color: [Manufacturer's standard] <**Insert color**>.

D. Aluminum Wire Fabric: 18-by-16 (1.1-by-1.3-mm) mesh of 0.011-inch- (0.28-mm-) diameter, coated aluminum wire.

1. Wire-Fabric Finish: [Natural bright] [**Charcoal gray**] [**Black**] <**Insert finish**>.

2.6 FABRICATION

A. Fabricate aluminum windows in sizes indicated. Include a complete system for assembling components and anchoring windows.

B. Glaze aluminum windows in the factory.

C. Weather strip each operable sash to provide weathertight installation.

D. Weep Holes: Provide weep holes and internal passages to conduct infiltrating water to exterior.

E. Provide water-shed members above side-hinged sashes and similar lines of natural water penetration.

F. Mullions: Provide mullions and cover plates, matching window units, complete with anchors for support to structure and installation of window units. Allow for erection tolerances and provide for movement of window units due to thermal expansion and building deflections, as indicated. Provide mullions and cover plates capable of withstanding design wind loads of window units.

G. Complete fabrication, assembly, finishing, hardware application, and other work in the factory to greatest extent possible. Disassemble components only as necessary for shipment and installation.

2.7 GENERAL FINISH REQUIREMENTS

A. Comply with NAAMM's "Metal Finishes Manual" for recommendations for applying and designating finishes.

B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

C. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.8 ALUMINUM FINISHES

A. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.

B.

C. Class I, Clear Anodic Finish: AA-M12C22A41 (Mechanical Finish: nonspecular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class I, clear coating 0.018 mm or thicker) complying with AAMA 611.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine openings, substrates, structural support, anchorage, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Verify rough opening dimensions, levelness of sill plate, and operational clearances.

C. Examine wall flashings, vapor retarders, water and weather barriers, and other built-in components to ensure weathertight window installation.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Comply with manufacturer's written instructions for installing windows, hardware, accessories, and other components. For installation procedures and requirements not addressed in manufacturer's written instructions, comply with installation requirements in ASTM E 2112.

B. Install windows level, plumb, square, true to line, without distortion or impeding thermal movement, anchored securely in place to structural support, and in proper relation to wall flashing and other adjacent construction to produce weathertight construction.

C. Install windows and components to drain condensation, water penetrating joints, and moisture migrating within windows to the exterior.

D. Separate aluminum and other corrodible surfaces from sources of corrosion or electrolytic action at points of contact with other materials.

E. Set continuous sill members & flashing in full sealant bed as specified in Section 07920 “Joint Sealants” to produce watertight installation.

F. Where aluminum will contact concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.

3.3 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

1. Testing and inspecting agency will interpret tests and state in each report whether tested work complies with or deviates from requirements.

B. Testing Services: Testing and inspecting of installed windows shall take place as follows:

1. Testing Methodology: Testing of windows for air infiltration and water resistance shall be performed according to AAMA 502, including reference to ASTM E 783 for Air Infiltration Test and ASTM E 1105 Water Infiltration Test.
2. Air-Infiltration Testing:

a. Test Pressure: That required to determine compliance with AAMA/WDMA/CSA 101/I.S.2/A440 performance class indicated.

b. Allowable Air-Leakage Rate: 1.5 times the applicable AAMA/WDMA/CSA 101/I.S.2/A440 rate for product type and performance class rounded down to one decimal place or 01.5 cfm per foot of crack length, which ever is greater

3. Water-Resistance Testing:

a. Test Pressure: Two-thirds times test pressure required to determine compliance with AAMA/WDMA/CSA 101/I.S.2/A440 performance grade indicated but not less than 6.24 psf
b. Allowable Water Infiltration: No water penetration.

4. Testing Extent: Three windows of each type as selected by Architect and a qualified independent testing and inspecting agency. Windows shall be tested after perimeter sealants have cured.
5. Test Reports: Prepared according to AAMA 502.

C. Remove and replace noncomplying windows and retest as specified above.

D. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

E. Prepare test and inspection reports.

3.4 ADJUSTING, CLEANING, AND PROTECTION

A. Adjust operating sashes and hardware for a tight fit at contact points and weather stripping for smooth operation and weathertight closure.

B. Clean exposed surfaces immediately after installing windows. Avoid damaging protective coatings and finishes. Remove excess sealants, glazing materials, dirt, and other substances.

1. Keep protective films and coverings in place until final cleaning.

C. Clean installed products in accordance with manufacturer’s instructions prior to owner’s acceptance.

D. Remove and replace glass that has been broken, chipped, cracked, abraded, or damaged during construction period.

E. Protect window surfaces from contact with contaminating substances resulting from construction operations. If contaminating substances do contact window surfaces, remove contaminants immediately according to manufacturer's written instructions. Remove and replace damaged aluminum windows at no extra cost.

END OF SECTION 08520

SECTION 08710 – DOOR HARDWARE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes commercial door hardware for the following:

1. Swinging doors.
2. Sliding doors.
3. Other doors to the extent indicated.

B. Door hardware includes, but is not necessarily limited to, the following:

1. Mechanical door hardware.
2. Electromechanical door hardware.
3. Cylinders specified for doors in other sections.

C. Related Sections:

1. Division 08 Section “Door Hardware Schedule”.
2. Division 08 Section “Hollow Metal Doors and Frames”.
3. Division 08 Section “Flush Wood Doors”.
4. Division 08 Section “Aluminum-Framed Entrances and Storefronts”.
5. Division 08 Section “Access Control Hardware”.

D. Codes and References: Comply with the version year adopted by the Authority Having Jurisdiction.

1. ANSI A117.1 - Accessible and Usable Buildings and Facilities.
2. ANSI/SDI A250.13 - Testing and Rating of Severe Windstorm Resistant Components for Swing Door Assemblies.
3. ICC/IBC - International Building Code.
4. NFPA 70 - National Electrical Code.
5. NFPA 80 - Fire Doors and Windows.
6. NFPA 101 - Life Safety Code.
7. NFPA 105 - Installation of Smoke Door Assemblies.
8. State Building Codes, Local Amendments.

E. Standards: All hardware specified herein shall comply with the following industry standards:

1. ANSI/BHMA Certified Product Standards - A156 Series
2. UL10C – Positive Pressure Fire Tests of Door Assemblies

1.3 SUBMITTALS

A. Product Data: Manufacturer's product data sheets including installation details, material descriptions, dimensions of individual components and profiles, operational descriptions and finishes.

B. Door Hardware Schedule: Prepared by or under the supervision of supplier, detailing fabrication and assembly of door hardware, as well as procedures and diagrams. Coordinate the final Door Hardware Schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.

1. Format: Comply with scheduling sequence and vertical format in DHI's "Sequence and Format for the Hardware Schedule."

2. Organization: Organize the Door Hardware Schedule into door hardware sets indicating complete designations of every item required for each door or opening. Organize door hardware sets in same order as in the Door Hardware Sets at the end of Part 3. Submittals that do not follow the same format and order as the Door Hardware Sets will be rejected and subject to resubmission.

3. Content: Include the following information:

    a. Type, style, function, size, label, hand, and finish of each door hardware item.
    b. Manufacturer of each item.
    c. Fastenings and other pertinent information.
    d. Location of door hardware set, cross-referenced to Drawings, both on floor plans and in door and frame schedule.
    e. Explanation of abbreviations, symbols, and codes contained in schedule.
    f. Mounting locations for door hardware.
    g. Door and frame sizes and materials.
    h. Warranty information for each product.

4. Submittal Sequence: Submit the final Door Hardware Schedule at earliest possible date, particularly where approval of the Door Hardware Schedule must precede fabrication of other work that is critical in the Project construction schedule. Include Product Data, Samples, Shop Drawings of other work affected by door hardware, and other information essential to the coordinated review of the Door Hardware Schedule.

C. Shop Drawings: Details of electrified access control hardware indicating the following:

1. Wiring Diagrams: Upon receipt of approved schedules, submit detailed system wiring diagrams for power, signaling, monitoring, communication, and control of the access

control system electrified hardware. Differentiate between manufacturer-installed and field-installed wiring. Include the following:

a. Elevation diagram of each unique access controlled opening showing location and interconnection of major system components with respect to their placement in the respective door openings.
b. Complete (risers, point-to-point) access control system block wiring diagrams.
c. Wiring instructions for each electronic component scheduled herein.

2. Electrical Coordination: Coordinate with related sections the voltages and wiring details required at electrically controlled and operated hardware openings.

D. Keying Schedule: After a keying meeting with the owner has taken place prepare a separate keying schedule detailing final instructions. Submit the keying schedule in electronic format. Include keying system explanation, door numbers, key set symbols, hardware set numbers and special instructions. Owner must approve submitted keying schedule prior to the ordering of permanent cylinders/cores.

E. Informational Submittals:

1. Hurricane Resistant Openings: Exterior hurricane opening assemblies to be tested according to ASTM E330, ASTM E1886, ASTM E1996 standards, and certified by a qualified independent third party testing agency acceptable to authority having jurisdiction, with labeling indicating compliance with the wind load and design pressure level requirements specified for the Project.

2. Product Test Reports: Indicating compliance with cycle testing requirements, based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified independent testing agency.

F. Operating and Maintenance Manuals: Provide manufacturers operating and maintenance manuals for each item comprising the complete door hardware installation in quantity as required in Division 01, Closeout Submittals.

1.4 QUALITY ASSURANCE

A. Hardware Supplier and Hardware Installer must obtain a license with the Louisiana Office of State Fire Marshall in accordance to RS 40:1464 and RS 40:1664.

B. Manufacturers Qualifications: Engage qualified manufacturers with a minimum 5 years of documented experience in producing hardware and equipment similar to that indicated for this Project and that have a proven record of successful in-service performance.

C. Installer Qualifications: A minimum 3 years documented experience installing both standard and electrified door hardware similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.

D. Door Hardware Supplier Qualifications: Experienced commercial door hardware distributors with a minimum 5 years documented experience supplying both mechanical and electromechanical hardware installations comparable in material, design, and extent to that indicated for this Project. Supplier recognized as a factory direct distributor by the manufacturers of the primary materials with a warehousing facility in Project's vicinity.

E. Source Limitations: Obtain each type and variety of door hardware specified in this section from a single source unless otherwise indicated.

1. Electrified modifications or enhancements made to a source manufacturer's product line by a secondary or third party source will not be accepted.

2. Provide electromechanical door hardware from the same manufacturer as mechanical door hardware, unless otherwise indicated.

F. Hurricane Resistant Exterior Openings: Provide exterior door hardware as complete and tested assemblies, or component assemblies, including approved doors and frames specified under Section 081113 "Hollow Metal Doors and Frames", to meet the wind loads, design pressures, debris impact resistance, and glass and glazing requirements applicable to the Project.

1. Test units according to ASTM E330, ASTM E1886, ASTM E1996 standards, certified by a qualified independent third party testing agency acceptable to authority having jurisdiction, and bearing a third party certification agency permanent label indicting windstorm approved product.

G. Each unit to bear third party permanent label demonstrating compliance with the referenced standards.

H. Keying Conference: Conduct conference to comply with requirements in Division 01 Section "Project Meetings." Keying conference to incorporate the following criteria into the final keying schedule document:

1. Function of building, purpose of each area and degree of security required.
2. Plans for existing and future key system expansion.
3. Requirements for key control storage and software.
4. Installation of permanent keys, cylinder cores and software.
5. Address and requirements for delivery of keys.

I. Pre-Submittal Conference: Conduct coordination conference in compliance with requirements in Division 01 Section "Project Meetings" with attendance by representatives of Supplier(s), Installer(s), and Contractor(s) to review proper methods and the procedures for receiving, handling, and installing door hardware.

1. Prior to installation of door hardware, conduct a project specific training meeting to instruct the installing contractors' personnel on the proper installation and adjustment of their respective products. Product training to be attended by installers of door hardware (including electromechanical hardware) for aluminum, hollow metal and wood doors. Training will include the use of installation manuals, hardware schedules, templates and physical product samples as required.

2. Inspect and discuss electrical roughing-in, power supply connections, and other preparatory work performed by other trades.
3. Review sequence of operation narratives for each unique access controlled opening.
4. Review and finalize construction schedule and verify availability of materials.
5. Review the required inspecting, testing, commissioning, and demonstration procedures

J. At completion of installation, provide written documentation that components were applied to manufacturer's instructions and recommendations and according to approved schedule.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Inventory door hardware on receipt and provide secure lock-up and shelving for door hardware delivered to Project site. Do not store electronic access control hardware, software or accessories at Project site without prior authorization.

B. Tag each item or package separately with identification related to the final Door Hardware Schedule, and include basic installation instructions with each item or package.

C. Deliver, as applicable, permanent keys, cylinders, cores, access control credentials, software and related accessories directly to Owner via registered mail or overnight package service. Instructions for delivery to the Owner shall be established at the "Keying Conference".

1.6 COORDINATION

A. Templates: Obtain and distribute to the parties involved templates for doors, frames, and other work specified to be factory prepared for installing standard and electrified hardware. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing hardware to comply with indicated requirements.

B. Door Hardware and Electrical Connections: Coordinate the layout and installation of scheduled electrified door hardware and related access control equipment with required connections to source power junction boxes, low voltage power supplies, detection and monitoring hardware, and fire and detection alarm systems.

C. Door and Frame Preparation: Doors and corresponding frames are to be prepared, reinforced and pre-wired (if applicable) to receive the installation of the specified electrified, monitoring, signaling and access control system hardware without additional in-field modifications.

1.7 WARRANTY

A. General Warranty: Reference Division 01, General Requirements. Special warranties specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.

B. Warranty Period: Written warranty, executed by manufacturer(s), agreeing to repair or replace components of standard and electrified door hardware that fails in materials or workmanship

within specified warranty period after final acceptance by the Owner. Failures include, but are not limited to, the following:

1. Structural failures including excessive deflection, cracking, or breakage.
2. Faulty operation of the hardware.
3. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
4. Electrical component defects and failures within the systems operation.

C. Standard Warranty Period: One year from date of Substantial Completion, unless otherwise indicated.

D. Special Warranty Periods:

1. Ten years for mortise locks and latches.
2. Seven years for heavy duty cylindrical (bored) locks and latches.
3. Twenty five years for manual surface door closer bodies.
4. Two years for electromechanical door hardware.

1.8 MAINTENANCE SERVICE

A. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of door hardware.

PART 2 - PRODUCTS

2.1 SCHEDULED DOOR HARDWARE

A. General: Provide door hardware for each door to comply with requirements in Door Hardware Sets and each referenced section that products are to be supplied under.

B. Designations: Requirements for quantity, item, size, finish or color, grade, function, and other distinctive qualities of each type of door hardware are indicated in the Door Hardware Sets at the end of Part 3. Products are identified by using door hardware designations, as follows:

1. Named Manufacturer's Products: Product designation and manufacturer are listed for each door hardware type required for the purpose of establishing requirements. Manufacturers' names are abbreviated in the Door Hardware Schedule.

C. Substitutions: Requests for substitution and product approval for inclusive mechanical and electromechanical door hardware in compliance with the specifications must be submitted in writing and in accordance with the procedures and time frames outlined in Division 01, Substitution Procedures. Approval of requests is at the discretion of the architect, owner, and their designated consultants.

2.2 HANGING DEVICES

A. Hinges: ANSI/BHMA A156.1 certified butt hinges with number of hinge knuckles and other options as specified in the Door Hardware Sets.

1. Quantity: Provide the following hinge quantity:

a. Two Hinges: For doors with heights up to 60 inches.
b. Three Hinges: For doors with heights 61 to 90 inches.
c. Four Hinges: For doors with heights 91 to 120 inches.
d. For doors with heights more than 120 inches, provide 4 hinges, plus 1 hinge for every 30 inches of door height greater than 120 inches.

2. Hinge Size: Provide the following, unless otherwise indicated, with hinge widths sized for door thickness and clearances required:

a. Widths up to 3’0”: 4-1/2” standard or heavy weight as specified.
b. Sizes from 3’1” to 4’0”: 5” standard or heavy weight as specified.

3. Hinge Weight and Base Material: Unless otherwise indicated, provide the following:

a. Exterior Doors: Heavy weight, non-ferrous, ball bearing or oil impregnated bearing hinges unless Hardware Sets indicate standard weight.
b. Interior Doors: Standard weight, steel, ball bearing or oil impregnated bearing hinges unless Hardware Sets indicate heavy weight.

4. Hinge Options: Comply with the following:

a. Non-removable Pins: Provide set screw in hinge barrel that, when tightened into a groove in hinge pin, prevents removal of pin while door is closed; for the all out-swinging lockable doors.

5. Manufacturers:

a. Hager Companies (HA) - CB Series.
b. Ives (IV).
c. McKinney Products; ASSA ABLOY Architectural Door Accessories (MK) - TA Series.

B. Continuous Geared Hinges: ANSI/BHMA A156.26 Grade 1-600 certified continuous geared hinge. with minimum 0.120-inch thick extruded 6060 T6 aluminum alloy hinge leaves and a minimum overall width of 4 inches. Hinges are non-handed, reversible and fabricated to template screw locations. Factory trim hinges to suit door height and prepare for electrical cut-outs.

1. Manufacturers:

a. Hager Companies (HA).
b. Ives (IV).
c. Pemko Products; ASSA ABLOY Architectural Door Accessories (PE).

C. Sliding and Folding Door Hardware: Hardware is to be of type and design as specified and should comply with ANSI/BHMA A156.14.

1. Sliding Bi-Passing Pocket Door Hardware: Provide complete sets consisting of track, hangers, stops, bumpers, floor channel, guides, and accessories indicated.

2. Cascading: Provide a bi-parting or single direction telescoping system as required with a minimum 200 lb. per door capacity.

3. Bi-folding Door Hardware: Rated for door panels weighing up to 125 lb.

4. Pocket Sliding Door Hardware: Rated for doors weighing up to 200 lb.

5. Manufacturers:

a. Hager Companies (HA).
b. Johnson Hardware (JO).
c. Pemko Products; ASSA ABLOY Architectural Door Accessories (PE).

2.3 DOOR OPERATING TRIM

A. Flush Bolts and Surface Bolts: ANSI/BHMA A156.3 and A156.16, Grade 1, certified.

1. Flush bolts to be furnished with top rod of sufficient length to allow bolt retraction device location approximately six feet from the floor.
2. Furnish dust proof strikes for bottom bolts.
3. Surface bolts to be minimum 8” in length and U.L. listed for labeled fire doors and U.L. listed for windstorm components where applicable.
4. Provide related accessories (mounting brackets, strikes, coordinators, etc.) as required for appropriate installation and operation.

5. Manufacturers:

a. Ives (IV).
b. Rockwood Products; ASSA ABLOY Architectural Door Accessories (RO).
c. Trimco (TC).

B. Coordinators: ANSI/BHMA A156.3 certified door coordinators consisting of active-leaf, hold-open lever and inactive-leaf release trigger. Model as indicated in hardware sets.

1. Manufacturers:

a. Ives (IV).
b. Rockwood Products; ASSA ABLOY Architectural Door Accessories (RO).
c. Trimco (TC).

C. Door Push Plates and Pulls: ANSI/BHMA A156.6 certified door pushes and pulls of type and design specified in the Hardware Sets. Coordinate and provide proper width and height as required where conflicting hardware dictates.

1. Push/Pull Plates: Minimum .050 inch thick, size as indicated in hardware sets, with beveled edges, secured with exposed screws unless otherwise indicated.
2. Door Pull and Push Bar Design: Size, shape, and material as indicated in the hardware sets. Minimum clearance of 2 1/2-inches from face of door unless otherwise indicated.
3. Offset Pull Design: Size, shape, and material as indicated in the hardware sets. Minimum clearance of 2 1/2-inches from face of door and offset of 90 degrees unless otherwise indicated.
4. Fasteners: Provide manufacturer's designated fastener type as indicated in Hardware Sets.
5. Manufacturers:
    a. Ives (IV).
    b. Rockwood Products; ASSA ABLOY Architectural Door Accessories (RO).
    c. Trimco (TC).

2.4 CYLINDERS AND KEYING

A. General: Cylinder manufacturer to have minimum (10) years experience designing secured master key systems and have on record a published security keying system policy.

B. Source Limitations: Obtain each type of keyed cylinder and keys from the same source manufacturer as locksets and exit devices, unless otherwise indicated.

C. Cylinders: Original manufacturer cylinders complying with the following:

1. Mortise Type: Threaded cylinders with rings and cams to suit hardware application.
2. Rim Type: Cylinders with back plate, flat-type vertical or horizontal tailpiece, and raised trim ring.
3. Bored-Lock Type: Cylinders with tailpieces to suit locks.
4. Mortise and rim cylinder collars to be solid and recessed to allow the cylinder face to be flush and be free spinning with matching finishes.
5. Keyway: Manufacturer’s Standard.

D. Keying System: Each type of lock and cylinders to be factory keyed.

1. Conduct specified "Keying Conference" to define and document keying system instructions and requirements.
2. Furnish factory cut, nickel-silver large bow permanently inscribed with a visual key control number as directed by Owner.
3. New System: Key locks to a new key system as directed by the Owner.

E. Key Quantity: Provide the following minimum number of keys:

1. Change Keys per Cylinder: Two (2)
2. Master Keys (per Master Key Level/Group): Five (5).
3. Construction Keys (where required): Ten (10).

F. Construction Keying: Provide construction master keyed cylinders.

G. Key Registration List (Bitting List):

1. Provide keying transcript list to Owner's representative in the proper format for importing into key control software.
2. Provide transcript list in writing or electronic file as directed by the Owner.

H. Key Control Software: Provide one network version of "Key Wizard" branded key management software package that includes one year of technical support and upgrades to software at no charge. Provide factory key system formatted for importing into “Key Wizard” software.

2.5 MECHANICAL LOCKS AND LATCHING DEVICES

A. Mortise Locksets, Grade 1 (Heavy Duty): ANSI/BHMA A156.13, Series 1000, Operational Grade 1 certified. Locksets are to be manufactured with a corrosion resistant steel case and be field-reversible for handing without disassembly of the lock body.

1. Manufacturers:

a. Schlage (SC) – L9000 Series.
b. Yale Locks and Hardware (YA) – 8800FL Series.

B. Cylindrical Locksets, Grade 1 (Heavy Duty): ANSI/BHMA A156.2, Series 4000, Grade 1 certified.

1. Furnish with solid cast levers, standard 2 3/4” backset, and 1/2" (3/4" at rated paired openings) throw brass or stainless steel latchbolt.

2. Locks are to be non-handed and fully field reversible.

3. Extended cycle test: Locks to have been cycle tested in ordinance with ANSI/BHMA 156.2 requirements to 2 million cycles.

4. Manufacturers:

a. Yale Locks and Hardware (YA) 5400LN Series.
b. Dorma Products (DO) - CL800 Series.
c. Falcon Lock (FA) - T Series.

2.6 AUXILIARY LOCKS

A. Mortise Deadlocks, Small Case: ANSI/BHMA A156.36, Grade 1, small case mortise type deadlocks constructed of heavy gauge wrought corrosion resistant steel. Steel or stainless steel bolts with a 1" throw and hardened steel roller pins. Deadlocks to be products of the same source manufacturer and keyway as other specified locksets.

1. Manufacturers:

a. Schlage (SC) - L460 Series.

b. Yale Locks and Hardware (YA) - 350 Series.

B. Narrow Case Deadlocks and Deadlatches: ANSI/BHMA 156.13 Series 1000 Grade 1 certified narrow case deadlocks and deadlatches for swinging or sliding door applications. All functions shall be manufactured in a single sized case formed from 12 gauge minimum, corrosion resistant steel (option for fully stainless steel case and components). Provide minimum 2 7/8" throw laminated stainless steel bolt. Bottom rail deadlocks to have 3/8” diameter bolts.

1. Manufacturers:

a. Adams Rite Manufacturing (AD) - MS1850S / MS1950 Series.

2.7 LOCK AND LATCH STRIKES

A. Strikes: Provide manufacturer's standard strike with strike box for each latch or lock bolt, with curved lip extended to protect frame, finished to match door hardware set, unless otherwise indicated, and as follows:

1. Flat-Lip Strikes: For locks with three-piece antifriction latchbolts, as recommended by manufacturer.
2. Extra-Long-Lip Strikes: For locks used on frames with applied wood casing trim.
3. Aluminum-Frame Strike Box: Provide manufacturer's special strike box fabricated for aluminum framing.
4. Double-lipped strikes: For locks at double acting doors. Furnish with retractable stop for rescue hardware applications.

B. Standards: Comply with the following:

1. Strikes for Mortise Locks and Latches: BHMA A156.13.
2. Strikes for Bored Locks and Latches: BHMA A156.2.
3. Strikes for Auxiliary Deadlocks: BHMA A156.36.
4. Dustproof Strikes: BHMA A156.16.

2.8 CONVENTIONAL EXIT DEVICES

A. General Requirements: All exit devices specified herein shall meet or exceed the following criteria:

1. At doors not requiring a fire rating, provide devices complying with NFPA 101 and listed and labeled for "Panic Hardware" according to UL305. Provide proper fasteners as required by manufacturer including sex nuts and bolts at openings specified in the Hardware Sets.

2. Where exit devices are required on fire rated doors, provide devices complying with NFPA 80 and with UL labeling indicating "Fire Exit Hardware". Provide devices with the proper fasteners for installation as tested and listed by UL. Consult manufacturer’s catalog and template book for specific requirements.

3. Except on fire rated doors, provide exit devices with hex key dogging device to hold the pushbar and latch in a retracted position. Provide optional keyed cylinder dogging on devices where specified in Hardware Sets.

4. Devices must fit flat against the door face with no gap that permits unauthorized dogging of the push bar. The addition of filler strips is required in any case where the door light extends behind the device as in a full glass configuration.

5. Energy Efficient Design: Provide lock bodies which have a holding current draw of 15mA maximum, and can operate on either 12 or 24 volts. Locks are to be field configurable for fail safe or fail secure operation.

6. Lever Operating Trim: Where exit devices require lever trim, furnish manufacturer's heavy duty escutcheon trim with threaded studs for thru-bolts.

    a. Lock Trim Design: As indicated in Hardware Sets, provide finishes and designs to match that of the specified locksets.
    b. Where function of exit device requires a cylinder, provide a cylinder (Rim or Mortise) as specified in Hardware Sets.

7. Vertical Rod Exit Devices: Where surface or concealed vertical rod exit devices are used at interior openings, provide as less bottom rod (LBR) unless otherwise indicated. Provide dust proof strikes where thermal pins are required to project into the floor.

8. Narrow Stile Applications: At doors constructed with narrow stiles, or as specified in Hardware Sets, provide devices designed for maximum 2” wide stiles.

9. Dummy Push Bar: Nonfunctioning push bar matching functional push bar.

10. Rail Sizing: Provide exit device rails factory sized for proper door width application.

11. Through Bolt Installation: For exit devices and trim as indicated in Door Hardware Sets.

12. Hurricane and Tornado Resistance Compliance: Conventional exit devices are to be U.L. listed for windstorm assemblies where applicable. Provide the appropriate hurricane or tornado resistant products that have been independent third party tested, certified, and labeled to meet state and local windstorm building codes applicable to project.

B. Conventional Push Rail Exit Devices (Commercial Duty): ANSI/BHMA A156.3, Grade 1 certified panic and fire exit hardware devices furnished in the functions specified in the Hardware Sets. Fabricate latchbolts from cast stainless steel, Pullman type, incorporating a deadlocking feature.

1. Manufacturers:

    a. Dorma Products (DO) - 9000 Series.
    b. Falcon Hardware (FA) - 24/25 Series.
    c. Yale Locks and Hardware (YA) - 6000 Series.

2.9 DOOR CLOSERS

A. All door closers specified herein shall meet or exceed the following criteria:

1. General: Door closers to be from one manufacturer, matching in design and style, with the same type door preparations and templates regardless of application or spring size. Closers to be non-handed with full sized covers including installation and adjusting information on inside of cover.

2. Standards: Closers to comply with UL-10C for Positive Pressure Fire Test and be U.L. listed for use of fire rated doors.

3. Cycle Testing: Provide closers which have surpassed 15 million cycles in a test witnessed and verified by UL.

4. Size of Units: Comply with manufacturer's written recommendations for sizing of door closers depending on size of door, exposure to weather, and anticipated frequency of use. Where closers are indicated for doors required to be accessible to the physically handicapped, provide units complying with ANSI ICC/A117.1.

5. Closer Arms: Provide heavy duty, forged steel closer arms unless otherwise indicated in Hardware Sets.

6. Closers shall not be installed on exterior or corridor side of doors; where possible install closers on door for optimum aesthetics.

7. Closer Accessories: Provide door closer accessories including custom templates, special mounting brackets, spacers and drop plates as required for proper installation. Provide through-bolt and security type fasteners as specified in the hardware sets.

B. Door Closers, Surface Mounted (Heavy Duty): ANSI/BHMA A156.4, Grade 1 surface mounted, heavy duty door closers with complete spring power adjustment, sizes 1 thru 6; and fully operational adjustable according to door size, frequency of use, and opening force. Closers to be rack and pinion type, one piece cast iron or aluminum alloy body construction, with adjustable backcheck and separate non-critical valves for closing sweep and latch speed control. Provide non-handed units standard.

1. Manufacturers:

a. Yale Locks and Hardware (YA) - 4400 Series.
b. Dorma Products (DO) - 8900 Series.
c. Falcon Hardware (FA) - SC70 Series.

C. Door Closers, Surface Mounted (Unitrol): Unitrol arms to have door stop mechanism to absorb dead stop shock on arm and top hinge. Hold-open arms to have a spring loaded mechanism in addition to shock absorber assembly. Arms to be provided with rigid steel main arm and secondary arm lengths proportional to the door width.

1. Manufacturers:

a. Yale Locks and Hardware (YA) - Unitrol Series.

2.10 SURFACE MOUNTED CLOSER HOLDERS

A. Electromagnetic Door Holders: Certified ANSI A156.15 electromagnetic door holder/releases with a minimum 20 to 40 pounds holding power and single coil construction able to accommodate.12VDC, 24VAC, 24VDC and 120VAC. Coils to be independently wound, employing an integral fuse and armatures to include a positive release button.

1. Manufacturers:

a. LCN Door Closers (LC) - SEM7800 Series.
b. Rixson (RF) - 980/990 Series.
c. Sargent Manufacturing (SA) - 1560 Series.

2.11 ARCHITECTURAL TRIM

A. Door Protective Trim

1. General: Door protective trim units to be of type and design as specified below or in the Hardware Sets.

2. Size: Fabricate protection plates (kick, armor, or mop) not more than 2" less than door width (LDW) on stop side of single doors and 1” LDW on stop side of pairs of doors, and not more than 1" less than door width on pull side. Coordinate and provide proper width and height as required where conflicting hardware dictates. Height to be as specified in the Hardware Sets.

3. Where plates are applied to fire rated doors with the top of the plate more than 16” above the bottom of the door, provide plates complying with NFPA 80. Consult manufacturer’s catalog and template book for specific requirements for size and applications.

4. Protection Plates: ANSI/BHMA A156.6 certified protection plates (kick, armor, or mop), fabricated from the following:

a. Stainless Steel: 300 grade, 050-inch thick.

5. Options and fasteners: Provide manufacturer's designated fastener type as specified in the Hardware Sets. Provide countersunk screw holes.

6. Manufacturers:

a. Ives (IV).
b. Rockwood Products; ASSA ABLOY Architectural Door Accessories (RO).
c. Trimco (TC).

2.12 DOOR STOPS AND HOLDERS

A. General: Door stops and holders to be of type and design as specified below or in the Hardware Sets.

B. Door Stops and Bumpers: ANSI/BHMA A156.16, Grade 1 certified door stops and wall bumpers. Provide wall bumpers, either convex or concave types with anchorage as indicated, unless floor or other types of door stops are specified in Hardware Sets. Do not mount floor stops where they will impede traffic. Where floor or wall bumpers are not appropriate, provide overhead type stops and holders.

1. Manufacturers:

a. Ives (IV).
b. Rockwood Products; ASSA ABLOY Architectural Door Accessories (RO).
c. Trimco (TC).

C. Overhead Door Stops and Holders: ANSI/BHMA A156.6, Grade 1 certified overhead stops and holders to be surface or concealed types as indicated in Hardware Sets. Track, slide, arm and jamb bracket to be constructed of extruded bronze and shock absorber spring of heavy tempered steel. Provide non-handed design with mounting brackets as required for proper operation and function.

1. Manufacturers:

a. Dorma (DO).
b. Rixson Door Controls (RF).
c. Rockwood Products; ASSA ABLOY Architectural Door Accessories (RO).
d. Sargent Manufacturing (SA).

2.13 ARCHITECTURAL SEALS

A. General: Thresholds, weatherstripping, and gasket seals to be of type and design as specified below or in the Hardware Sets. Provide continuous weatherstrip gasketing on exterior doors and provide smoke, light, or sound gasketing on interior doors where indicated. At exterior applications provide non-corrosive fasteners and elsewhere where indicated.

B. Smoke Labeled Gasketing: Assemblies complying with NFPA 105 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for smoke control ratings indicated, based on testing according to UL 1784.

1. Provide smoke labeled perimeter gasketing at all smoke labeled openings.

C. Fire Labeled Gasketing: Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to UL-10C.

1. Provide intumescent seals as indicated to meet UL10C Standard for Positive Pressure Fire Tests of Door Assemblies, and NPFA 252, Standard Methods of Fire Tests of Door Assemblies.

D. Sound-Rated Gasketing: Assemblies that are listed and labeled by a testing and inspecting agency, for sound ratings indicated.

E. Replaceable Seal Strips: Provide only those units where resilient or flexible seal strips are easily replaceable and readily available from stocks maintained by manufacturer.

F. Manufacturers:

1. National Guard Products (NG).
2. Pemko Products; ASSA ABLOY Architectural Door Accessories (PE).
3. Zero (ZE).

2.14 FABRICATION

A. Fasteners: Provide door hardware manufactured to comply with published templates generally prepared for machine, wood, and sheet metal screws. Provide screws according to manufacturers recognized installation standards for application intended.

2.15 FINISHES

A. Standard: Designations used in the Hardware Sets and elsewhere indicate hardware finishes complying with ANSI/BHMA A156.18, including coordination with traditional U.S. finishes indicated by certain manufacturers for their products.

B. Provide quality of finish, including thickness of plating or coating (if any), composition, hardness, and other qualities complying with manufacturer's standards, but in no case less than specified by referenced standards for the applicable units of hardware

C. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine scheduled openings, with Installer present, for compliance with requirements for installation tolerances, labeled fire door assembly construction, wall and floor construction, and other conditions affecting performance.

B. Notify architect of any discrepancies or conflicts between the door schedule, door types, drawings and scheduled hardware. Proceed only after such discrepancies or conflicts have been resolved in writing.

3.2 PREPARATION

A. Hollow Metal Doors and Frames: Comply with ANSI/DHI A115 series.

B. Wood Doors: Comply with ANSI/DHI A115-W series.

3.3 INSTALLATION

A. Install each item of mechanical and electromechanical hardware and access control equipment to comply with manufacturer's written instructions and according to specifications.

1. Installers are to be trained and certified by the manufacturer on the proper installation and adjustment of fire, life safety, and security products including: hanging devices; locking devices; closing devices; and seals.

B. Mounting Heights: Mount door hardware units at heights indicated in following applicable publications, unless specifically indicated or required to comply with governing regulations:

1. Standard Steel Doors and Frames: DHI's "Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames."
2. Wood Doors: DHI WDHS.3, "Recommended Locations for Architectural Hardware for Wood Flush Doors."
3. Where indicated to comply with accessibility requirements, comply with ANSI A117.1 "Accessibility Guidelines for Buildings and Facilities."
4. Provide blocking in drywall partitions where wall stops or other wall mounted hardware is located.

C. Retrofitting: Install door hardware to comply with manufacturer's published templates and written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing work specified in Division 9 Sections. Do not install surface-mounted items until finishes have been completed on substrates involved.

D. Thresholds: Set thresholds for exterior and acoustical doors in full bed of sealant complying with requirements specified in Division 7 Section "Joint Sealants."

E. Storage: Provide a secure lock up for hardware delivered to the project but not yet installed. Control the handling and installation of hardware items so that the completion of the work will not be delayed by hardware losses before and after installation.

3.4 FIELD QUALITY CONTROL

A. Field Inspection: Supplier will perform a final inspection of installed door hardware and state in report whether work complies with or deviates from requirements, including whether door hardware is properly installed, operating and adjusted.

3.5 ADJUSTING

A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.

3.6 CLEANING AND PROTECTION

A. Protect all hardware stored on construction site in a covered and dry place. Protect exposed hardware installed on doors during the construction phase. Install any and all hardware at the latest possible time frame.

B. Clean adjacent surfaces soiled by door hardware installation.

C. Clean operating items as necessary to restore proper finish. Provide final protection and maintain conditions that ensure door hardware is without damage or deterioration at time of owner occupancy.

3.7 DEMONSTRATION

A. Instruct Owner's maintenance personnel to adjust, operate, and maintain mechanical and electromechanical door hardware.

3.8 DOOR HARDWARE SETS

A. The hardware sets represent the design intent and direction of the owner and architect. They are a guideline only and should not be considered a detailed hardware schedule. Discrepancies, conflicting hardware and missing items should be brought to the attention of the architect with corrections made prior to the bidding process. Omitted items not included in a hardware set should be scheduled with the appropriate additional hardware required for proper application and functionality.

B. The supplier is responsible for handing and sizing all products and providing the correct option for the appropriate door type and material where more than one is presented in the hardware sets. Quantities listed are for each pair of doors, or for each single door.

C. Manufacturer’s Abbreviations:

1. MK - McKinney
2. PE - Pemko
3. RO - Rockwood
4. SA - SARGENT
5. YA - Yale
6. AD - Adams Rite
7. RF - Rixson

8. OT - OTHER

Hardware Sets

Set: 1.0
Doors: 112.B
Description: Ext Pr HM Storage

2	Continuous Hinge	CFM__HD1		PE
2	Surface Bolt	988	Bright Zinc	SA
1	Storeroom Lock	PBR 8840FL	630	YA
1	Coordinator	2672	US28	RO
2	Mounting Bracket	2601AB or 2601C as required	Black	RO
2	Surface Closer	UNI4400 brk / spacer as required	689	YA
2	Kick Plate	K1050 8" x 2" LDW BEV CSK	US32D	RO
1	Threshold	2005AT		PE
1	Rain Guard	346C width plus 4"		PE
1	Gasketing	2891APK		PE
2	Sweep	315CN x Width		PE
1	Astragal	By Door Supplier		OT

Notes: The specified hardware is for design intent only for hurricane/windstorm. Verify and supply all products in compliance with the door manufacturers assembly rating for hurricane/windstorm and impact rating required.

Set: 2.0
Doors: 113, 114.B, 144, 206, 234
Description: Ext Sgl HM Storage

1	Continuous Hinge	CFM__HD1		PE
1	Storeroom Lock	PBR 8840FL	630	YA
1	Surface Closer	UNI4400 brk / spacer as required	689	YA
1	Kick Plate	K1050 8" x 2" LDW BEV CSK	US32D	RO
1	Threshold	2005AT		PE
1	Rain Guard	346C width plus 4"		PE
1	Gasketing	2891APK		PE
1	Sweep	315CN x Width		PE

Notes: The specified hardware is for design intent only for hurricane/windstorm. Verify and supply all products in compliance with the door manufacturers assembly rating for hurricane/windstorm and impact rating required.

Set: 3.0
Doors: 140.B,126.B,135.B, 136.B
Description: Ext Sgl HM NL Exit

1	Continuous Hinge	CFM__HD1		PE
1	Exit Device (rim, nightlatch)	7150 WS 632F	630	YA

1	Surface Closer	UNI4400 brk / spacer as required	689	YA
1	Kick Plate	K1050 8" x 2" LDW BEV CSK	US32D	RO
1	Threshold	2005AT		PE
1	Rain Guard	346C width plus 4"		PE
1	Gasketing	2891APK		PE
1	Sweep	315CN x Width		PE

Notes: The specified hardware is for design intent only for hurricane/windstorm. Verify and supply all products in compliance with the door manufacturers assembly rating for hurricane/windstorm and impact rating required.

Set: 4.0
Doors: 220, 221, 225
Description: Int Pr Storeroom - OH Stop - Tall

8	Hinge	TA2714	US26D	MK
2	Flush Bolt	555 12" / 72" AFF	US26D	RO
1	Dust Proof Strike	570	US26D	RO
1	Storeroom Lock	PB 5405LN	626	YA
2	Surf Overhead Stop	10-X36	630	RF
2	Silencer	608		RO

Notes:

Set: 5.0
Doors: 115, 116, 216
Description: Int Pr Storeroom - OH Stop

6	Hinge	TA2714	US26D	MK
2	Flush Bolt	555 12" / 72" AFF	US26D	RO
1	Dust Proof Strike	570	US26D	RO
1	Storeroom Lock	PB 5405LN	626	YA
2	Surf Overhead Stop	10-X36	630	RF
2	Silencer	608		RO

Notes:

Set: 6.0
Doors: 202.A, 205.A
Description: Int Pr Classroom DB - Closer

8	Hinge	TA2714	US26D	MK
2	Flush Bolt	555 12" / 72" AFF	US26D	RO
1	Dust Proof Strike	570	US26D	RO
1	Mortise Deadlock	MS1850SN Schoolhouse Function	628	AD
1	Strike	4000	628	AD
1	Cylinder	4066-01	130	AD
1	Mortise Cylinder	2153	626	YA
4	Pull	RM201 BTB Mtd	US32D	RO

2	Surface Closer	3501	689	YA
2	Door Stop	409 / 441CU as required	US26D	RO
2	Silencer	608		RO

Notes:

Set: 7.0
Doors: 123, 208.A, 226
Description: Int Sgl Office - Door Bottom / Closer

4	Hinge	TA2714	US26D	MK
1	Entry/Office Lock	PB 5407LN	626	YA
1	Surface Closer	3501	689	YA
1	Kick Plate	K1050 8" x 2" LDW BEV CSK	US32D	RO
1	Door Stop	409 / 441CU as required	US26D	RO
1	Gasketing	S88BL LAR		PE
1	Door Bottom	217APK		PE

Set: 8.0
Doors: 224
Description: Int Pr Storeroom - Rated - Closer / stop

8	Hinge	TA2714	US26D	MK
1	Flush Bolt Set	2845/2945 to suite dr mtl	US26D	RO
1	Dust Proof Strike	570	US26D	RO
1	Storeroom Lock	PB 5405LN	626	YA
1	Coordinator	2672	US28	RO
1	Mounting Bracket	2601AB or 2601C as required	Black	RO
1	Conc Overhead Stop	1-X36	630	RF
1	Closer with stop arm	3531	689	YA
2	Kick Plate	K1050 8" x 2" LDW BEV CSK	US32D	RO
1	Gasketing	S88BL LAR		PE
2	Astragal	303AS		PE

Notes: Closer on active leaf.

Set: 9.0
Doors: 120
Description: Int Sgl Storeroom - Rated/Smoke - Tall

4	Hinge	TA2714	US26D	MK
1	Storeroom Lock	PB 5405LN	626	YA
1	Surface Closer	3501	689	YA
1	Kick Plate	K1050 8" x 2" LDW BEV CSK	US32D	RO
1	Door Stop	409 / 441CU as required	US26D	RO
1	Gasketing	S88BL LAR		PE

Notes: At stairwell, mount closer on stair side.

Set: 10.0
Doors: 143
Description: Int Sgl Storeroom - Rated - Wide

3	Hinge (heavy weight)	T4A3786	US26D	MK
1	Storeroom Lock	PB 5405LN	626	YA
1	Surface Closer	3501	689	YA
1	Kick Plate	K1050 8" x 2" LDW BEV CSK	US32D	RO
1	Door Stop	409 / 441CU as required	US26D	RO
1	Gasketing	S88BL LAR		PE

Notes: At stairwell, mount closer on stair side.

Set: 11.0
Doors: 117
Description: Int Sgl Storeroom - Rated/Smoke

3	Hinge	TA2714	US26D	MK
1	Storeroom Lock	PB 5405LN	626	YA
1	Surface Closer	3501	689	YA
1	Kick Plate	K1050 8" x 2" LDW BEV CSK	US32D	RO
1	Door Stop	409 / 441CU as required	US26D	RO
1	Gasketing	S88BL LAR		PE

Notes: At stairwell, mount closer on stair side.

Set: 12.0
Doors: 132, 222
Description: Int Sgl Storeroom - Rated / Smoke- Closer / stop

4	Hinge	TA2714	US26D	MK
1	Storeroom Lock	PB 5405LN	626	YA
1	Closer with stop arm	3531	689	YA
1	Kick Plate	K1050 8" x 2" LDW BEV CSK	US32D	RO
1	Gasketing	S88BL LAR		PE

Set: 13.0
Doors: 201
Description: Int Sgl Storeroom - Closer

4	Hinge	TA2714	US26D	MK
1	Storeroom Lock	PB 5405LN	626	YA
1	Surface Closer	3501	689	YA
1	Kick Plate	K1050 8" x 2" LDW BEV CSK	US32D	RO
1	Door Stop	409 / 441CU as required	US26D	RO
3	Silencer	608		RO

Set: 14.0
Doors: 109

Description: Int Sgl Storeroom - Wide - Closer

4	Hinge (heavy weight)	T4A3786	US26D	MK
1	Storeroom Lock	PB 5405LN	626	YA
1	Surface Closer	3501	689	YA
1	Kick Plate	K1050 8" x 2" LDW BEV CSK	US32D	RO
1	Door Stop	409 / 441CU as required	US26D	RO
3	Silencer	608		RO

Set: 15.0
Doors: 118, 119, 217
Description: Int Sgl Storeroom - Closer/stop

3	Hinge	TA2714	US26D	MK
1	Storeroom Lock	PB 5405LN	626	YA
1	Closer with stop arm	3531	689	YA
1	Kick Plate	K1050 8" x 2" LDW BEV CSK	US32D	RO
3	Silencer	608		RO

Set: 16.0
Doors: 214, 233
Description: Int Sgl Storeroom - Tall

4	Hinge	TA2714	US26D	MK
1	Storeroom Lock	PB 5405LN	626	YA
1	Door Stop	409 / 441CU as required	US26D	RO
3	Silencer	608		RO

Set: 17.0
Doors: 134.A, 134.B, 232
Description: Int Sgl Storeroom

3	Hinge	TA2714	US26D	MK
1	Storeroom Lock	PB 5405LN	626	YA
1	Door Stop	409 / 441CU as required	US26D	RO
3	Silencer	608		RO

Set: 18.0
Doors: 228, 229, 230, 231
Description: Int Sgl Office - Acoustic - Single Lock

1	Entry/Office Lock	PB 5407LN	626	YA
1	Surface Closer	3501	689	YA
1	Door Stop	409 / 441CU as required	US26D	RO
1	Balance of Hardware	By Door Manufacturer		OT

Notes: Hinges, gasketing, astragal, threshold, door bottom and any additionally required hardware is by door manufacturer.

The specified hardware is for design intent only for STC rated doors. Verify and supply all products in compliance with the door manufacturers assembly rating for STC rating required.

Set: 19.0
Doors: 124
Description: Int Sgl Office -Closer/Stop - Smoke

4	Hinge	TA2714	US26D	MK
1	Entry/Office Lock	PB 5407LN	626	YA
1	Closer with stop arm	3531	689	YA
1	Kick Plate	K1050 8" x 2" LDW BEV CSK	US32D	RO
1	Gasketing	S88BL LAR		PE

Notes: Hinges, gasketing, astragal, threshold, door bottom and any additionally required hardware is by door manufacturer.
The specified hardware is for design intent only for STC rated doors. Verify and supply all products in compliance with the door manufacturers assembly rating for STC rating required.

Set: 20.0
Doors: 208.B, 209, 210, 211, 212
Description: Int Sgl Office

4	Hinge	TA2714	US26D	MK
1	Entry/Office Lock	PB 5407LN	626	YA
1	Door Stop	409 / 441CU as required	US26D	RO
3	Silencer	608		RO

Notes: Hinges, gasketing, astragal, threshold, door bottom and any additionally required hardware is by door manufacturer.
The specified hardware is for design intent only for STC rated doors. Verify and supply all products in compliance with the door manufacturers assembly rating for STC rating required.

Set: 21.0
Doors: 107.B, 108.A, 108.B
Description: Int Pr Classroom - Acoustic - Exit Device

2	SVR Exit (classroom)	6170 LBR PB426F	630	YA
2	Surface Closer	3501	689	YA
2	Door Stop	409 / 441CU as required	US26D	RO
1	Balance of Hardware	By Door Manufacturer		OT

Notes: Hinges, gasketing, astragal, threshold, door bottom and any additionally required hardware is by door manufacturer.
The specified hardware is for design intent only for STC rated doors. Verify and supply all products in compliance with the door manufacturers assembly rating for STC rating required.

Set: 22.0
Doors: 126.A, 127
Description: Int Pr Classroom - Rated SVR - MHO

8	Hinge	TA2714	US26D	MK
2	Fire Rated SVR Exit (classroom)	6170F LBR PB426F	630	YA
2	Surface Closer	3501	689	YA
2	Kick Plate	K1050 8" x 2" LDW BEV CSK	US32D	RO
2	Electromagnetic Holder	998M	689	RF
1	Gasketing	S88BL LAR		PE
2	Astragal	303AS		PE

Notes: Doors are magnetically held open. Upon loss of power or signal from fire controls, doors will close and latch.

Set: 23.0
Doors: 108.C, 114.A, 125
Description: Int Sgl Classroom - Rated / Smoke - Tall

4	Hinge	TA2714	US26D	MK
1	Classroom Lock	PB 5408LN	626	YA
1	Surface Closer	3501	689	YA
1	Kick Plate	K1050 8" x 2" LDW BEV CSK	US32D	RO
1	Door Stop	409 / 441CU as required	US26D	RO
1	Gasketing	S88BL LAR		PE

Set: 24.0
Doors: 107.A, 128.A, 128.B, 130.A, 130.B, 135.A, 136.A, 140.A, 223.A, 223.B
Description: Int Sgl Classroom - Acoustic - Single Lock

1	Classroom Lock	PB 5408LN	626	YA
1	Surface Closer	3501	689	YA
1	Door Stop	409 / 441CU as required	US26D	RO
1	Balance of Hardware	By Door Manufacturer		OT

Notes: Hinges, gasketing, astragal, threshold, door bottom and any additionally required hardware is by door manufacturer.
The specified hardware is for design intent only for STC rated doors. Verify and supply all products in compliance with the door manufacturers assembly rating for STC rating required.

Set: 25.0
Doors: 110.A, 110.B
Description: Int Sgl Classroom - Rated

3	Hinge	TA2714	US26D	MK
1	Classroom Lock	PB 5408LN	626	YA
1	Surface Closer	3501	689	YA
1	Kick Plate	K1050 8" x 2" LDW BEV CSK	US32D	RO
1	Door Stop	409 / 441CU as required	US26D	RO
1	Gasketing	S88BL LAR		PE

Set: 26.0

Doors: 202.B, 205.B
Description: Int Sgl Classroom

4	Hinge	TA2714	US26D	MK
1	Classroom Lock	PB 5408LN	626	YA
1	Door Stop	409 / 441CU as required	US26D	RO
3	Silencer	608		RO

Set: 27.0
Doors: 104, 204, 213
Description: Int Sgl Passage - Rated

4	Hinge	TA2714	US26D	MK
1	Passage Set	PB 5401LN	626	YA
1	Surface Closer	3501	689	YA
1	Kick Plate	K1050 8" x 2" LDW BEV CSK	US32D	RO
1	Door Stop	409 / 441CU as required	US26D	RO
1	Gasketing	S88BL LAR		PE

Notes: At stairwell, mount closer on stair side.

Set: 28.0
Doors: 133.A, 133.B, 139.A, 139.B
Description: Int Sgl Shared restroom - Acoustic - Single Lock

1	Passage Set	PB 5401LN	626	YA
1	Surface Closer	3501	689	YA
1	Door Stop	409 / 441CU as required	US26D	RO
1	Balance of Hardware	By Door Manufacturer		OT

Notes: Hinges, gasketing, astragal, threshold, door bottom and any additionally required hardware is by door manufacturer.
The specified hardware is for design intent only for STC rated doors. Verify and supply all products in compliance with the door manufacturers assembly rating for STC rating required.

Set: 29.0
Doors: 121, 122, 218, 219
Description: Int Sgl Push/Pull - Closer

4	Hinge	TA2714	US26D	MK
1	Pull Plate	111x70C	US32D	RO
1	Push Plate	70C-RKW	US32D	RO
1	Surface Closer	3501	689	YA
1	Kick Plate	K1050 8" x 2" LDW BEV CSK	US32D	RO
1	Door Stop	409 / 441CU as required	US26D	RO
3	Silencer	608		RO

Set: 30.0
Doors: 227

Description: Int Pr Biparting Doors - Counsel

1	Side Wall Track Kit	SF280C-SWTK		PE
4	Door Pull	RM3300-24 Mtg-Type 5HD	US32D	RO

Set: 31.0
Doors: 101
Description: Ext AL Exit

2	Continuous Hinge	CFM__HD1		PE
2	Exit Device (rim, nightlatch)	7150 WS 632F	630	YA
2	Surface Closer	UNI4400 brk / spacer as required	689	YA
2	Kick Plate	K1050 8" x 2" LDW BEV CSK	US32D	RO
2	Threshold	2005AT		PE
2	Rain Guard	346C width plus 4"		PE
2	Gasketing	2891APK		PE
2	Sweep	315CN x Width		PE

Notes: The specified hardware is for design intent only for hurricane/windstorm. Verify and supply all products in compliance with the door manufacturers assembly rating for hurricane/windstorm and impact rating required.

Set: 32.0
Doors: 150
Description: Hardware by door manufacturer

1	All hardware by door manufactuer	By Manufacturer		OT

END OF SECTION 087100

SECTION 08800 - GLAZING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes glazing for the following products and applications, including those specified in other Sections where glazing requirements are specified by reference to this Section:

1. Windows.
2. Doors.
3. Glazed curtain walls.
4. Storefront framing.
5. Glazed entrances.
6. Interior borrowed lites.

B. Related Sections:
1. Section 08830 "Mirrors."
2. Section 08211 “Flush Wood Doors” for interior doors to receive glazing.
3. Section 08411 “Aluminum Framed Entrances and Storefronts” for exterior storefront openings to receive glazing.
4. Section 08911 “Glazed Aluminum Curtain Walls” for exterior curtainwall openings to receive glazing.

1.3 DEFINITIONS

A. Glass Manufacturers: Firms that produce primary glass, fabricated glass, or both, as defined in referenced glazing publications.

B. Glass Thicknesses: Indicated by thickness designations in millimeters according to ASTM C 1036.

C. Interspace: Space between lites of an insulating-glass unit.

1.4 PERFORMANCE REQUIREMENTS

A. General: Installed glazing systems shall withstand normal thermal movement and wind and impact loads (where applicable) without failure, including loss or glass breakage

attributable to the following: defective manufacture, fabrication, or installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing materials; or other defects in construction.

B. Delegated Design: Design glass, including comprehensive engineering analysis according to ASTM E 1300 and ICC's 2003 International Building Code by a qualified professional engineer, using the following design criteria:
   a. Basic Wind Speed: 130 mph.
   b. Importance Factor: 1.0.
   c. Exposure Category: B .
   2. Vertical Glazing: For glass surfaces sloped 15 degrees or less from vertical, design glass to resist design wind pressure based on glass type factors for short-duration load.
   3. Maximum Lateral Deflection: For glass supported on all four edges, limit center-of-glass deflection at design wind pressure to not more than 1/50 times the short-side length or 1 inch (25 mm), whichever is less.
   4. Differential Shading: Design glass to resist thermal stresses induced by differential shading within individual glass lites.

C. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes acting on glass framing members and glazing components.

   1. Temperature Change: 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

1.5 ACTION SUBMITTALS

A. Product Data: For each glass product and glazing material indicated.

B. Glass Samples: For each type of [**glass product other than clear monolithic vision glass**] [**the following products**]; 12 inches (300 mm) square.
   1. Coated glass.
   2. Insulating glass.

C. Glazing Accessory Samples: For gaskets sealants and colored spacers, in 12-inch (300-mm) lengths.

D. Glazing Schedule: List glass types and thicknesses for each size opening and location. Use same designations indicated on Drawings.

E. Delegated-Design Submittal: For glass indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For installersand manufacturers of insulating-glass units with sputter-coated, low-e coatings .

B. Product Certificates: For glass and glazing products, from manufacturer.

C. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for coated glass insulating glass glazing sealants and glazing gaskets.

1. For glazing sealants, provide test reports based on testing current sealant formulations within previous 36-month period.

D. Preconstruction adhesion and compatibility test report.

E. Warranties: Sample of special warranties.

1.7 QUALITY ASSURANCE

A. Manufacturer Qualifications for Insulating-Glass Units with Sputter-Coated, Low-E Coatings: A qualified insulating-glass manufacturer who is approved and certified by coated-glass manufacturer.

B. Installer Qualifications: A qualified installer who employs glass installers for this Project who are certified under the National Glass Association's Certified Glass Installer Program.

C. Glass Testing Agency Qualifications: A qualified independent testing agency accredited according to the NFRC CAP 1 Certification Agency Program.

D. Sealant Testing Agency Qualifications: An independent testing agency qualified according to ASTM C 1021 to conduct the testing indicated.

E. Source Limitations for Glass: Obtain coated float glass and insulating glass from single source from single manufacturer for each glass type.

F. Source Limitations for Glazing Accessories: Obtain from single source from single manufacturer for each product and installation method.

G. Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations below, unless more stringent requirements are indicated. Refer to these publications for glazing terms not otherwise defined in this Section or in referenced standards.

1. GANA Publications: GANA's "Laminated Glazing Reference Manual" and GANA's "Glazing Manual."
2. AAMA Publications: AAMA GDSG-1, "Glass Design for Sloped Glazing," and AAMA TIR-A7, "Sloped Glazing Guidelines."
3. IGMA Publication for Sloped Glazing: IGMA TB-3001, "Guidelines for Sloped Glazing."
4. IGMA Publication for Insulating Glass: SIGMA TM-3000, "North American Glazing Guidelines for Sealed Insulating Glass Units for Commercial and Residential Use."

H. Safety Glazing Labeling: Where safety glazing labeling is indicated, permanently mark glazing with certification label of the SGCC or another certification agency acceptable to authorities having jurisdiction . Label shall indicate manufacturer's name, type of glass, thickness, and safety glazing standard with which glass complies.

I. Fire-Protection-Rated Glazing Labeling: Permanently mark fire-protection-rated glazing with certification label of a testing agency acceptable to authorities having jurisdiction. Label shall indicate manufacturer's name, test standard, whether glazing is for use in fire doors or other openings, whether or not glazing passes hose-stream test, whether or not glazing has a temperature rise rating of 450 deg F (250 deg C), and the fire-resistance rating in minutes.

J. Insulating-Glass Certification Program: Permanently marked either on spacers or on at least one component lite of units with appropriate certification label of IGCC.
1.

K. Preinstallation Conference: Conduct conference at Project site.

1. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
2. Review temporary protection requirements for glazing during and after installation.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Protect glazing materials according to manufacturer's written instructions. Prevent damage to glass and glazing materials from condensation, temperature changes, direct exposure to sun, or other causes.

B. Comply with insulating-glass manufacturer's written recommendations for venting and sealing units to avoid hermetic seal ruptures due to altitude change.

1.9 PROJECT CONDITIONS

A. Environmental Limitations: Do not proceed with glazing when ambient and substrate temperature conditions are outside limits permitted by glazing material manufacturers and when glazing channel substrates are wet from rain, frost, condensation, or other causes.

1. Do not install glazing sealants when ambient and substrate temperature conditions are outside limits permitted by sealant manufacturer or below 40 deg F (4.4 deg C).

1.10 WARRANTY

A. Manufacturer's Special Warranty for Coated-Glass Products: Manufacturer's standard form in which coated-glass manufacturer agrees to replace coated-glass units that deteriorate within specified warranty period. Deterioration of coated glass is defined as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning coated glass contrary to manufacturer's written instructions. Defects include peeling, cracking, and other indications of deterioration in coating.

1. Warranty Period: 10 years from date of Substantial Completion.

B. Manufacturer's Special Warranty on Laminated Glass: Manufacturer's standard form in which laminated-glass manufacturer agrees to replace laminated-glass units that deteriorate within specified warranty period. Deterioration of laminated glass is defined as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning laminated glass contrary to manufacturer's written instructions. Defects include edge separation, delamination materially obstructing vision through glass, and blemishes exceeding those allowed by referenced laminated-glass standard.

1. Warranty Period: Five years from date of Substantial Completion.

C. Manufacturer's Special Warranty on Insulating Glass: Manufacturer's standard form in which insulating-glass manufacturer agrees to replace insulating-glass units that deteriorate within specified warranty period. Deterioration of insulating glass is defined as failure of hermetic seal under normal use that is not attributed to glass breakage or to maintaining and cleaning insulating glass contrary to manufacturer's written instructions. Evidence of failure is the obstruction of vision by dust, moisture, or film on interior surfaces of glass.

1. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 GLASS PRODUCTS, GENERAL

A. Thickness: Where glass thickness is indicated, it is a minimum. Provide glass lites in thicknesses as needed to comply with requirements indicated.

1. Minimum Glass Thickness for Exterior Lites: Not less than 1 5-16/ inchor needed to meet the requirements set by the large missile impact test of the unit schedule to receive the glazing.

B. Strength: Where float glass is indicated, provide annealed float glass, Kind HS heat-treated float glass, or Kind FT heat-treated float glass as needed to comply with "Performance Requirements" Article. Where heat-strengthened glass is indicated, provide Kind HS heat-treated float glass or Kind FT heat-treated float glass as needed

to comply with "Performance Requirements" Article. Where fully tempered glass is indicated, provide Kind FT heat-treated float glass.

C. Windborne-Debris-Impact Resistance: Provide exterior glazing that passes enhanced-protection testing requirements in ASTM E 1996 for Wind Zone 3 when tested according to ASTM E 1886. Test specimens shall be no smaller in width and length than glazing indicated for use on the Project and shall be installed in same manner as glazing indicated for use on the Project.

1. Large-Missile Test: For glazing located within 30 feet (9.1 m) of grade.
2. Small-Missile Test: For glazing located more than 30 feet (9.1 m) above grade.

D. Thermal and Optical Performance Properties: Provide glass with performance properties specified, as indicated in manufacturer's published test data, based on procedures indicated below:

1. For monolithic-glass lites, properties are based on units with lites 1-5/16 inch or required to meet the large missile impact test for interior lights, properties are based on units with lites 6.0 mm thick.
2. For laminated-glass lites, properties are based on products of construction indicated.
3. For insulating-glass units, properties are based on units of thickness indicated for overall unit and for each lite.
4. U-Factors: Center-of-glazing values, according to NFRC 100 and based on LBL's WINDOW 5.2 computer program, expressed as Btu/sq. ft. x h x deg F (W/sq. m x K).
5. Solar Heat-Gain Coefficient and Visible Transmittance: Center-of-glazing values, according to NFRC 200 and based on LBL's WINDOW 5.2 computer program.
6. Visible Reflectance: Center-of-glazing values, according to NFRC 300.

2.2 GLASS PRODUCTS

A. Float Glass: ASTM C 1036, Type I, Quality-Q3, Class I (clear) unless otherwise indicated.

B. Heat-Treated Float Glass: ASTM C 1048; Type I; Quality-Q3; Class I (clear) unless otherwise indicated; of kind and condition indicated.

1. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed unless otherwise indicated.
2. For uncoated glass, comply with requirements for Condition A.
3. For coated vision glass, comply with requirements for Condition C (other coated glass).

2.3 LAMINATED GLASS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Viracon.

B. Windborne-Debris-Impact-Resistant Laminated Glass: ASTM C 1172, and complying with testing requirements in 16 CFR 1201 for Category II materials, with "Windborne-Debris-Impact Resistance" Paragraph in "Glass Products, General" Article, and with other requirements specified. Use materials that have a proven record of no tendency to bubble, discolor, or lose physical and mechanical properties after fabrication and installation.

1. Construction: Laminate glass with one of the following to comply with interlayer manufacturer's written recommendations:

a. Polyvinyl butyral interlayer.
b. Polyvinyl butyral interlayers reinforced with polyethylene terephthalate film.
c. Ionoplast interlayer.
d. Cast-in-place and cured-transparent-resin interlayer.
e. Cast-in-place and cured-transparent-resin interlayer reinforced with polyethylene terephthalate film.

2. Interlayer Thickness: Provide thickness not less than that indicated and as needed to comply with requirements.
3. Interlayer Color: Clear unless otherwise indicated.

C. Glass: Comply with applicable requirements in "Glass Products" Article as indicated by designations in "Laminated-Glass Types" Article.

2.4 INSULATING GLASS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Viracon.

B. Insulating-Glass Units: Factory-assembled units consisting of sealed lites of glass separated by a dehydrated interspace, qualified according to ASTM E 2190, and complying with other requirements specified.

1. Sealing System: Dual seal, with manufacturer's standard primary and secondary.
2. Spacer: Aluminum with mill or clear anodic finish .
3. Desiccant: Molecular sieve or silica gel, or blend of both.

C. Glass: Comply with applicable requirements in "Glass Products" Article and in "Laminated Glass" Article as indicated by designations in "Insulating-Glass Types" Article and in "Insulating-Laminated-Glass Types" Article.

2.5 FIRE-PROTECTION-RATED GLAZING

A. Fire-Protection-Rated Glazing, General: Listed and labeled by a testing agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated, based on testing according to NFPA 252 for door assemblies .

B. Laminated Ceramic Glazing: Laminated glass made from 2 plies of clear, ceramic flat glass; 5/16-inch (8-mm) total nominal thickness; complying with testing requirements in 16 CFR 1201 for Category II materials.

1. Products: Subject to compliance with requirements, provide one of the following:

   a. Nippon Electric Glass Co., Ltd. (distributed by Technical Glass Products); FireLite Plus.
   b. Schott North America, Inc.; Laminated Pyran Crystal.
   c. Vetrotech Saint-Gobain; SGG Keralite FR-L.

C. Fire-Protection-Rated Tempered Glass: 1/4-inch- (6.4-mm-) thick, fire-protection-rated tempered glass, complying with testing requirements in 16 CFR 1201 for Category II materials.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

   a. InterEdge, Inc., a subsidiary of AFG Industries, Inc.; PyroEdge-20.
   b. Safti First; SuperLite20.
   c. Vetrotech Saint-Gobain; SSG Pyroswiss.

2.6 GLAZING GASKETS

A. Dense Compression Gaskets: Molded or extruded gaskets of profile and hardness required to maintain watertight seal, made from one of the following:

1. Neoprene complying with ASTM C 864.
2. EPDM complying with ASTM C 864.
3. Silicone complying with ASTM C 1115.
4. Thermoplastic polyolefin rubber complying with ASTM C 1115.

B. Soft Compression Gaskets: Extruded or molded, closed-cell, integral-skinned neoprene EPDM silicone or thermoplastic polyolefin rubber gaskets complying with ASTM C 509, Type II, black; of profile and hardness required to maintain watertight seal.

1. Application: Use where soft compression gaskets will be compressed by inserting dense compression gaskets on opposite side of glazing or pressure applied by means of pressure-glazing stops on opposite side of glazing.

C. Lock-Strip Gaskets: Neoprene extrusions in size and shape indicated, fabricated into frames with molded corner units and zipper lock-strips, complying with ASTM C 542, black.

2.7 GLAZING SEALANTS

A. General:

1. Compatibility: Provide glazing sealants that are compatible with one another and with other materials they will contact, including glass products, seals of insulating-glass units, and glazing channel substrates, under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.
2. Suitability: Comply with sealant and glass manufacturers' written instructions for selecting glazing sealants suitable for applications indicated and for conditions existing at time of installation.
3. Sealants used inside the weatherproofing system shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
4. Colors of Exposed Glazing Sealants: As selected by Architect from manufacturer's full range.

B. Glazing Sealant: Neutral-curing silicone glazing sealant complying with ASTM C 920, Type S, Grade NS, Class 100/50, Use NT.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

   a. Dow Corning Corporation; 790.
   b. GE Advanced Materials - Silicones; SilPruf LM SCS2700.
   c. May National Associates, Inc.; Bondaflex Sil 290.
   d. Pecora Corporation; 890.
   e. Sika Corporation, Construction Products Division; SikaSil-C990.
   f. Tremco Incorporated; Spectrem 1.

2. Applications: Manufacturers recommended sealant or required to meet the requirements for large missile impact testing.

C. Glazing Sealant: Neutral-curing silicone glazing sealant complying with ASTM C 920, Type S, Grade NS, Class 50, Use NT.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. BASF Building Systems; Omniseal 50.
b. Dow Corning Corporation; 756 SMS .
c. GE Advanced Materials - Silicones; SilGlaze II SCS2800 .
d. May National Associates, Inc.; Bondaflex Sil 295.
e. Pecora Corporation; 864 .
f. Polymeric Systems, Inc.; PSI-641.
g. Sika Corporation, Construction Products Division; SikaSil-C995.
h. Tremco Incorporated; Spectrem 2.

2. Applications: Manufacturers recommended sealant or required to meet the requirements for large missile impact testing.

2.8 GLAZING TAPES

A. Back-Bedding Mastic Glazing Tapes: Preformed, butyl-based, 100 percent solids elastomeric tape; nonstaining and nonmigrating in contact with nonporous surfaces; with or without spacer rod as recommended in writing by tape and glass manufacturers for application indicated; and complying with ASTM C 1281 and AAMA 800 for products indicated below:

1. AAMA 804.3 tape, where indicated.
2. AAMA 806.3 tape, for glazing applications in which tape is subject to continuous pressure.
3. AAMA 807.3 tape, for glazing applications in which tape is not subject to continuous pressure.

B. Expanded Cellular Glazing Tapes: Closed-cell, PVC foam tapes; factory coated with adhesive on both surfaces; and complying with AAMA 800 for the following types:

1. AAMA 810.1, Type 1, for glazing applications in which tape acts as the primary sealant.
2. AAMA 810.1, Type 2, for glazing applications in which tape is used in combination with a full bead of liquid sealant.

2.9 MISCELLANEOUS GLAZING MATERIALS

A. General: Provide products of material, size, and shape complying with referenced glazing standard, requirements of manufacturers of glass and other glazing materials for application indicated, and with a proven record of compatibility with surfaces contacted in installation.

B. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.

C. Setting Blocks: Elastomeric material with a Shore, Type A durometer hardness of 85, plus or minus 5.

D. Spacers: Elastomeric blocks or continuous extrusions of hardness required by glass manufacturer to maintain glass lites in place for installation indicated.

E. Edge Blocks: Elastomeric material of hardness needed to limit glass lateral movement (side walking).

F. Cylindrical Glazing Sealant Backing: ASTM C 1330, Type O (open-cell material), of size and density to control glazing sealant depth and otherwise produce optimum glazing sealant performance.

G. Perimeter Insulation for Fire-Resistive Glazing: Product that is approved by testing agency that listed and labeled fire-resistant glazing product with which it is used for application and fire-protection rating indicated.

H. Laminated Panels: Large Missile Impact Resistant Panels with manufacturer's standard smooth exterior skin that is compatible with opening to receive panel. Provide manufacturer's standard waterproof/impact resistant substrate/core in thickness required to replace glass panel at storefront or curtainwall glass at locations indicated on drawings.

2.10 FABRICATION OF GLAZING UNITS

A. Fabricate glazing units in sizes required to fit openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written instructions of product manufacturer and referenced glazing publications, to comply with system performance requirements.

B. Clean-cut or flat-grind vertical edges of butt-glazed monolithic lites to produce square edges with slight chamfers at junctions of edges and faces.

C. Grind smooth and polish exposed glass edges and corners.

2.11 MONOLITHIC-GLASS TYPES

A. Glass Type [**GL-**]: Clear float glassorfully tempered float glass.

1. Thickness: 6.0 mm

2. Location:
   a. For all interior areas where the bottom of glass is 2'-0" above the finish floor provide float glass unless otherwise indicated.
   b. For all interior areas where the bottom of the glass is less than 2'-0" from the bottom of the floor provide tempered glass..
3. Provide safety glazing labeling.

2.12 LAMINATED-GLASS TYPES

A. Glass Type [**GL-**]: Clear laminated glass with two plies of fully tempered float glass .

1. Thickness of Each Glass Ply: as required by manufacturer to meet the requirements for large missile impact testing..
2. Interlayer Thickness: .as required by manufacturer to meet the requirements for large missile impact testing.
3. Provide safety glazing labeling.

B. Glass Type [**GL-**<#>]: Low-e-coated, laminated vision glass with two plies of clear fully tempered float glass.

1. Thickness of Each Glass Ply: as required by manufacturer to meet the requirements for large missile impact testing..
2. Interlayer Thickness: [as required by manufacturer to meet the requirements for large missile impact testing
3. Provide safety glazing labeling.

2.13 INSULATING-GLASS TYPES

A. Glass Type : Clear insulating glass.

1. Overall Unit Thickness: as required by manufacturer to meet the requirements for large missile impact testing..
2. Thickness of Each Glass Lite: as required by manufacturer to meet the requirements of large missile impact testing.
3. Provide safety glazing labeling.

B. Glass Type [**GL-**<#>]: Low-e-coated, clear insulating glass.

1. Overall Unit Thickness: as required by manufacturer to meet the requirements of large missile impact testing
2. Thickness of Each Glass Lite: as requirement by manufacturer to meet the requirements of large missile impact testing.
3. Provide safety glazing labeling.
4. Opaque Coating Location: Fourth surface.

2.14 INSULATING-LAMINATED-GLASS TYPES

A. Glass Type : Low-e-coated, clear insulating laminated glass.

1. Overall Unit Thickness: as required by manufacturer to meet the requirements of large missile impact testing.
2. Thickness of Outdoor Lite: as required by manufacturer to meet the requirements of large missile impact testing.
3. Provide safety glazing labeling.

2.15 FIRE-PROTECTION-RATED GLAZING TYPES

A. Glass Type : 20-minute fire-rated glazing without hose-stream test; fire-protection-rated tempered glass .

1. Provide safety glazing labeling.

2. Location: Manufacturer’s tested standard for 20 minute interior fire rated doors.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine framing, glazing channels, and stops, with Installer present, for compliance with the following:

1. Manufacturing and installation tolerances, including those for size, squareness, and offsets at corners.
2. Presence and functioning of weep systems.
3. Minimum required face and edge clearances.
4. Effective sealing between joints of glass-framing members.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Clean glazing channels and other framing members receiving glass immediately before glazing. Remove coatings not firmly bonded to substrates.

B. Examine glazing units to locate exterior and interior surfaces. Label or mark units as needed so that exterior and interior surfaces are readily identifiable. Do not use materials that will leave visible marks in the completed work.

3.3 GLAZING, GENERAL

A. Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials, unless more stringent requirements are indicated, including those in referenced glazing publications.

B. Adjust glazing channel dimensions as required by Project conditions during installation to provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances.

C. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass is glass with edge damage or other imperfections that, when installed, could weaken glass and impair performance and appearance.

D. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction testing.

E. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.

F. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.

G. Provide spacers for glass lites where length plus width is larger than 50 inches (1270 mm).

1. Locate spacers directly opposite each other on both inside and outside faces of glass. Install correct size and spacing to preserve required face clearances, unless gaskets and glazing tapes are used that have demonstrated ability to maintain required face clearances and to comply with system performance requirements.
2. Provide 1/8-inch (3-mm) minimum bite of spacers on glass and use thickness equal to sealant width. With glazing tape, use thickness slightly less than final compressed thickness of tape.

H. Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel, as recommended in writing by glass manufacturer and according to requirements in referenced glazing publications.

I. Set glass lites in each series with uniform pattern, draw, bow, and similar characteristics.

J. Set glass lites with proper orientation so that coatings face exterior or interior as specified.

K. Square cut wedge-shaped gaskets at corners and install gaskets in a manner recommended by gasket manufacturer to prevent corners from pulling away; seal corner joints and butt joints with sealant recommended by gasket manufacturer.

3.4 TAPE GLAZING

A. Position tapes on fixed stops so that, when compressed by glass, their exposed edges are flush with or protrude slightly above sightline of stops.

B. Install tapes continuously, but not necessarily in one continuous length. Do not stretch tapes to make them fit opening.

C. Cover vertical framing joints by applying tapes to heads and sills first and then to jambs. Cover horizontal framing joints by applying tapes to jambs and then to heads and sills.

D. Place joints in tapes at corners of opening with adjoining lengths butted together, not lapped. Seal joints in tapes with compatible sealant approved by tape manufacturer.

E. Do not remove release paper from tape until right before each glazing unit is installed.

F. Apply heel bead of elastomeric sealant.

G. Center glass lites in openings on setting blocks and press firmly against tape by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings.

H. Apply cap bead of elastomeric sealant over exposed edge of tape.

3.5 GASKET GLAZING (DRY)

A. Cut compression gaskets to lengths recommended by gasket manufacturer to fit openings exactly, with allowance for stretch during installation.

B. Insert soft compression gasket between glass and frame or fixed stop so it is securely in place with joints miter cut and bonded together at corners.

C. Installation with Drive-in Wedge Gaskets: Center glass lites in openings on setting blocks and press firmly against soft compression gasket by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.

D. Installation with Pressure-Glazing Stops: Center glass lites in openings on setting blocks and press firmly against soft compression gasket. Install dense compression gaskets and pressure-glazing stops, applying pressure uniformly to compression gaskets. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.

E. Install gaskets so they protrude past face of glazing stops.

3.6 SEALANT GLAZING (WET)

A. Install continuous spacers, or spacers combined with cylindrical sealant backing, between glass lites and glazing stops to maintain glass face clearances and to prevent sealant from extruding into glass channel and blocking weep systems until sealants cure. Secure spacers or spacers and backings in place and in position to control depth of installed sealant relative to edge clearance for optimum sealant performance.

B. Force sealants into glazing channels to eliminate voids and to ensure complete wetting or bond of sealant to glass and channel surfaces.

C. Tool exposed surfaces of sealants to provide a substantial wash away from glass.

3.7 LOCK-STRIP GASKET GLAZING

A. Comply with ASTM C 716 and gasket manufacturer's written instructions. Provide supplementary wet seal and weep system unless otherwise indicated.

3.8 CLEANING AND PROTECTION

A. Protect exterior glass from damage immediately after installation by attaching crossed streamers to framing held away from glass. Do not apply markers to glass surface. Remove nonpermanent labels and clean surfaces.

B. Protect glass from contact with contaminating substances resulting from construction operations. If, despite such protection, contaminating substances do come into contact with glass, remove substances immediately as recommended in writing by glass manufacturer.

C. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for buildup of dirt, scum, alkaline deposits, or stains; remove as recommended in writing by glass manufacturer.

D. Remove and replace glass that is broken, chipped, cracked, or abraded or that is damaged from natural causes, accidents, and vandalism, during construction period.

E. Wash glass on both exposed surfaces in each area of Project not more than four days before date scheduled for inspections that establish date of Substantial Completion. Wash glass as recommended in writing by glass manufacturer.

END OF SECTION 08800

SECTION 08830 - MIRRORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes the following types of silvered flat glass mirrors:
   1. Tempered glass mirrors qualifying as safety glazing.

B. Related Sections:

   1. Section 08800 "Glazing" for glass with reflective coatings used for vision and spandrel lites.

1.3 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified Installer.

B. Product Certificates: For each type of mirror and mirror mastic, from manufacturer.

C. Warranty: Sample of special warranty.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: A qualified installer who employs glass installers for this Project who are certified under the National Glass Association's Certified Glass Installer Program.

B. Source Limitations for Mirrors: Obtain mirrors from single source from single manufacturer.

C. Source Limitations for Mirror Accessories: Obtain mirror glazing accessories from single source.

D. Glazing Publications: Comply with the following published recommendations:

   1. GANA's "Glazing Manual" unless more stringent requirements are indicated. Refer to this publication for definitions of glass and glazing terms not otherwise defined in this Section or in referenced standards.

2. GANA Mirror Division's "Mirrors, Handle with Extreme Care: Tips for the Professional on the Care and Handling of Mirrors."

E. Safety Glazing Products: For tempered mirrors, provide products complying with testing requirements in 16 CFR 1201 for Category II materials.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Protect mirrors according to mirror manufacturer's written instructions and as needed to prevent damage to mirrors from moisture, condensation, temperature changes, direct exposure to sun, or other causes.

B. Comply with mirror manufacturer's written instructions for shipping, storing, and handling mirrors as needed to prevent deterioration of silvering, damage to edges, and abrasion of glass surfaces and applied coatings. Store indoors.

1.6 PROJECT CONDITIONS

A. Environmental Limitations: Do not install mirrors until ambient temperature and humidity conditions are maintained at levels indicated for final occupancy.

1.7 WARRANTY

A. Special Warranty: Manufacturer's standard form in which mirror manufacturer agrees to replace mirrors that deteriorate within specified warranty period. Deterioration of mirrors is defined as defects developed from normal use that are not attributed to mirror breakage or to maintaining and cleaning mirrors contrary to manufacturer's written instructions. Defects include discoloration, black spots, and clouding of the silver film.

1. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 SILVERED FLAT GLASS MIRRORS

A. Glass Mirrors, General: ASTM C 1503; manufactured using copper-free, low-lead mirror coating process.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   a. Binswanger Mirror; a division of Vitro America, Inc.
   b. Gardner Glass, Inc.
   c. Independent Mirror Industries, Inc.
   d. Lenoir Mirror Company.

e. National Glass Industries.
f. Virginia Mirror Company, Inc.

B. Annealed Monolithic Glass mirrors & mirrors select quality, clear
1. Nominal Thickness: 6.0 mm

C. Tempered Clear Glass: Mirror Glazing Quality, for blemish requirements; and comply with ASTM C 1048 for Kind FT, Condition A, tempered float glass before silver coating is applied.

1. Nominal Thickness: 1/4 inch.

2.2 MISCELLANEOUS MATERIALS

A. Setting Blocks: Elastomeric material with a Shore, Type A durometer hardness of 85, plus or minus 5.

B. Edge Sealer: Coating compatible with glass coating and approved by mirror manufacturer for use in protecting against silver deterioration at mirrored glass edges.

C. Mirror Mastic: An adhesive setting compound, asbestos-free, produced specifically for setting mirrors and certified by both mirror manufacturer and mastic manufacturer as compatible with glass coating and substrates on which mirrors will be installed.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
a. C.R. Laurence Co., Inc.
b. Liquid Nail Adhesive
c. Macco Adhesives; Liquid Nails Division.
d. Pecora Corporation.
e. Sommer & Maca Industries, Inc.

2.3 MIRROR HARDWARE

A. Top Channel/Cleat and Bottom Aluminum J-Channels: Aluminum extrusions with a return deep enough to produce a glazing channel to accommodate mirrors of thickness indicated and in lengths required to cover bottom and top edges of each mirror in a single piece.
1. Manufacturers: Subject to compliance with requirements, available Manufacturers offering products that may be incorporated into the project include, but are not limited to, the following:
a. C.R. Laurence
b. Andscot Company, Inc.
c. Stylmark, Inc.

2. Bottom Trim: J-channels formed with front leg and back leg not less than 3/8 and 7/8 inch in height, respectively and a thickness not less than 0.04 inch.

3. Top Trim: J-Channels formed with front leg and back leg not less than 5/8 and 1 inch in height, respectively, and a thickness of not less than 0.04 inch.

   a.

4. Finish: Clear bright anodized.

B. Fasteners: Fabricated of same basic metal and alloy as fastened metal and matching it in finished color and texture where fasteners are exposed.

C. Anchors and Inserts: Provide devices as required for mirror hardware installation. Provide toothed or lead-shield expansion-bolt devices for drilled-in-place anchors. Provide galvanized anchors and inserts for applications on inside face of exterior walls and where indicated.

2.4 FABRICATION

A. Mirror Sizes: To suit Project conditions, and before tempering, cut mirrors to final sizes and shapes. (Full width of wall unless otherwise indicated.)

B. Cutouts: Fabricate cutouts before tempering for notches and holes in mirrors without marring visible surfaces. Locate and size cutouts so they fit closely around penetrations in mirrors.

C. Mirror Edge Treatment: Flat polished.

1. Seal edges of mirrors with edge sealer after edge treatment to prevent chemical or atmospheric penetration of glass coating.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, over which mirrors are to be mounted, with Installer present, for compliance with installation tolerances, substrate preparation, and other conditions affecting performance of the Work.

B. Verify compatibility with and suitability of substrates, including compatibility of mirror mastic with existing finishes or primers.

C. Proceed with installation only after unsatisfactory conditions have been corrected and surfaces are dry.

3.2 PREPARATION

A. Comply with mastic manufacturer's written installation instructions for preparation of substrates, including coating substrates with mastic manufacturer's special bond coating where applicable.

3.3 INSTALLATION

A. General: Install mirrors to comply with mirror manufacturer's written instructions and with referenced GANA publications. Mount mirrors accurately in place in a manner that avoids distorting reflected images.

B. Provide a minimum air space of 1/8 inch (3 mm) between back of mirrors and mounting surface for air circulation between back of mirrors and face of mounting surface.

C. Wall-Mounted Mirrors: Install mirrors with mastic and mirror hardware. Attach mirror hardware securely to mounting surfaces with mechanical fasteners installed with anchors or inserts as applicable. Install fasteners so heads do not impose point loads on backs of mirrors.
   1. Top Channel/Cleat and Bottom Aluminum J-Channels: Fasten J-channel directly to wall and attach top trim to continuous cleat fastened directly to wall.
   2. Mirror Clips: Place a felt or plastic pad between mirror and each clip to prevent spalling of mirror edges. Locate clips so they are symmetrically placed and evenly spaced.
   3. Install mastic as follows:
      a. Apply barrier coat to mirror backing where approved in writing by manufacturers of mirrors and backing material.
      b. Apply mastic to comply with mastic manufacturer's written instructions for coverage and to allow air circulation between back of mirrors and face of mounting surface.
      c. After mastic is applied, align mirrors and press into place while maintaining a minimum air space of 1/8 inch (3 mm) between back of mirrors and mounting surface.

3.4 CLEANING AND PROTECTION

A. Protect mirrors from breakage and contaminating substances resulting from construction operations.

B. Do not permit edges of mirrors to be exposed to standing water.

C. Maintain environmental conditions that will prevent mirrors from being exposed to moisture from condensation or other sources for continuous periods of time.

D. Wash exposed surface of mirrors not more than four days before date scheduled for inspections that establish date of Substantial Completion. Wash mirrors as recommended in writing by mirror manufacturer.

END OF SECTION 08830

DIVISION 09

SECTION 09111 - NON-LOAD BEARING STEEL FRAMING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Non-structural metal framing systems for interior gypsum board assemblies.
2. Resilient channels for stud walls and fur
3. Suspension systems for interior gypsum ceilings, soffits, and grid systems.
4. Sound isolation clips

B. Related Requirements:

1. Section 05400 "Cold-Formed Metal Framing" for exterior and interior load-bearing wall studs; floor joists; roof rafters and ceiling joists; and roof trusses.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.4 INFORMATION SUBMITTALS

A. Evaluation Reports: Submit evaluation reports certified under an independent third-party inspection program administered by an agency accredited by IAS to ICC-ES AC98 accreditation criteria for inspection agencies.

1.5 QUALITY ASSURANCE

A. Code-Compliance Certification of Studs and Tracks: Provide documentation that framing members are certified in accordance with the product-certification program of the Steel Framing Industry Association (SFIA) or similar organization providing a verifiable code-compliance program.

PART 2 - PRODUCTS

2.1 DESCRIPTION

A. Fire-Test-Response Characteristics: For fire-resistance-rated assemblies that incorporate non-load-bearing steel framing, provide materials and construction identical to those tested in assembly indicated according to ASTM E 119 by an independent testing agency.

B. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 90 and classified according to ASTM E 413 by an independent testing agency.

C. Design framing systems in accordance with AISI S220 and ASTM C645, Section 10, unless otherwise indicated

2.2 FRAMING SYSTEMS

A. Framing Members, General: Comply with ASTM C 754 for conditions indicated.

1. Steel Sheet Components: Comply with AISI S220 and ASTM C 645, Section 10 requirements for metal unless otherwise indicated.
2. Protective Coating: Comply with AISI S220; ASTM A 653/A 653M, G40 (Z120); or coating with equivalent corrosion resistance for interior stud walls, ASTM A 653/A 653M, G60 (Z180) for exterior stud walls, hot-dip galvanized, unless otherwise indicated. Galvannealed products are unacceptable.

    a. Coating to demonstrate equivalent corrosion resistance with an evaluation report acceptable to authorities having jurisdiction.

B. Studs and Runners: AISI S220 and ASTM C 645, Section 10. Use either steel studs and runners or steel studs and runners of equivalent minimum base-steel thickness.

1. Steel Studs and Runners:

    a. Product: ClarkDietrich; ProSTUD Drywall Framing System with Smart Edge technology [and with DiamondPlus® Coating] or comparable product.
    b. Minimum Base-Steel Thickness: [**0.0181 inch (0.46 mm)**] [**0.0296 inch (0.75 mm)**] [**0.0329 inch (0.8382 mm)**] unless otherwise indicated on the drawings or required for walls over 12'-0" in height.
    c. Depth: As indicated on Drawings.

C. Slip-Type Head Joints: Where indicated, provide one of the following:

1. Single Long-Leg Runner System: AISI S220 top runner with 2-inch- (51-mm-) deep flanges in thickness not less than indicated for studs, installed with studs friction fit into top runner and with continuous bridging located within 12 inches (305 mm) of the top of studs to provide lateral bracing.
2. Deflection Track: Steel sheet top runner manufactured to prevent cracking of

finishes applied to interior partition framing resulting from deflection of structure above; in thickness not less than indicated for studs and in width to accommodate depth of studs.

a. Products: Subject to compliance with requirements, provide one of the following] [available products that may be incorporated into the Work include, but are not limited to, the following:

1) ClarkDietrich; MaxTrak Slotted Deflection Track.
2) MBA Building Supplies; FlatSteel Deflection Track or Slotted Deflecto Track.
3) Steel Network Inc. (The); VertiClip SLD or VertiTrack VTD Series.

D. Firestop Tracks: Top runner manufactured to allow partition heads to expand and contract with movement of the structure while maintaining continuity of fire-resistance- rated assembly indicated; in thickness not less than indicated for studs and in width to accommodate depth of studs.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. ClarkDietrich; BlazeFrame [**UltraBEAD with UltraTRAK Slotted System**] [**UltraBEAD with Deep Leg Deflection Track**] [**DL**] [**DSL**] [**RipTRAK**].
b. Fire Trak Corp.; Fire Trak System attached to studs with Fire Trak Posi Klip.
c. Metal-Lite, Inc.; The System.

E. Flat Strap and Backing Plate: Steel sheet for blocking and bracing in length and widthindicated.

1. Minimum Base-Steel Thickness: 0.018 inch (0.45 mm), 0.0296 inch (0.75 mm) unless otherwise indicated on the drawings.

F. Cold-Rolled Channel Bridging: Steel, 0.053-inch (1.34-mm) minimum base-steel thickness, with minimum 1/2-inch- (13-mm-) wide flanges.

1. Depth: 1-1/2 inches (38 mm).
2. Clip Angle: Not less than 1-1/2 by 1-1/2 inches (38 by 38 mm), 0.068-inch- (1.72-mm-) thick, galvanized steel.

G. Hat-Shaped, Rigid Furring Channels: AISI S220.

1. Product: ClarkDietrich; Furring Channel or comparable product.
2. Minimum Base-Steel Thickness: 0.0296 inch (0.75 mm) unless otherwise indicated on the drawings.
3. Depth: 7/8 inch (22.2 mm).

H. Cold-Rolled Furring Channels: 0.053-inch (1.34-mm) base-steel thickness, with

minimum 1/2-inch- (13-mm-) wide flanges.

1. Depth: As indicated on Drawings.
2. Furring Brackets: Adjustable, corrugated-edge type of steel sheet with minimum base-steel thickness of 0.0296 inch (0.75 mm).
3. Tie Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.062-inch- (1.59-mm-) diameter wire, or double strand of 0.048-inch- (1.21-mm-) diameter wire.

I. Resilient Furring Channels: 1/2 -inch deep, steel sheet members designed to reducesound transmission

1. Configuration: Asymmetrical
2. Products: Subject to compliance with requirements, available products that maybe incorporated into the Work include, but are not limited to, the following:

    a. ClarkDietrich RC Deluxe (Basis of Design)
    b. Marino Ware
    c. MBA Building Supplies
    d. MRI Steel Framing, LLC
    e. SCAFCO Steel Stud Company
    f. Steel Construction Systems

2.3 SUSPENSION SYSTEMS

A. Tie Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.062-inch- (1.59-mm-) diameter wire, or double strand of 0.048-inch- (1.21-mm-) diameter wire.

B. Wire Hangers: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.16 inch (4.12mm) in diameter.

C. Flat Hangers: Steel sheet, 1 by 3/16 inch (25 by 5 mm.

D. Carrying Channels: Cold-rolled, commercial-steel sheet with a base-steel thickness of 0.053 inch (1.34 mm) and minimum 1/2-inch- (13-mm-) wide flanges.

1. Depth: As indicated on Drawings otherwise 2 inches (51 mm).

E. Furring Channels (Furring Members):

1. Cold-Rolled Channels: 0.053-inch (1.34-mm) base-steel thickness, with minimum 1/2-inch- (13-mm-) wide flanges, 3/4 inch (19 mm) deep.
2. Steel Studs and Runners: AISI S220 and ASTM C 645, Section 10.

    a. Product: ClarkDietrich; ProSTUD Drywall Framing System with Smart Edge technology [and with DiamondPlus® Coating] or comparable product.
    b. Minimum Base-Steel Thickness: As indicated on Drawings otherwise

[**0.0181 inch (0.46 mm)**] [**0.0296 inch (0.75 mm)**] [**0.0329 inch (0.8382 mm)**].

c. Depth: As indicated on Drawings.

3. Hat-Shaped, Rigid Furring Channels: AISI S220, 7/8 inch (22 mm) deep.

a. Product: ClarkDietrich; Hat-Shaped, Rigid Furring Channels, or comparable product.
b. Minimum Base-Steel Thickness: As indicated on Drawings otherwise 0.0296 inch (0.75 mm).

F. Resilient Furring Channels: ½-inch deep members designed to reduce sound transmission

1. Configuration: Asymmetrical
2. Products: Subject to compliance with requirements, available products that maybe incorporated into the Work include, but are not limited to, the following:

a. ClarkDietrich RC Deluxe (Basis of Design)
b. Marino Ware
c. MBA Building Supplies
d. MRI Steel Framing, LLC
e. SCAFCO Steel Stud Company
f. Steel Construction Systems

G. Grid Suspension System for Gypsum Board Ceilings: ASTM C 645, direct-hung system composed of main beams and cross-furring members that interlock.

1. Products: Subject to compliance with requirements, available products that maybe incorporated into the Work include, but are not limited to, the following:

a. Armstrong World Industries, Inc.; Drywall Grid Systems.
b. USG Corporation; Drywall Suspension System.

H. Sound Isolation Clips: Resilient sound isolation clip installed for support of gypsum board for noise control in walls and ceilings

1. Products: Subject to compliance with requirements, available products that maybe incorporated into the Work include, but are not limited to, the following:

a. Pliteq GenieClip
b. PAC International

2.4 AUXILIARY MATERIALS

A. General: Provide auxiliary materials that comply with referenced installation standards.

1. Fasteners for Metal Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel members to substrates.

B. Isolation Strip at Exterior Walls: Provide the following:

1. Foam Gasket: Adhesive-backed, closed-cell vinyl foam strips that allow fastener penetration without foam displacement, 1/8 inch (3.2 mm) thick, in width to suit steel stud size.
2. Self-adhering membrane: as recommended by membrane manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and substrates, with Installer present, and including welded hollow-metal frames, cast-in anchors, and structural framing, for compliance with requirementsand other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Suspended Assemblies: Coordinate installation of suspension systems with installation of overhead structure to ensure that inserts and other provisions for anchorages to building structure have been installed to receive hangers at spacing required to support the Work and that hangers will develop their full strength.

1. Furnish concrete inserts and other devices indicated to other trades for installation in advance of time needed for coordination and construction.

B. Coordination with Sprayed Fire-Resistive Materials:

1. Before sprayed fire-resistive materials are applied, attach offset anchor plates or ceiling runners (tracks) to surfaces indicated to receive sprayed fire-resistive materials. Where offset anchor plates are required, provide continuous plates fastened to building structure not more than 24 inches (610 mm) o.c.
2. After sprayed fire-resistive materials are applied, remove them only to extent necessary for installation of non-load-bearing steel framing. Do not reduce thickness of fire-resistive materials below that required for fire-resistance ratings indicated. Protect adjacent fire-resistive materials from damage.

3.3 INSTALLATION, GENERAL

A. Installation Standard: ASTM C 754, except comply with framing sizes and spacing

indicated.

1. Portland Cement Plaster Assemblies: Also comply with requirements in ASTM C 1063 that apply to framing installation.
2. Gypsum Veneer Plaster Assemblies: Also comply with requirements inASTM C 844 that apply to framing installation.
3. Gypsum Board Assemblies: Also comply with requirements in ASTM C 840 thatapply to framing installation.

B. Install supplementary framing, and blocking to support fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, or similar construction.

C. Install bracing at terminations in assemblies.

D. Do not bridge building control and expansion joints with non-load-bearing steel framingmembers. Frame both sides of joints independently.

3.4 INSTALLING FRAMED ASSEMBLIES

A. Where studs are installed directly against exterior masonry walls or dissimilar metals atexterior walls, install isolation strip between studs and exterior wall.

B. Install studs so flanges within framing system point in same direction.

1. Space studs as follows:

   a. Single-Layer Application: 16 inches (406 mm) o.c. unless otherwise indicated.
   b. Multilayer Application: 16 inches (406 mm o.c. unless otherwise indicated.
   c. Tile Backing Panels: 16 inches (406 mm) o.c. unless otherwise indicated.

C. Install tracks (runners) at floors and overhead supports. Extend framing full height to structural supports or substrates above suspended ceilings, except where partitions are indicated to terminate at suspended ceilings. Continue framing around ducts penetrating partitions above ceiling.

1. Slip-Type Head Joints: Where framing extends to overhead structural supports, install to produce joints at tops of framing systems that prevent axial loading of finished assemblies.
2. Door Openings: Screw vertical studs at jambs to jamb anchor clips on door frames; install runner track section (for cripple studs) at head and secure to jamb studs.

   a. Install two studs at each jamb unless otherwise indicated.
   b. Install cripple studs at head adjacent to each jamb stud, with a minimum 1/2-inch (13-mm) clearance from jamb stud to allow for installation of control joint in finished assembly.

c. Extend jamb studs through suspended ceilings and attach to underside of overhead structure.

3. Other Framed Openings: Frame openings other than door openings the same as required for door openings unless otherwise indicated. Install framing below sills of openings to match framing required above door heads.
4. Fire-Resistance-Rated Partitions: Install framing to comply with fire-resistance-rated assembly indicated and support closures and to make partitions continuousfrom floor to underside of solid structure.

   a. Firestop Track: Where indicated, install to maintain continuity of fire-resistance-rated assembly indicated.

5. Sound-Rated Partitions: Install framing to comply with sound-rated assembly indicated.
6. Curved Partitions:

   a. Bend track to uniform curve and locate straight lengths so they are tangent to arcs.
   b. Begin and end each arch with a stud, and space intermediate studs quality along arcs. On straight lengths of no fewer than two studs at ends of arcs, place studs 6 inches o.c.

D. Installation Tolerance: Install each framing member so fastening surfaces vary notmore than 1/8 inch (3 mm) from the plane formed by faces of adjacent framing.

E. Direct furring: Attach to concrete or masonry with stud nails, screws designed formasonry attachment, or powder-driven fasteners spaced 24 inches o.c.

F. Z-Shaped Furring Members:

1. Erect insulation, specified under Section 07210 "Building Insulation" vertically and hold in pace with Z-shaped furring members spaced 24 inches o.c.
2. Except at exterior corners, securely attach narrow flanges of furring members to wall with concrete stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced 24 inches o.c.
3. At exterior corners, attach wide flanges of furring members to wall with short flange extending beyond corner; on adjacent wall surface, screw-attach short flange of furring channel to web of attached channel. At interior corners, space second member no more than 12 inches from corner and cut insulation to fit.
4. Installation tolerance: Install each framing member so fastening surfaces vary not more than 1/8 inch from the place formed by faces of adjacent framing.

3.5 INSTALLING SUSPENSION SYSTEMS

A. Install suspension system components in sizes and spacings indicated on Drawings, but not less than those required by referenced installation standards for assembly

types and other assembly components indicated.

B. Isolate suspension systems from building structure where they abut or are penetrated by building structure to prevent transfer of loading imposed by structural movement.

C. Suspend hangers from building structure as follows:

1. Install hangers plumb and free from contact with insulation or other objects withinceiling plenum that are not part of supporting structural or suspension system.

    a. Splay hangers only where required to miss obstructions and offset resultinghorizontal forces by bracing, countersplaying, or other equally effective means.

2. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with locations of hangers required to support standard suspension system members, install supplemental suspension members and hangers in the form of trapezes or equivalent devices.

    a. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced installation standards.

3. Wire Hangers: Secure by looping and wire tying, either directly to structures or toinserts, eye screws, or other devices and fasteners that are secure and appropriate for substrate, and in a manner that will not cause hangers to deteriorate or otherwise fail.
4. Flat Hangers: Secure to structure, including intermediate framing members, by attaching to inserts, eye screws, or other devices and fasteners that are secure and appropriate for structure and hanger, and in a manner that will not cause hangers to deteriorate or otherwise fail.
5. Do not attach hangers to steel roof deck.
6. Do not attach hangers to permanent metal forms. Furnish cast-in-place hanger inserts that extend through forms.
7. Do not attach hangers to rolled-in hanger tabs of composite steel floor deck.
8. Do not connect or suspend steel framing from ducts, pipes, or conduit.

D. Fire-Resistance-Rated Assemblies: Wire tie furring channels to supports.

E. Grid Suspension Systems: Attach perimeter wall track or angle where grid suspensionsystems meet vertical surfaces. Mechanically join main beam and cross-furring members to each other and butt-cut to fit into wall track.

F. Installation Tolerances: Install suspension systems that are level to within 1/8 inch in 12 feet (3 mm in 3.6 m) measured lengthwise on each member that will receive finishes and transversely between parallel members that will receive finishes.

END OF SECTION 09111

SECTION 09220 - PORTLAND CEMENT PLASTER

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:
1. Exterior portland cement plasterwork (stucco) on metal lath .

B. Related Sections:
1. Section 04813 “Brick Masonry Assemblies” for mock ups and installation of adjacent brick assemblies

2. Section 05400 "Cold-Formed Metal Framing" for structural, load-bearing (transverse and axial) steel studs and joists that support lath and portland cement plaster.
3. Section 06160 "Sheathing" for sheathing and water-resistant barriers included in portland cement plaster assemblies.
4. Section 07210 "Building Insulation" for thermal insulations and vapor retarders included in portland cement plaster assemblies.
5. Sections 07710 “Manufactured Roof Specialities” and 07620 “Sheet Metal Flashing and Trim” for manufactured stucco reglet and counterflashing included in protland cement plaster assemblies.
6. Section 09111 "Non-Load-Bearing Steel Framing" for non-structural framing and suspension systems that support lath and portland cement plaster.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

1.4 QUALITY ASSURANCE

A. Mockups: Before plastering, install mockups of at least 100 sq. ft. (9.3 sq. m) in surface area to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Install mockups for each type of finish indicated.

2. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

B. Preinstallation Conference: Conduct conference at Project site.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Store materials inside under cover and keep them dry and protected against damage from weather, direct sunlight, surface contamination, corrosion, construction traffic, and other causes.

1.6 PROJECT CONDITIONS

A. Comply with ASTM C 926 requirements.

B. Exterior Plasterwork:

1. Apply and cure plaster to prevent plaster drying out during curing period. Use procedures required by climatic conditions, including moist curing, providing coverings, and providing barriers to deflect sunlight and wind.
2. Apply plaster when ambient temperature is greater than 40 deg F (4.4 deg C).
3. Protect plaster coats from freezing for not less than 48 hours after set of plaster coat has occurred.

PART 2 - PRODUCTS

2.1 METAL LATH

A. Expanded-Metal Lath: ASTM C 847 with ASTM A 653/A 653M, G60 (Z180), hot-dip galvanized zinc coating.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

   a. Alabama Metal Industries Corporation; a Gibraltar Industries company.
   b. CEMCO.
   c. Clark Western Building Systems.
   d. Dietrich Metal Framing; a Worthington Industries company.
   e. MarinoWARE.
   f. Phillips Manufacturing Co.

2. Diamond-Mesh Lath: Self-furring, 2.5 lb/sq. yd. (1.4 kg/sq. m) for vertical surfaces and 3.4 lb/sq. yd. (1.8 kg/sq. m) for horizontal surfaces.

2.2 ACCESSORIES

A. General: Comply with ASTM C 1063 and coordinate depth of trim and accessories with thicknesses and number of plaster coats required.

B. Metal Accessories:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

    a. Alabama Metal Industries Corporation; a Gibraltar Industries company.
    b. CEMCO.
    c. Clark Western Building Systems.
    d. Dietrich Metal Framing; a Worthington Industries company.
    e. Fry Reglet Col
    f. MarinoWARE.
    g. Phillips Manufacturing Co.

2. Foundation Weep Screed: Fabricated from hot-dip galvanized-steel sheet, ASTM A 653/A 653M, G60 (Z180) zinc coating.
3. Cornerite: Fabricated from metal lath with ASTM A 653/A 653M, G60 (Z180), hot-dip galvanized zinc coating.
4. External-Corner Reinforcement: Fabricated from metal lath with ASTM A 653/A 653M, G60 (Z180), hot-dip galvanized zinc coating.
5. Cornerbeads: Fabricated from zinc or zinc-coated (galvanized) steel with a plastic nose.

    a. Small nose cornerbead with expanded flanges; use unless otherwise indicated.
    b. Small nose cornerbead with expanded flanges reinforced by perforated stiffening rib; use on columns and for finishing masonry corners.

6. Casing Beads: Fabricated from zinc or zinc-coated (galvanized) steel; square-edged style; with expanded flanges.
7. Control Joints: Fabricated from clear anodized aluminum finish; one-piece-type, folded pair of unperforated screeds in M-shaped configuration; with perforated flanges and removable protective tape on plaster face of control joint.
8. Drip Screed: Fabricated from clear anodized Aluminum finish

2.3 MISCELLANEOUS MATERIALS

A. Water for Mixing: Potable and free of substances capable of affecting plaster set or of damaging plaster, lath, or accessories.

B. Fiber for Base Coat: Alkaline-resistant glass or polypropylene fibers, 1/2 inch (13 mm) long, free of contaminants, manufactured for use in portland cement plaster.

C. Steel Drill Screws: For metal-to-metal fastening, ASTM C 1002 or ASTM C 954, as required by thickness of metal being fastened; with pan head that is suitable for application; in lengths required to achieve penetration through joined materials of no fewer than three exposed threads.

D. Fasteners for Attaching Metal Lath to Substrates: Complying with ASTM C 1063.

E. Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, not less than 0.0475-inch (1.21-mm) diameter, unless otherwise indicated.

2.4 PLASTER MATERIALS

A. Portland Cement: ASTM C 150, Type I or Type II.

1. Color for Finish Coats: White.

B. Lime: ASTM C 206, Type S; or ASTM C 207, Type S.

C. Sand Aggregate: ASTM C 897.

1. Color for Job-Mixed Finish Coats: White.

D. Ready-Mixed Finish-Coat Plaster: Mill-mixed portland cement, aggregates, coloring agents, and proprietary ingredients.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. Bonsal American, an Oldcastle Company; Marblesil Stucco Mix.
b. California Stucco Products Corp.; Conventional Portland Cement Stucco.
c. El Rey Stucco Company, Inc., a brand of ParexLaHabra, Inc.; Premium Stucco Finish.
d. Omega Products International, Inc.; ColorTek Exterior Stucco.
e. QUIKCRETE; QUIKCRETE Finish Coat Stucco, No. 1201.
f. Shamrock Stucco LLC; Exterior Stucco.
g. SonoWall, BASF Wall Systems, Inc.; Thoro Stucco.
h. USG Corporation; Oriental Exterior Finish Stucco.

2. Color: As selected by Architect from manufacturer's full range.

2.5 PLASTER MIXES

A. General: Comply with ASTM C 926 for applications indicated.

1. Fiber Content: Add fiber to base-coat mixes after ingredients have mixed at least two minutes. Comply with fiber manufacturer's written instructions for fiber quantities in mixes, but do not exceed 1 lb of fiber/cu. yd. (0.6 kg of fiber/cu. m) of cementitious materials.

B. Base-Coat Mixes for Use over Metal Lath: Scratch and brown coats for three-coat plasterwork as follows:

1. Portland Cement Mixes:

a. Scratch Coat: For cementitious material, mix 1 part portland cement and 3/4 to 1-1/2 parts lime. Use 2-1/2 to 4 parts aggregate per part of cementitious material.
b. Brown Coat: For cementitious material, mix 1 part portland cement and 3/4 to 1-1/2 parts lime. Use 3 to 5 parts aggregate per part of cementitious material, but not less than volume of aggregate used in scratch coat.

C. Base-Coat Mixes: Single base coats for two-coat plasterwork as follows:

1. Portland Cement Mix: For cementitious material, mix 1 part portland cement and 0 to 3/4 part lime. Use 2-1/2 to 4 parts aggregate per part of cementitious material.

D. Job-Mixed Finish-Coat Mixes:

1. Portland Cement Mix: For cementitious materials, mix 1 part portland cement and 3/4 to 1-1/2 parts lime. Use 1-1/2 to 3 parts aggregate per part of cementitious material.

E. Factory-Prepared Finish-Coat Mixes: For ready-mixed finish-coat plasters, comply with manufacturer's written instructions.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and substrates, with Installer present, and including welded hollow-metal frames, cast-in anchors, and structural framing, for compliance with requirements and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Protect adjacent work from soiling, spattering, moisture deterioration, and other harmful effects caused by plastering.

B. Prepare solid substrates for plaster that are smooth or that do not have the suction capability required to bond with plaster according to ASTM C 926.

3.3 INSTALLING METAL LATH

A. Expanded-Metal Lath: Install according to ASTM C 1063.

1. Partition Framing and Vertical Furring: Install 2.5 lb/sq yd self-furring diamond-mesh lath.
2. Flat-Ceiling and Horizontal Framing: Install 3.4 lb/sq yd self furring diamond-mesh lath.

3.4 INSTALLING ACCESSORIES

A. Install according to ASTM C 1063 and at locations indicated on Drawings.

B. Reinforcement for External Corners:

1. Install lath-type, external-corner reinforcement at exterior locations.

C. Control Joints: Install control joints at locations indicated on Drawings.

1. At distances between control joints of not greater than 18 feet (5.5 m) o.c.
2. As required to delineate plasterwork into areas (panels) with length-to-width ratios of not greater than 2-1/2:1.
3. Where control joints occur in surface of construction directly behind plaster.
4. Where plasterwork areas change dimensions, to delineate rectangular-shaped areas (panels) and to relieve the stress that occurs at the corner formed by the dimension change.

3.5 PLASTER APPLICATION

A. General: Comply with ASTM C 926.

1. Do not deviate more than plus or minus 1/4 inch in 10 feet (6.4 mm in 3 m) from a true plane in finished plaster surfaces, as measured by a 10-foot (3-m) straightedge placed on surface.
2. Finish plaster flush with metal frames and other built-in metal items or accessories that act as a plaster ground unless otherwise indicated. Where casing bead does not terminate plaster at metal frame, cut base coat free from metal frame before plaster sets and groove finish coat at junctures with metal.
3. Provide plaster surfaces that are ready to receive field-applied finishes indicated.

B. Bonding Compound: Apply on unit masonry and concrete plaster bases.

C. Walls; Base-Coat Mixes for Use over Metal Lath: Scratch and brown coats for three-coat plasterwork, on concrete; 3/4-inch (19-mm) thickness.

1. Portland cement mixes.

D. Ceilings; Base-Coat Mixes for Use over Metal Lath: Scratch and brown coats for three-coat plasterwork; 1/2 inch (13 mm) thick.

1. Portland cement mixes.

E. Plaster Finish Coats: Apply to provide smooth finish to match Architect's sample to receive elastomeric coating specified.

3.6 PLASTER REPAIRS

A. Repair or replace work to eliminate cracks, dents, blisters, buckles, crazing and check cracking, dry outs, efflorescence, sweat outs, and similar defects and where bond to substrate has failed.

3.7 PROTECTION

A. Remove temporary protection and enclosure of other work. Promptly remove plaster from door frames, windows, and other surfaces not indicated to be plastered. Repair floors, walls, and other surfaces stained, marred, or otherwise damaged during plastering.

END OF SECTION 09220

SECTION 09250 - GYPSUM BOARD

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Interior gypsum board.
2. Tile backing panels.
3. Texture finishes.

B. Related Requirements:
1. Section 09111 "Non-Load-Bearing Steel Framing" for non-structural framing and suspension systems that support gypsum board panels.
2. Section 09310 "Ceramic Tile" for cementitious backer units installed as substrates for ceramic tile.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.4 QUALITY ASSURANCE

A. Mockups: Before beginning gypsum board installation, install mockups of at least 100 sq. ft. (9 sq. m) in surface area to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Install mockups for the following:
   a. Each texture finish indicated.

2. Apply or install final decoration indicated, including painting and wallcoverings, on exposed surfaces for review of mockups.
3. Simulate finished lighting conditions for review of mockups.
4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.5 DELIVERY, STORAGE AND HANDLING

A. Store materials inside under cover and keep them dry and protected against weather, condensation, direct sunlight, construction traffic, and other potential causes of damage. Stack panels flat and supported on risers on a flat platform to prevent sagging.

1.6 FIELD CONDITIONS

A. Environmental Limitations: Comply with ASTM C 840 requirements or gypsum board manufacturer's written recommendations, whichever are more stringent.

B. Do not install paper-faced gypsum panels until installation areas are enclosed and conditioned.

C. Do not install panels that are wet, those that are moisture damaged, and those that are mold damaged.

1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Resistance-Rated Assemblies: For fire-resistance-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 119 by an independent testing agency.

B. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 90 and classified according to ASTM E 413 by an independent testing agency.

2.2 GYPSUM BOARD, GENERAL

A. Size: Provide maximum lengths and widths available that will minimize joints in each area and that correspond with support system indicated.

2.3 INTERIOR GYPSUM BOARD

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. American Gypsum.
2. CertainTeed Corp.
3. Georgia-Pacific Gypsum LLC.
4. Lafarge North America Inc.
5. National Gypsum Company.
6. USG Corporation.

B. Gypsum Wallboard: ASTM C 1396/C 1396M.

C. Gypsum Board, Type X: ASTM C 1396/C 1396M.

1. Thickness: 5/8 inch (15.9 mm).
2. Long Edges: Tapered and featured (rounded or beveled) for prefilling.

D. Moisture- and Mold-Resistant Gypsum Board: ASTM C 1396/C 1396M. With moisture- and mold-resistant core and paper surfaces.

1. Core: 5/8 inch (15.9 mm), Type X.
2. Long Edges: Tapered.
3. Mold Resistance: ASTM D 3273, score of 10 as rated according to ASTM D 3274.

2.4 TILE BACKING PANELS

A. Cementitious Backer Units: ANSI A118.9 and ASTM C 1288 or 1325, with manufacturer's standard edges.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

   a. C-Cure; C-Cure Board 990.
   b. CertainTeed Corp.; FiberCement BackerBoard.
   c. Custom Building Products; Wonderboard.
   d. James Hardie Building Products, Inc.; Hardiebacker.
   e. National Gypsum Company, Permabase Cement Board.
   f. USG Corporation; DUROCK Cement Board.

2. Thickness: 5/8 inch (15.9 mm).
3. Mold Resistance: ASTM D 3273, score of 10 as rated according to ASTM D 3274.

2.5 TRIM ACCESSORIES

A. Interior Trim: ASTM C 1047.

1. Material: Paper-faced galvanized steel sheet.
2. Shapes:

a. Cornerbead.
b. LC-Bead: J-shaped; exposed long flange receives joint compound.
c. L-Bead: L-shaped; exposed long flange receives joint compound.

B. Aluminum Trim: Extruded accessories of profiles and dimensions indicated.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. Fry Reglet Corp.
b. Gordon, Inc.
c. Pittcon Industries.

2. Aluminum: Alloy and temper with not less than the strength and durability properties of ASTM B 221 (ASTM B 221M), Alloy 6063-T5.
3. Finish: Clear Anodized Aluminum

2.6 JOINT TREATMENT MATERIALS

A. General: Comply with ASTM C 475/C 475M.

B. Joint Tape:

1. Interior Gypsum Board: Paper.
2. Tile Backing Panels: As recommended by panel manufacturer.

C. Joint Compound for Interior Gypsum Board: For each coat use formulation that is compatible with other compounds applied on previous or for successive coats.

1. Prefilling: At open joints, rounded or beveled panel edges, and damaged surface areas, use setting-type taping compound.
2. Embedding and First Coat: For embedding tape and first coat on joints, fasteners, and trim flanges, use setting-type taping compound.

a. Use setting-type compound for installing paper-faced metal trim accessories.

3. Fill Coat: For second coat, use setting-type, sandable topping compound.
4. Finish Coat: For third coat, use drying-type, all-purpose compound.

2.7 AUXILIARY MATERIALS

A. General: Provide auxiliary materials that comply with referenced installation standards and manufacturer's written recommendations.

B. Steel Drill Screws: ASTM C 1002, unless otherwise indicated.

1. Use screws complying with ASTM C 954 for fastening panels to steel members from 0.033 to 0.112 inch (0.84 to 2.84 mm) thick.
2. For fastening cementitious backer units, use screws of type and size recommended by panel manufacturer.

C. Sound Attenuation Blankets: ASTM C 665, Type I (blankets without membrane facing) produced by combining thermosetting resins with mineral fibers manufactured from glass, slag wool, or rock wool.

1. Fire-Resistance-Rated Assemblies: Comply with mineral-fiber requirements of assembly.

D. Acoustical Joint Sealant: Manufacturer's standard nonsag, paintable, nonstaining latex sealant complying with ASTM C 834. Product effectively reduces airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

   a. Accumetric LLC; BOSS 824 Acoustical Sound Sealant.
   b. Grabber Construction Products; Acoustical Sealant GSC.
   c. Pecora Corporation; AIS-919.
   d. Specified Technologies, Inc.; Smoke N Sound Acoustical Sealant.
   e. USG Corporation; SHEETROCK Acoustical Sealant.

2. Acoustical joint sealant shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

E. Thermal Insulation: As specified in Section 07210 "Building Insulation."

F. Vapor Retarder: As specified in Section 07210 "Building Insulation."

2.8 TEXTURE FINISHES

A. Primer: As recommended by textured finish manufacturer.

B. Non-Aggregate Finish: Pre-mixed, vinyl texture finish for spray application.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

   a. CertainTeed Corp.; ProRoc Easi-Tex Spray Texture.
   b. National Gypsum Company; Perfect Spray EM Texture.
   c. USG Corporation; BEADEX FasTex Wall and Ceiling Spray Texture.

2. Texture: Fine Orange Peel .

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and substrates including welded hollow-metal frames and framing, with Installer present, for compliance with requirements and other conditions affecting performance.

B. Examine panels before installation. Reject panels that are wet, moisture damaged, and mold damaged.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 APPLYING AND FINISHING PANELS, GENERAL

A. Comply with ASTM C 840.

B. Install ceiling panels across framing to minimize the number of abutting end joints and to avoid abutting end joints in central area of each ceiling. Stagger abutting end joints of adjacent panels not less than one framing member.

C. Install panels with face side out. Butt panels together for a light contact at edges and ends with not more than 1/16 inch (1.5 mm) of open space between panels. Do not force into place.

D. Locate edge and end joints over supports, except in ceiling applications where intermediate supports or gypsum board back-blocking is provided behind end joints. Do not place tapered edges against cut edges or ends. Stagger vertical joints on opposite sides of partitions. Do not make joints other than control joints at corners of framed openings.

E. Form control and expansion joints with space between edges of adjoining gypsum panels.

F. Cover both faces of support framing with gypsum panels in concealed spaces (above ceilings, etc.), except in chases braced internally.

1. Unless concealed application is indicated or required for sound, fire, air, or smoke ratings, coverage may be accomplished with scraps of not less than 8 sq. ft. (0.7 sq. m) in area.
2. Fit gypsum panels around ducts, pipes, and conduits.
3. Where partitions intersect structural members projecting below underside of floor/roof slabs and decks, cut gypsum panels to fit profile formed by structural members; allow 1/4- to 3/8-inch- (6.4- to 9.5-mm-) wide joints to install sealant.

G. Isolate perimeter of gypsum board applied to non-load-bearing partitions at structural abutments, except floors. Provide 1/4- to 1/2-inch- (6.4- to 12.7-mm-) wide spaces at

these locations and trim edges with edge trim where edges of panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.

H. Attachment to Steel Framing: Attach panels so leading edge or end of each panel is attached to open (unsupported) edges of stud flanges first.

I. STC-Rated Assemblies: Seal construction at perimeters, behind control joints, and at openings and penetrations with a continuous bead of acoustical sealant. Install acoustical sealant at both faces of partitions at perimeters and through penetrations. Comply with ASTM C 919 and with manufacturer's written recommendations for locating edge trim and closing off sound-flanking paths around or through assemblies, including sealing partitions above acoustical ceilings.

J. Install sound attenuation blankets before installing gypsum panels unless blankets are readily installed after panels have been installed on one side.

3.3 APPLYING INTERIOR GYPSUM BOARD

A. Install interior gypsum board in the following locations:
   1. Type X: Vertical and horizontal surfaces unless otherwise indicated.
   2. Moisture- and Mold-Resistant Type: In all wet areas on surface not scheduled to receive tile. Includes but not limited to Restrooms, Kitchen, Mop Closets, and Janitor’s Closet.

B. Single-Layer Application:

   1. On ceilings, apply gypsum panels before wall/partition board application to greatest extent possible and at right angles to framing unless otherwise indicated.
   2. On partitions/walls, apply gypsum panels vertically (parallel to framing) unless otherwise indicated or required by fire-resistance-rated assembly, and minimize end joints.

      a. Stagger abutting end joints not less than one framing member in alternate courses of panels.
      b. At stairwells and other high walls, install panels horizontally unless otherwise indicated or required by fire-resistance-rated assembly.

   3. On Z-furring members, apply gypsum panels vertically (parallel to framing) with no end joints. Locate edge joints over furring members.
   4. Fastening Methods: Apply gypsum panels to supports with steel drill screws.

3.4 APPLYING TILE BACKING PANELS

A. Cementitious Backer Units: ANSI A108.11, at locations indicated to receive tile.

B. Where tile backing panels abut other types of panels in same plane, shim surfaces to produce a uniform plane across panel surfaces.

3.5 INSTALLING TRIM ACCESSORIES

A. General: For trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels. Otherwise, attach trim according to manufacturer's written instructions.

B. Interior Trim: Install in the following locations:

1. Cornerbead: Use at outside corners unless otherwise indicated.
2. Bullnose Bead: Use at outside corners where indicated.
3. LC-Bead: Use at exposed panel edges.
4. L-Bead: Use where indicated.

C. Aluminum Trim: Install in locations indicated on Drawings.

3.6 FINISHING GYPSUM BOARD

A. General: Treat gypsum board joints, interior angles, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration. Promptly remove residual joint compound from adjacent surfaces.

B. Prefill open joints, rounded or beveled edges, and damaged surface areas.

C. Apply joint tape over gypsum board joints, except for trim products specifically indicated as not intended to receive tape.

D. Gypsum Board Finish Levels: Finish panels to levels indicated below and according to ASTM C 840:

1. Level 1: Ceiling plenum areas, concealed areas, and where indicated.
2. Level 2: Panels that are substrate for tile and Panels that are substrate for acoustical tile Where indicated on Drawings.
3. Level 4: At panel surfaces that will be exposed to view unless otherwise indicated.

E. Cementitious Backer Units: Finish according to manufacturer's written instructions.

3.7 APPLYING TEXTURE FINISHES

A. Surface Preparation and Primer: Prepare and apply primer to gypsum panels and other surfaces receiving texture finishes. Apply primer to surfaces that are clean, dry, and smooth.

B. Texture Finish Application: Mix and apply finish using powered spray equipment, to produce a uniform texture matching approved mockup and free of starved spots or other evidence of thin application or of application patterns.

C. Prevent texture finishes from coming into contact with surfaces not indicated to receive texture finish by covering them with masking agents, polyethylene film, or other means. If, despite these precautions, texture finishes contact these surfaces, immediately remove droppings and overspray to prevent damage according to texture-finish manufacturer's written recommendations.

3.8 PROTECTION

A. Protect adjacent surfaces from drywall compound and promptly remove from floors and other non-drywall surfaces. Repair surfaces stained, marred, or otherwise damaged during drywall application.

B. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.

C. Remove and replace panels that are wet, moisture damaged, and mold damaged.

1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION 09250

SECTION 09310 - CERAMIC TILE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Ceramic tile.
2. Tile backing panels.

B. Related Sections:

1. Section 07131 "Self-Adhering Sheet Waterproofing" for waterproofing under thickset mortar beds.
2. Section 07920 "Joint Sealants" for sealing of expansion, contraction, control, and isolation joints in tile surfaces.
3. Section 09250 "Gypsum Board" for cementitious backer units .
4. Section 09638 "Stone Flooring" for stone thresholds.

1.3 DEFINITIONS

A. General: Definitions in the ANSI A108 series of tile installation standards and in ANSI A137.1 apply to Work of this Section unless otherwise specified.

B. ANSI A108 Series: ANSI A108.01, ANSI A108.02, ANSI A108.1A, ANSI A108.1B, ANSI A108.1C, ANSI A108.4, ANSI A108.5, ANSI A108.6, ANSI A108.8, ANSI A108.9, ANSI A108.10, ANSI A108.11, ANSI A108.12, ANSI A108.13, ANSI A108.14, ANSI A108.15, ANSI A108.16, and ANSI A108.17, which are contained in "American National Standard Specifications for Installation of Ceramic Tile."

C. Module Size: Actual tile size plus joint width indicated.

D. Face Size: Actual tile size, excluding spacer lugs.

1.4 PERFORMANCE REQUIREMENTS

A. Static Coefficient of Friction: For tile installed on walkway surfaces, provide products with the following values as determined by testing identical products per ASTM C 1028:

1. Level Surfaces: Minimum 0.51.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Samples for Initial Selection: For each type of tile and grout indicated. Include Samples of accessories involving color selection.

C. Samples for Verification:

1. Full-size units of each type and composition of tile and for each color and finish required.
2. Full-size units of each type of trim and accessory for each color and finish required.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified Installer.

B. Master Grade Certificates: For each shipment, type, and composition of tile, signed by tile manufacturer and Installer.

C. Product Certificates: For each type of product, signed by product manufacturer.

D. Material Test Reports: For each tile-setting and -grouting product and special purpose tile.

1.7 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match and are from same production runs as products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Tile and Trim Units: Furnish quantity of full-size units equal to 3 percent of amount installed for each type, composition, color, pattern, and size indicated.

1.8 QUALITY ASSURANCE

A. Source Limitations for Tile: Obtain tile of each type from one source or producer.

1. Obtain tile of each type and color or finish from same production run and of consistent quality in appearance and physical properties for each contiguous area.

B. Source Limitations for Setting and Grouting Materials: Obtain ingredients of a uniform quality for each mortar, adhesive, and grout component from one manufacturer and each aggregate from one source or producer.

C. Source Limitations for Other Products: Obtain each of the following products specified in this Section from a single manufacturer for each product:
1. Joint sealants.
2. Cementitious backer units.

D. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
1. Build mockup of each type of floor tile installationBuild mockup of each type of wall tile installation.

2. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

E. Preinstallation Conference: Conduct conference at Project site.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Deliver and store packaged materials in original containers with seals unbroken and labels intact until time of use. Comply with requirements in ANSI A137.1 for labeling tile packages.

B. Store tile and cementitious materials on elevated platforms, under cover, and in a dry location.

C. Store aggregates where grading and other required characteristics can be maintained and contamination can be avoided.

D. Store liquid materials in unopened containers and protected from freezing.

E. Handle tile that has temporary protective coating on exposed surfaces to prevent coated surfaces from contacting backs or edges of other units. If coating does contact bonding surfaces of tile, remove coating from bonding surfaces before setting tile.

1.10 PROJECT CONDITIONS

A. Environmental Limitations: Do not install tile until construction in spaces is complete and ambient temperature and humidity conditions are maintained at the levels indicated in referenced standards and manufacturer's written instructions.

PART 2 - PRODUCTS

2.1 PRODUCTS, GENERAL

A. ANSI Ceramic Tile Standard: Provide tile that complies with ANSI A137.1 for types, compositions, and other characteristics indicated.

1. Provide tile complying with Standard grade requirements unless otherwise indicated.

B. ANSI Standards for Tile Installation Materials: Provide materials complying with ANSI A108.02, ANSI standards referenced in other Part 2 articles, ANSI standards referenced by TCA installation methods specified in tile installation schedules, and other requirements specified.

C. Factory Blending: For tile exhibiting color variations within ranges, blend tile in factory and package so tile units taken from one package show same range in colors as those taken from other packages and match approved Samples.

D. Mounting: For factory-mounted tile, provide back- or edge-mounted tile assemblies as standard with manufacturer unless otherwise indicated.

2.2 TILE PRODUCTS

A. Tile Type CT1-]: Factory-mounted glazed ceramic mosaic

a.

b. 1. Basis of Design Product: Subject to compliance with requirements, provided for:American Olean; Division of Dal-Tile International Inc.
c. Crossville, Inc.
d. Daltile; Division of Dal-Tile International Inc.; Keystone Series
e. Deutsche Steinzeug America, Inc.
f. Interceramic.
g. Lone Star Ceramics Company.
h. Grupo Porcelanite.
i. Portobello America, Inc.
j. Seneca Tiles, Inc.

2. Composition: .Vitreous or impervious natural clay or porcelain.
3. Module Size: .2 by 2 inches.
4. Thickness: 1/4 inch (6.35 mm).
5. Face: Pattern of design indicated,
6. SurfaceSlip resistant, with abrasive admixture.
7. Tile Color and Pattern: As selected by Architect from manufacturer's full range .
8. Grout Color: As selected by Architect from manufacturer's full range .

B. Tile Type QT1: Unglazed square-edged quarry tile.
1. Basis of Design Product: Subject to compliance with requirements, provide:

a. American Olean; Division of Dal-Tile International Inc.
b. Atlas Minerals & Chemicals, Inc.
c. Daltile; Division of Dal-Tile International Inc.
d. Deutsche Steinzeug America, Inc.
e. Endicott Tile Ltd.; Endicott Clay Products Co.
f. Florida Brick & Clay Company Inc.
g. Florida Tile Industries, Inc.
h. Interceramic.
i. Metropolitan Ceramics.
j. Portobello America, Inc.
k. Quarry Tile Co.
l. Seneca Tiles, Inc.
m. Summitville Tiles, Inc.
n. United States Ceramic Tile Company.

2. Face Size: 6 by 6 inches (152 by 152 mm) .
3. Thickness: .3/8 inch (9.5 mm)
4. Wearing Surface: Nonabrasive, smooth .
5. Tile Color and Pattern: As selected by Architect from manufacturer's full range.
6. Grout Color: As selected by Architect from manufacturer's full range .
7.
8. Trim Units: Coordinated with sizes and coursing of adjoining flat tile where applicable and matching characteristics of adjoining flat tile. Provide shapes as follows, selected from manufacturer's standard shapes:

a. Base: Coved, face size 6 by 6 inches (152 by 152 mm) .

C. Tile Type [**CT-**2-9]: Glazed wall tile .

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

    a. American Marazzi Tile, Inc.
    b. American Olean; Division of Dal-Tile International Inc.
    c. Daltile; Division of Dal-Tile International Inc.
    d. Deutsche Steinzeug America, Inc.
    e. Florida Tile Industries, Inc.
    f. Florim USA.
    g. Laufen.
    h. Grupo Porcelanite.
    i. Portobello America, Inc.
    j. Seneca Tiles, Inc.
    k. United States Ceramic Tile Company.

2. Module Size: varies
3. Thickness: 5/16 inch (8 mm).
4. Face: Plain with modified square edges or cushion edges .
5. Tile Color and Pattern: As selected by Architect from manufacturer's full range.
6. Grout Color: As selected by Architect from manufacturer's full range .
7. Mounting: Factory, back mounted.
8. Mounting: Pregrouted sheets of tiles factory assembled and grouted with manufacturer's standard white silicone rubber.
9. Trim Units: Coordinated with sizes and coursing of adjoining flat tile where applicable and matching characteristics of adjoining flat tile. Provide shapes as follows, selected from manufacturer's standard shapes:
    a. Internal Corners: Field-butted square corners. For coved base and cap use angle pieces designed to fit with stretcher shapes.

2.3 TILE BACKING PANELS

A. Cementitious Backer Units: ANSI A118.9 or ASTM C 1325, in maximum lengths available to minimize end-to-end butt joints.

1. Products: Subject to compliance with requirements, provide one of the following :
    a. Custom Building Products; Wonderboard.
    b. FinPan, Inc.; Util-A-Crete Concrete Backer Board.
    c. USG Corporation; DUROCK Cement Board.

2. Thickness: 5/8 inch (15.9 mm) .

2.4 SETTING MATERIALS

A. Dry-Set Portland Cement Mortar (Thin Set): ANSI A118.1.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
    a. C-Cure.
    b. Laticrete International, Inc.
    c. MAPEI Corporation.
    d. Southern Grouts & Mortars, Inc.

2. For wall applications, provide mortar that complies with requirements for nonsagging mortar in addition to the other requirements in ANSI A118.1.

2.5 GROUT MATERIALS

A. Sand-Portland Cement Grout: ANSI A108.10, composed of white or gray cement and white or colored aggregate as required to produce color indicated.

B. Standard Cement Grout: ANSI A118.6.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   a. C-Cure.
   b. Laticrete International, Inc.
   c. MAPEI Corporation.

2.6 ELASTOMERIC SEALANTS

A. General: Provide sealants, primers, backer rods, and other sealant accessories that comply with the following requirements and with the applicable requirements in Section 07920 "Joint Sealants."

B. Colors: Provide colors of exposed sealants to match colors of grout in tile adjoining sealed joints unless otherwise indicated.

C. One-Part, Mildew-Resistant Silicone Sealant: ASTM C 920; Type S; Grade NS; Class 25; Uses NT, G, A, and, as applicable to nonporous joint substrates indicated, O; formulated with fungicide, intended for sealing interior ceramic tile joints and other nonporous substrates that are subject to in-service exposures of high humidity and extreme temperatures.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

   a. DAP Inc.; Titanium Enriched Kitchen and Bath Sealant .
   b. Dow Corning Corporation; Dow Corning 786.
   c. GE Silicones; a division of GE Specialty Materials; Sanitary 1700.
   d. Laticrete International, Inc.; Latasil Tile & Stone Sealant.
   e. Pecora Corporation; Pecora 898 Sanitary Silicone Sealant.
   f. Tremco Incorporated; Tremsil 600 White.
   g. <

2.7 MISCELLANEOUS MATERIALS

A. Grout Sealer: Manufacturer's standardor the tile product for sealing grout joints and that does not change color or appearance of grout.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

   a. Bonsal American; an Oldcastle company; Grout Sealer.
   b. Custom Building Products; Grout Sealer.

c. Southern Grouts & Mortars, Inc.; Silicone Grout Sealer.
d. TEC; a subsidiary of H. B. Fuller Company; TA-256 Penetrating Silicone Grout Sealer.

2.8 MIXING MORTARS AND GROUT

A. Mix mortars and grouts to comply with referenced standards and mortar and grout manufacturers' written instructions.

B. Add materials, water, and additives in accurate proportions.

C. Obtain and use type of mixing equipment, mixer speeds, mixing containers, mixing time, and other procedures to produce mortars and grouts of uniform quality with optimum performance characteristics for installations indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions where tile will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of installed tile.

1. Verify that substrates for setting tile are firm, dry, clean, free of coatings that are incompatible with tile-setting materials including curing compounds and other substances that contain soap, wax, oil, or silicone; and comply with flatness tolerances required by ANSI A108.01 for installations indicated.

2. Verify that installation of grounds, anchors, recessed frames, electrical and mechanical units of work, and similar items located in or behind tile has been completed.
3. Verify that joints and cracks in tile substrates are coordinated with tile joint locations; if not coordinated, adjust joint locations in consultation with Architect.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Fill cracks, holes, and depressions in concrete substrates for tile floors installed with thin-set mortar with trowelable leveling and patching compound specifically recommended by tile-setting material manufacturer.

B. Where indicated, prepare substrates to receive waterproofing by applying a reinforced mortar bed that complies with ANSI A108.1A and is sloped 1/4 inch per foot (1:50) toward drains.

C. Blending: For tile exhibiting color variations, verify that tile has been factory blended and packaged so tile units taken from one package show same range of colors as those taken from other packages and match approved Samples. If not factory blended, either return to manufacturer or blend tiles at Project site before installing.

D. Field-Applied Temporary Protective Coating: If indicated under tile type or needed to prevent grout from staining or adhering to exposed tile surfaces, precoat them with continuous film of temporary protective coating, taking care not to coat unexposed tile surfaces.

3.3 TILE INSTALLATION

A. Comply with TCA's "Handbook for Ceramic Tile Installation" for TCA installation methods specified in tile installation schedules. Comply with parts of the ANSI A108 Series "Specifications for Installation of Ceramic Tile" that are referenced in TCA installation methods, specified in tile installation schedules, and apply to types of setting and grouting materials used.

1. For the following installations, follow procedures in the ANSI A108 Series of tile installation standards for providing 95 percent mortar coverage:
   a. Tile floors in wet areas.
   b. Tile floors in laundries.

B. Extend tile work into recesses and under or behind equipment and fixtures to form complete covering without interruptions unless otherwise indicated. Terminate work neatly at obstructions, edges, and corners without disrupting pattern or joint alignments.

C. Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Carefully grind cut edges of tile abutting trim, finish, or built-in items for straight aligned joints. Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so plates, collars, or covers overlap tile.

D. Provide manufacturer's standard trim shapes where necessary to eliminate exposed tile edges.

E. Jointing Pattern: Lay tile in grid pattern unless otherwise indicated. Lay out tile work and center tile fields in both directions in each space or on each wall area. Lay out tile work to minimize the use of pieces that are less than half of a tile. Provide uniform joint widths unless otherwise indicated.

1. For tile mounted in sheets, make joints between tile sheets same width as joints within tile sheets so joints between sheets are not apparent in finished work.
2. Where adjoining tiles on floor, base, walls, or trim are specified or indicated to be same size, align joints.
3. Where tiles are specified or indicated to be whole integer multiples of adjoining tiles on floor, base, walls, or trim, align joints unless otherwise indicated.

F. Joint Widths: Unless otherwise indicated, install tile with the following joint widths:
1. Quarry Tile: 3/8 inch (9.5 mm).
2. Glazed Wall Tile: 1/16 inch (1.6 mm).

G. Lay out tile wainscots to dimensions indicated or to next full tile beyond dimensions indicated.

H. Expansion Joints: Provide expansion joints and other sealant-filled joints, including control, contraction, and isolation joints, where indicated. Form joints during installation of setting materials, mortar beds, and tile. Do not saw-cut joints after installing tiles.

1. Where joints occur in concrete substrates, locate joints in tile surfaces directly above them.

I. Grout Sealer: Apply grout sealer to cementitious grout joints in tile floors according to grout-sealer manufacturer's written instructions. As soon as grout sealer has penetrated grout joints, remove excess sealer and sealer from tile faces by wiping with soft cloth.

3.4 TILE BACKING PANEL INSTALLATION

A. Install cementitious backer units and treat joints according to ANSI A108.11 and manufacturer's written instructions for type of application indicated. Use latex-portland cement mortar for bonding material unless otherwise directed in manufacturer's written instructions.

3.5 CLEANING AND PROTECTING

A. Cleaning: On completion of placement and grouting, clean all ceramic tile surfaces so they are free of foreign matter.

1. Remove latex-portland cement grout residue from tile as soon as possible.
2. Clean grout smears and haze from tile according to tile and grout manufacturer's written instructions but no sooner than 10 days after installation. Use only cleaners recommended by tile and grout manufacturers and only after determining that cleaners are safe to use by testing on samples of tile and other surfaces to be cleaned. Protect metal surfaces and plumbing fixtures from effects of cleaning. Flush surfaces with clean water before and after cleaning.
3. Remove temporary protective coating by method recommended by coating manufacturer and that is acceptable to tile and grout manufacturer. Trap and remove coating to prevent drain clogging.

B. Protect installed tile work with kraft paper or other heavy covering during construction period to prevent staining, damage, and wear. If recommended by tile manufacturer, apply coat of neutral protective cleaner to completed tile walls and floors.

C. Prohibit foot and wheel traffic from tiled floors for at least seven days after grouting is completed.

D. Before final inspection, remove protective coverings and rinse neutral protective cleaner from tile surfaces.

1. Tile Installation F113: Thin-set mortar; TCA F113.

    a. Tile Type: quarry tile and glazed ceramic mosaics
    b. Thin-Set Mortar: Dry-set portland cement mortar.
    c. Grout: Sand-portland cement grout.

2. Tile Installation W244: Thin-set mortar on cementitious backer units or fiber cement underlayment; TCA W244.

    a. Tile Type: Semi Gloss Porcelain tile
    b. Thin-Set Mortar: Dry-set portland cement mortar.
    c. Grout: Sand-portland cement grout.

END OF SECTION 09310

SECTION 09512 - ACOUSTICAL TILE CEILINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes acoustical tiles for ceilings and the following:

1. Concealed suspension systems.

1.3 DEFINITIONS

A. AC: Articulation Class.

B. CAC: Ceiling Attenuation Class.

C. LR: Light-Reflectance coefficient.

D. NRC: Noise Reduction Coefficient.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Samples for Verification: For each component indicated and for each exposed finish required, prepared on Samples of size indicated below.

1. Acoustical Tile: Set of full-size Samples of each type, color, pattern, and texture.
2. Concealed Suspension System Members: 12-inch- long Sample of each type.
3. Exposed Moldings and Trim: Set of 12-inch- long Samples of each type and color.

C. Qualification Data: For testing agency.

D. Maintenance Data: For finishes to include in maintenance manuals.

1.5 QUALITY ASSURANCE

A. Acoustical Testing Agency Qualifications: An independent testing laboratory, or an NVLAP-accredited laboratory, with the experience and capability to conduct the testing indicated. NVLAP-accredited laboratories must document accreditation, based on a "Certificate of Accreditation" and a "Scope of Accreditation" listing the test methods specified.

B. Source Limitations: Obtain each type of acoustical ceiling tile and supporting suspension system through one source from a single manufacturer.

C. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver acoustical tiles, suspension system components, and accessories to Project site in original, unopened packages and store them in a fully enclosed, conditioned space where they will be protected against damage from moisture, humidity, temperature extremes, direct sunlight, surface contamination, and other causes.

B. Before installing acoustical tiles, permit them to reach room temperature and a stabilized moisture content.

C. Handle acoustical tiles carefully to avoid chipping edges or damaging units in any way.

1.7 PROJECT CONDITIONS

A. Environmental Limitations: Do not install acoustical tile ceilings until spaces are enclosed and weatherproof, wet work in spaces is complete and dry, work above ceilings is complete, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

1. Pressurized Plenums: Operate ventilation system for not less than 48 hours before beginning acoustical tile ceiling installation.

1.8 COORDINATION

A. Coordinate layout and installation of acoustical tiles and suspension system with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, fire-suppression system, and partition assemblies.

1.9 EXTRA MATERIALS

A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Acoustical Ceiling Units: Full-size tiles equal to 2.0 percent of quantity installed.
2. Suspension System Components: Quantity of each concealed grid and exposed component equal to 2.0 percent of quantity installed.

PART 2 - PRODUCTS

2.1 ACOUSTICAL TILES, GENERAL

A. Acoustical Tile Standard: Provide manufacturer's standard tiles of configuration indicated that comply with ASTM E 1264 classifications as designated by types, patterns, acoustical ratings, and light reflectances, unless otherwise indicated.

1. Mounting Method for Measuring NRC: Type E-400; plenum mounting in which face of test specimen is 15-3/4 inches away from test surface per ASTM E 795.

B. Acoustical Tile Colors and Patterns: Match appearance characteristics indicated for each product type.

C. Antimicrobial Fungicide Treatment: Provide acoustical tiles with face and back surfaces coated with antimicrobial treatment consisting of manufacturer's standard formulation with fungicide added to inhibit growth of mold and mildew and showing no mold or mildew growth when tested according to ASTM D 3273 and evaluated according to ASTM D 3274 or ASTM G 21.

2.2 ACOUSTICAL TILES FOR ACOUSTICAL TILE CEILING IN ALL AREAS UNLESS OTHERWISE NOTED

Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:

A. Basis-of-Design Product: Subject to compliance with requirements, provide Armstrong World Industries, Cirrus Beveled Tegular 9/16”, 589 or Architect approved equal non-fissured, fine textured tile:

B. Classification: Provide tiles complying with ASTM E 1264 for type, form, and pattern as follows:
1. Type and Form: Wet-formed mineral board
2. Pattern: As indicated by manufacturer's designation

C. Color: White.

D. LR: Not less than 0.80

E. NRC: Not less than 0.60.

F. CAC: Not less than 35 .

G. Edge/Joint Detail: Beaded Tegular for interface with Superfine 9/16” Exposed Tee.

H. Thickness: 9/16”.

I. Modular Size: 24”x24” (610 x 610mm).

2.3 METAL SUSPENSION SYSTEMS, GENERAL

A. Metal Suspension System Standard: Provide manufacturer's standard metal suspension systems of types, structural classifications, and finishes indicated that comply with applicable requirements in ASTM C 635.

B. Finishes and Colors, General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes. Provide manufacturer's standard factory-applied finish for type of system indicated.

C. Attachment Devices: Size for five times the design load indicated in ASTM C 635, Table 1, "Direct Hung," unless otherwise indicated. Comply with seismic design requirements.

1. Anchors in Concrete: Anchors of type and material indicated below, with holes or loops for attaching hangers of type indicated and with capability to sustain, without failure, a load equal to five times that imposed by ceiling construction, as determined by testing per ASTM E 488 or ASTM E 1512 as applicable, conducted by a qualified testing and inspecting agency. *Select type from three options in subparagraph below. Verify with Project's structural engineer.

a. Type: Postinstalled expansion or Postinstalled bonded anchors.
b. Corrosion Protection: Carbon-steel components zinc plated to comply with ASTM B 633, Class Fe/Zn 5 (0.005 mm) for Class SC 1 service condition.

2. Power-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hangers of type indicated, and with capability to sustain, without failure, a load equal to 10 times that imposed by ceiling construction, as determined by testing per ASTM E 1190, conducted by a qualified testing and inspecting agency. * Note: fasteners allowed at existing concrete joists or beams only. Acceptable for only distributed ceiling systems only and not for point loaded suspension.

D. Wire Hangers, Braces, and Ties: Provide wires complying with the following requirements:

1. Zinc-Coated, Carbon-Steel Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper.

E. Hanger Rods or Flat Hangers: Mild steel, zinc coated or protected with rust-inhibitive paint.

F. Angle Hangers: Angles with legs not less than 7/8 inch wide; formed with 0.04-inch- thick, galvanized steel sheet complying with ASTM A 653/A 653M, G90 coating designation; with bolted connections and 5/16-inch- diameter bolts.

2.4 METAL SUSPENSION SYSTEM FOR ACOUSTICAL TILE CEILING IN ALL AREAS UNLESS OTHERWISE NOTED

A. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:

B. Basis-of-Design Product: Subject to compliance with requirements, provide Armstrong World Industries, Superfine 9/16” Exposed Tee

2.5 METAL SUSPENSION SYSTEM FOR ACOUSTICAL TILE CEILING IN KITCHEN AND ALL KITCHEN SUPPORT AREAS

A. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:

B. Basis-of-Design Product: Subject to compliance with requirements, provide Armstrong World Industries,15/16" Exposed Tee Lay-In Grid

C. Direct-Hung, Double-Web**,** Suspension System: Main and cross runners roll formed from and capped with cold-rolled steel sheet, prepainted, electrolytically zinc coated, or hot-dip galvanized according to ASTM A 653/A 653M, G30 coating designation.

1. Structural Classification: Intermediate.

a. Initial Access Opening: In each module, .

D. Indirect-HungSuspension System: Main and cross runners roll formed from cold-rolled steel sheet, prepainted, electrolytically zinc coated, or hot-dip galvanized according to ASTM A 653/A 653M, G30 coating designation.

1. Structural Classification: Intermediate-duty system.
2. Carrying Channels: Cold-rolled steel, 0.059850-inch- minimum base (uncoated) metal thickness, not less than 3/16-inch- wide flanges by 1-1/2-inch- deep steel channels, 475 lb/1000 feet, with rust-inhibitive paint finish .

2.6 METAL EDGE MOLDINGS AND TRIM

A. Basis-of-Design Product: Subject to compliance with requirements, provide Armstrong World Industries

B. Roll-Formed, Sheet-Metal Edge Moldings and Trim: Type and profile indicated or, if not indicated, manufacturer's standard moldings for edges and penetrations that comply with seismic design requirements; formed from sheet metal of same material, finish, and color as that used for exposed flanges of suspension system runners.

1. Provide manufacturer's standard edge moldings that fit acoustical tile edge details and suspension systems indicated and that match width and configuration of exposed runners, unless otherwise indicated.
2. Conversion-Coated Finish: AA-M12C42 (Chemical Finish: cleaned with inhibited chemicals; acid-chromate-fluoride-phosphate conversion coating).
3. Baked-Enamel Finish: AA-C12C42R1x (Chemical Finish: cleaned with inhibited chemicals; Chemical Finish: acid-chromate-fluoride-phosphate conversion coating; organic coating: as specified below). Apply baked enamel complying with paint manufacturer's written instructions for cleaning, conversion coating, and painting.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, including structural framing and substrates to which acoustical tile ceilings attach or abut, with Installer present, for compliance with requirements specified in this and other Sections that affect ceiling installation and anchorage and with requirements for installation tolerances and other conditions affecting performance of acoustical tile ceilings.

1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Measure each ceiling area and establish layout of acoustical tiles to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width tiles at borders, and comply with layout shown on reflected ceiling plans.

3.3 INSTALLATION, SUSPENDED ACOUSTICAL TILE CEILINGS

A. General: Install acoustical tile ceilings to comply with ASTM C 636 and seismic design requirements indicated, per manufacturer's written instructions and CISCA's "Ceiling Systems Handbook."

B. Suspend ceiling hangers from building's structural members and as follows:

1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structure or of ceiling suspension system.
2. Splay hangers only where required to miss obstructions; offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
3. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with location of hangers at spacings required to support standard suspension system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices.
4. Secure wire hangers to ceiling suspension members and to supports above with a minimum of three tight turns. Connect hangers directly either to structures or to inserts, eye screws, or other devices that are secure and appropriate for substrate and that will not deteriorate or otherwise fail due to age, corrosion, or elevated temperatures.
5. When steel framing does not permit installation of hanger wires at spacing required, install carrying channels or other supplemental support for attachment of hanger wires.
6. Do not attach hangers to steel roof deck. Attach hangers to structural members.
7. Space hangers not more than 48 inches o.c. along each member supported directly from hangers, unless otherwise indicated; provide hangers not more than 8 inches from ends of each member.
8. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards and publications.

C. Install edge moldings and trim of type indicated at perimeter of acoustical tile ceiling area and where necessary to conceal edges of acoustical tiles.

1. Do not use exposed fasteners, including pop rivets, on moldings and trim.

D. Install suspension system runners so they are square and securely interlocked with one another. Remove and replace dented, bent, or kinked members.

E. Arrange directionally patterned acoustical tiles as follows:

1. As indicated on reflected ceiling plans.

F. Install acoustical tiles in coordination with suspension system and exposed moldings and trim. Place splines or suspension system flanges into kerfed edges so tile-to-tile joints are closed by double lap of material.

1. Fit adjoining tile to form flush, tight joints. Scribe and cut tile for accurate fit at borders and around penetrations through tile.
2. Hold tile field in compression by inserting leaf-type, spring-steel spacers between tile and moldings, spaced 12 inches o.c.

3.4 FIELD QUALITY CONTROL

3.5 CLEANING

A. Clean exposed surfaces of acoustical tile ceilings, including trim and edge moldings. Comply with manufacturer's written instructions for cleaning and touchup of minor finish damage. Remove and replace tiles and other ceiling components that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

END OF SECTION 09512

SECTION 09 60 1

ACOUSTIC UNDERLAYMENT

PART 1 - General

1.1 Summary

A. The work of this section includes:
   1. Types of re-bonded recycled rubber sound control underlayment to be placed under hard surface flooring at upper level floors
   2. Adhesives for finished floors to sound control underlayment

1.2 Related Sections
   1. Section 09 30310 –CeramicTile
   2. Section 09 651– Resilient Tile Flooring
   3. Section 09681- Tile Carpeting

1.3 References
A. Standards listed by reference, including revisions by issuing authority, form a part of this specification section to extent indicated. The standards listed are identified by an issuing authority, authority abbreviation, designation number, title, or other designation established by the issuing authority. The standards subsequently referenced herein are referred to by an issuing authority and standard designation.
B. ASTM E492 - Standard Test Method for Laboratory Measurement of Impact Sound Transmission Through Floor-Ceiling Assemblies Using the Tapping Machine
C. ASTM C627 - Standard Test Method for Evaluating Ceramic Floor Tile Installation Systems Using the Robinson-Type Floor Tester
D. ASTM E989 - Standard Classification for Determination of Impact Insulation Class (IIC)
E. ASTM E1007 - Standard Test Method for Field Measurement of Tapping Machine Impact Sound Transmission Through Floor-Ceiling Assemblies and Associated Support Structures
F. ASTM E2179 - Standard Test Method for Laboratory Measurement of the Effectiveness of Floor Coverings in Reducing Impact Sound Transmission Through Concrete Floors
G. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements
H. ASTM E336 - Standard Test Method for Measurement of Airborne Sound Insulation in Buildings
I. ASTM F2170 - Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in-situ Probes
J. ASTM D5116 CHPS/CA 01350 – Collaborative of High Performance Schools, Low-Emitting Materials Criteria
K. ASTM F1869 - Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride
L. ASTM F924 Standard Test Method for Resistance to Puncture of Cushioned Resilient Floor Coverings
M. ASTM F1265 - Standard Test Method for Resistance to Impact for Resilient Floor Tiles
N. ASTM F2753 - Standard Practice to Evaluate the Effects of Dynamic Rolling Load over Resilient Floor Covering System

O. ASTM D5215 - Standard Test Method for Instrumental Evaluation of Staining of Vinyl Flooring by Adhesives
P. ASTM D297 - Standard Test Method for Rubber Products - Chemical Analysis 1.2.2.16: ASTM C627 - Standard Test Method for Evaluating Ceramic Floor Tile Installation
Q. Systems Using the Robinson Wheel-Type Floor Tester
R. ASTM F2170 - Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs using in situ Probes

1.4 System Description
A. Performance Requirements: Provide recycled rubber resilient underlayment, which has been manufactured and installed to maintain performance criteria stated by manufacturer without defects, damage, or failure.

1.5 Submittals
A. General: Submit listed submittals in accordance with Conditions of the Contract and Division 1 Submittal Procedures Section.
B. Product Data: Submit product data, including manufacturer's guide specifications product sheet, for specified products.
C. Shop Drawings: Manufacturer's specifications, catalog cuts, and other items needed to demonstrate compliance with the specified requirements. Also the manufacturer's recommended installation procedures, which, when approved by the architect, will become the basis for accepting or rejecting actual installation procedures used on work.
D. Samples: Submit selection and verification samples for finishes, colors, and textures.
E. Quality Assurance Submittals: Submit the following:
    1. Certificates: If required, certification of performance characteristics specified in this document shall be provided by the manufacturer.
    2. Manufacturer's Instructions: Manufacturer's installation instructions.
    3. Sound Control Underlayment material manufacturer shall provide a Certificate of Compliance certifying that the material is compliant with all of the material specifications as outlined in Section 2, and the Certificate of Compliance shall be stamped by a Professional Engineer.
    4. Closeout Submittals
        a. Warranty: Warranty documents specified herein.

1.6 Quality Assurance
A. Qualifications
    1. Installer Qualifications: Installer experienced in performing work of this section who has specialized in installation of work similar to that required for this project.
        a. Certificate: When requested, submit certificate indicating qualification.
        b. Manufacturers' Qualifications: Manufacturer capable of approving application method.
    2. Regulatory Requirements: [specify applicable requirements of regulatory agencies].
B. Pre-installation Meetings: Conduct pre-installation meeting to verify project requirements, substrate conditions, manufacturer's instructions, and manufacturer's warranty requirements. Comply with Division 1 Project Management and Coordination (Project Meetings) Section.

1.7 Delivery, Storage, and Handling
A. General: Comply with Division 1 Product Requirements Sections.
B. Ordering: Comply with manufacturer's ordering instructions and lead time requirements to

avoid construction delays.

C. Delivery: Deliver materials in manufacturer's original, unopened, and undamaged containers with identification labels intact.

D. Storage and Protection: Store materials at temperature and humidity conditions recommended by manufacturer and protect from exposure to harmful weather conditions.

1.8 Project Conditions

A. Temperature Requirements: Maintain air temperature in spaces where products will be installed for time period before, during, and after installation as recommended by manufacturer.

B. Field Measurements: Verify actual measurements/openings by field measurements before fabrication; show recorded measurements on shop drawings. Coordinate field measurements and fabrication schedule with construction progress to avoid construction delays.

1.9 Warranty

A. Project Warranty: Refer to Conditions of the Contract for project warranty provisions.

1.10 Maintenance

A. Extra Materials: Deliver to Owner extra materials from the same production run as products installed. Package products with protective covering and identify with descriptive labels. Comply with Division 1 Closeout Submittals (Maintenance Materials) Section.

B. Quantity: Furnish quantity of re-bonded recycled rubber Sound Control Underlayment units as requested on purchase order.

C. Delivery, Storage and Protection: Comply with Owner's requirements for delivery, storage, and protection of extra materials.

PART 2 - Products

2.1 Manufacturers:

A. Pliteq Inc.: 131 Royal Group Crescent, Vaughan, ON L4H 1X9; Telephone: (416) 449-0049; Fax: (416) 849-0415; www.pliteq.com

B. Regupol America: 11 Ritter Way, Lebanon, PA, 17042; Telephone: (800) 537-8737; www.regupol.com

C. Substitution: See Section 01600 Product Requirements

2.2 Acoustical Underlayment

A. Underlayment, 2nd Floor VCT floors and floating wood floors:

1. Manufacturers:
   a. Proflex Products ;Proflex LV 200 (1.8 mm) (double glue down installation)
   b. Patcraft; Groundworks Noise reduction underlayment (1.4 mm)
   c. Diversified Products; Floormuffler 1mm
2. Substitution: See Section 01600 Product Requirements

B. Underlayment, 2nd Floor Ceramic tile floors:

1. Manufacturers:
   a. Regupol America; Sonos 12mm
   b. Pliteq; Genie Mat RST12
   c. Ecore International; QT 4012 Sound Isolation 12 mm

2. Substitution: See Section 01600 Product Requirements

2.3 Accessories

A. Perimeter Isolation Strips
Perimeter isolation strips: Per Manufacturers recommended product

B. Tape: Manufactures standard tape where required.

C. Adhesives: Per Manufacturers recommended product

PART 3 - Execution

3.1 General Procedures

A. Manufacturers' Instructions: Comply with manufacturer's product data, including product technical bulletins, product catalog installation instructions, and product carton instructions for installation.

B. Site Verification of Conditions: Verify substrate conditions, which have been previously installed under other sections, are acceptable for product installation in accordance with manufacturer's instructions.

C. Preparation

1. Surface Preparation: Surfaces shall be prepared in accordance with ANSI standards.
2. Erection/Installation/Application/Construction.
3. Related Products Installation: Refer to other sections listed in Related Sections paragraph herein for related products installation.
4. Installation should not begin until all other trades are finished in the area.
5. Areas to receive the re-bonded recycled rubber Sound Control Underlayment should be weather tight and maintained at a minimum uniform temperature of 65°F (18°C) for 48 hours before, during, and after the installation.

D. Field Quality Requirements: Upon Owner's request, provide manufacturer's field service consisting of product use recommendations in accordance with manufacturer's instructions.

E. Cleaning: Remove temporary coverings and protection of adjacent work areas. Repair or replace damaged installed products. Clean installed products in accordance with manufacturer's instructions prior to Owner's acceptance. Remove construction debris from project site and legally dispose of debris

F. Protection: Protect installed product and finish surfaces from damage during construction

End of Section

SECTION 09640 - WOOD FLOORING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Factory-finished engineered wood flooring.
2.
3. Sound control underlayment.

B. Related Requirements:
1. Division 06 Section “Miscellaneous Carpentry” for subfloor.
2. Division 09 “Acoustical Underlayment” for subfloor

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For each type of floor finish provide plan indicating location of installation along with threshold details and locations.

C. Samples: For each exposed product and for each color and texture specified, approximately 24 in x 36 in finish board and of same thickness and material indicated for the Work and showing the full range of normal color and texture variations expected.

D. Samples for Initial Selection: Manufacturer's color charts showing the full range of colors and finishes available for wood flooring.

1. Include Samples of accessories involving color and finish selection.

E. Samples for Verification: For each type of wood flooring and accessory, with stain color and finish required, approximately 12 inches long and of same thickness and material indicated for the Work and showing the full range of normal color and texture variations expected.

1.4 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Wood Flooring: Equal to 2 Insert number percent of amount installed for each type, color, and finish of wood flooring indicated.

1.5 QUALITY ASSURANCE

A. Provide workmanship in accordance with NWFA and the Hardwood Flooring Finishing/Refinishing Manual published by the National Oak Flooring Manufacturer's Association (NOFMA).

B. Provide a finish system as produced by a single manufacturer.

C. Refinishing: Performed by experienced millworking professionals with not less than three years of successful experience at salvage, reinstallation, reapirs, and finishing work similar to requirements for this project.

D. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.

1. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver wood flooring materials in unopened cartons or bundles.

B. Protect wood flooring from exposure to moisture. Do not deliver wood flooring until after concrete, masonry, plaster, ceramic tile, and similar wet-work is complete and dry.

C. Store wood flooring materials in a dry, warm, ventilated, weathertight location.

1.7 FIELD CONDITIONS

A. Conditioning period begins not less than seven days before wood flooring installation, is continuous through installation, and continues not less than seven days after wood flooring installation.

1. Environmental Conditioning: Maintain ambient temperature between 65 and 75 deg F and relative humidity planned for building occupants in spaces to receive wood flooring during the conditioning period.
2. Wood Flooring Conditioning: Move wood flooring into spaces where it will be installed, no later than the beginning of the conditioning period.

a. Do not install flooring until it adjusts to relative humidity of, and is at same temperature as, space where it is to be installed.
b. Open sealed packages to allow wood flooring to acclimatize immediately on moving flooring into spaces in which it will be installed.

B. After conditioning period, maintain relative humidity and ambient temperature planned for building occupants.

C. Install factory-finished wood flooring after other finishing operations, including painting, have been completed.

PART 2 - PRODUCTS

2.1 FACTORY-FINISHED ENGINEERED WOOD FLOORING

A. Solid-Wood Flooring: Kiln dried to 6 to 9 percent maximum moisture content; tongue and groove and end matched; with backs channeled.

1. Manufacturers:
   a. UA Flooring
      1) Old Charleson – True Reclaimed Heart Pine
   b. Albany millworks
      1) Custom product to match width of original flooring

2. Species: Reclaimed Heart Pine.
3. Grade: Select
4. Cut: Match Existing.
5. Thickness: 1/2 inch with 1/8” Wear layer.
6. Face Width: 3 9/16 inches.
7. Lengths: Random lengths between 36 inches and 120 inches
8. Edge Style: Square.
9. Finish: UV urethane.

   a. Color: As selected by Architect from manufacturer's full range.

2.2 SOUND CONTROL UNDERLAYMENT

A. Sound Control Underlayment: Sound reducing underlayment consisting of impact-absorbing materials. Minimum Impact Insulation Class (IIC) of 55 when tested according to ASTM E492. To be installed under engineered wood flooring.

1. Product: Genie Mat RST05

2.3 ACCESSORY MATERIALS

A. WoodSubfloor: As specified in Section 061000 "Rough Carpentry" and Section 061600 "Sheathing."

B. Wood Flooring Adhesive: Mastic recommended by flooring and adhesive manufacturers for application indicated.

C. Trowelable Leveling and Patching Compound: Latex-modified, hydraulic-cement-based formulation approved by wood flooring manufacturer.

D. Fasteners: As recommended by manufacturer, but not less than that recommended in NWFA's "Installation Guidelines."

E. Thresholds and Saddles: To match wood flooring. Milled T-shaped saddle transition strip. Tapered on each side not to exceed ½” with ¼” bevel.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for maximum moisture content, installation tolerances, and other conditions affecting performance of wood flooring.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

C. Concrete Slabs: Verify that concrete substrates are dry and moisture-vapor emissions are within acceptable levels according to manufacturer's written instructions.

3.2 PREPARATION

A. Concrete Slabs:

1. Grind high spots and fill low spots to produce a maximum 1/8-inch (3-mm) deviation in any direction when checked with a 10-foot (3-m) straight edge.
2. Use trowelable leveling and patching compounds, according to manufacturer's written instructions, to fill cracks, holes, and depressions in substrates.
3. Remove coatings, including curing compounds, and other substances on substrates that are incompatible with installation adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.

B. Broom or vacuum clean substrates to be covered immediately before product installation. After cleaning, examine substrates for moisture, alkaline salts, carbonation, or dust. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 INSTALLATION

A. Comply with flooring manufacturer's written installation instructions, but not less than applicable recommendations in NWFA's "Installation Guidelines."

B. Provide expansion space at walls and other obstructions and terminations of flooring as indicated on Drawings.

C. Sound Control Underlayment: Install over vapor retarder according to manufacturer's written instructions.

D. Solid-Wood Flooring: Blind nail or staple flooring to substrate.

1. Plank Flooring: For flooring of face width more than 3 inches (76 mm):

a. Hardwood: Install countersunk screws at each end of each piece in addition to blind nailing. Cover screw heads with wood plugs glued flush with flooring.
b. Softwood: Install no fewer than two countersunk nails at each end of each piece, spaced not more than 16 inches (406 mm) along length of each piece, in addition to blind nailing. Fill holes with matching wood filler.

E. Engineered-Wood Flooring: Install floating floor.

3.4 FIELD FINISHING

A. Machine-sand flooring to remove offsets, ridges, cups, and sanding-machine marks that are noticeable after finishing. Vacuum and tack with a clean cloth immediately before applying finish.

1. Comply with applicable recommendations in NWFA's "Installation Guidelines."

B. Fill open-grained hardwood.

C. Fill and repair wood flooring defects.

D. Apply floor-finish materials in number of coats recommended by finish manufacturer for application indicated, but not less than one coat of floor sealer and three finish coats.

1. Apply stains to achieve an even color distribution matching approved Samples.
2. For water-based finishes, use finishing methods recommended by finish manufacturer to minimize grain raise.

E. Cover wood flooring before finishing.

F. Do not cover wood flooring after finishing until finish reaches full cure, and not before seven days after applying last finish coat.

3.5 PROTECTION

A. Protect installed wood flooring during remainder of construction period with covering of heavy kraft paper or other suitable material. Do not use plastic sheet or film that might cause condensation.

1. Do not move heavy and sharp objects directly over kraft-paper-covered wood flooring. Protect flooring with plywood or hardboard panels to prevent damage from storing or moving objects over flooring.

END OF SECTION 096400

SECTION 09651 - RESILIENT FLOOR TILE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:
1. Rubber floor tile.
2. Vinyl composition floor tile.
3. Luxury vinyl tile

B. Related Sections:
1. Section 09653 "Resilient Wall Base and Accessories" for resilient base, reducer strips, and other accessories installed with resilient floor coverings.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Samples for Initial Selection: For each type of floor tile indicated.

C. Samples for Verification: Full-size units of each color and pattern of floor tile required.

1. For heat-welding bead, manufacturer's standard-size Samples, but not less than 9 inches (230 mm) long, of each color required.

D. Product Schedule: For floor tile.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified Installer.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For each type of floor tile to include in maintenance manuals.

1.6 MATERIALS MAINTENANCE SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Floor Tile: Furnish 1 box for every 50 boxes or fraction thereof, of each type, color, and pattern of floor tile installed.

1.7 QUALITY ASSURANCE

A. Installer Qualifications: A qualified installer who employs workers for this Project who are competent in techniques required by manufacturer for floor tile installation indicated.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Store floor tile and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 deg F (10 deg C) or more than 90 deg F (32 deg C). Store floor tiles on flat surfaces.

1.9 PROJECT CONDITIONS

A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 70 deg F (21 deg C) or more than 95 deg F (35 deg C) , in spaces to receive floor tile during the following time periods:

1. 48 hours before installation.
2. During installation.
3. 48 hours after installation.

B. Until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 deg F (13 deg C) or more than 95 deg F (35 deg C) .

C. Close spaces to traffic during floor tile installation.

D. Close spaces to traffic for 48 hours after floor tile installation.

E. Install floor tile after other finishing operations, including painting, have been completed.

PART 2 - PRODUCTS

2.1 SOLID VINYL FLOOR TILE (LVT)

A. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
1. Armstrong World Industries, Inc.;
2. Johnsonite;
3. Roppe Corporation, USA;
4. Tarkett, Inc.;

B. Tile Standard: ASTM F 1700.

1. Class: [**As indicated by product designations**] [**Class I, monolithic vinyl tile**] [**Class II, surface-decorated vinyl tile**] [**Class III, printed film vinyl tile**].
2. Type: [**Type A, smooth surface**] [**Type B, embossed surface**].

C. Thickness: [**0.080 inch (2.0 mm)**] [**0.100 inch (2.5 mm)**] [**0.120 inch (3.0 mm)**] [**0.125 inch (3.2 mm)**] <**Insert thickness**>.

D. Size: [**12 by 12 inches (305 by 305 mm)**] [**18 by 18 inches (457 by 457 mm)**] [**24 by 24 inches (610 by 610 mm)**] [**36 by 36 inches (914 by 914 mm)**] [**3 by 36 inches (76 by 914 mm)**] <**Insert size**>.

E. Seaming Method: [**Heat welded**] [**Chemically bonded**] [**Standard**] <**Insert requirements**>.

F. Colors and Patterns: [**As indicated by manufacturer's designations**] [**Match Architect's sample**] [**As selected by Architect from full range of industry colors**].

2.2 VINYL COMPOSITION FLOOR TILE (VCT)

A. Products: Subject to compliance with requirements, provide one of the following :
1. Armstrong World Industries, Inc.; .
2. Congoleum Corporation; <**Insert product name or designation**>.
3. Tarkett, Inc.; .

B. Tile Standard: ASTM F 1066, Class 1, solid-color tile .

C. Wearing Surface: Smooth .

D. Thickness: 0.125 inch (3.2 mm) .

E. Size: 12 by 12 inches (305 by 305 mm).

F. Colors and Patterns: As selected by Architect from full range of industry colors.

2.3 INSTALLATION MATERIALS

A. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement based or blended hydraulic-cement-based formulation provided or approved by manufacturer for applications indicated.

B. Adhesives: Water-resistant type recommended by manufacturer to suit floor tile and substrate conditions indicated.

1. Adhesives shall comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):

a. VCT and Asphalt Tile Adhesives: Not more than 50 g/L.

C. Floor Polish: Provide protective liquid floor polish products as recommended by manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

B. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of floor tile.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Prepare substrates according to manufacturer's written instructions to ensure adhesion of resilient products.

B. Concrete Substrates: Prepare according to ASTM F 710.

1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
2. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.
3. Alkalinity and Adhesion Testing: Perform tests recommended by manufacturer. Proceed with installation only after substrates pass testing.
4. Moisture Testing: Perform tests recommended by manufacturer and as follows. Proceed with installation only after substrates pass testing.

C. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound and remove bumps and ridges to produce a uniform and smooth substrate.

D. Do not install floor tiles until they are same temperature as space where they are to be installed.

1. Move resilient products and installation materials into spaces where they will be installed at least 48 hours in advance of installation.

E. Sweep and vacuum clean substrates to be covered by resilient products immediately before installation.

3.3 FLOOR TILE INSTALLATION

A. Comply with manufacturer's written instructions for installing floor tile.

B. Lay out floor tiles from center marks established with principal walls, discounting minor offsets, so tiles at opposite edges of room are of equal width. Adjust as necessary to avoid using cut widths that equal less than one-half tile at perimeter.

1. Lay tiles in pattern indicated .

C. Match floor tiles for color and pattern by selecting tiles from cartons in the same sequence as manufactured and packaged, if so numbered. Discard broken, cracked, chipped, or deformed tiles.

1. Lay tiles with grain direction alternating in adjacent tiles (basket-weave pattern) .

D. Scribe, cut, and fit floor tiles to butt neatly and tightly to vertical surfaces and permanent fixtures including built-in furniture, cabinets, pipes, outlets, and door frames.

E. Extend floor tiles into toe spaces, door reveals, closets, and similar openings. Extend floor tiles to center of door openings.

F. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on floor tiles as marked on substrates. Use chalk or other nonpermanent, nonstaining marking device.

G. Adhere floor tiles to flooring substrates using a full spread of adhesive applied to substrate to produce a completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections.

3.4 CLEANING AND PROTECTION

A. Comply with manufacturer's written instructions for cleaning and protection of floor tile.

B. Perform the following operations immediately after completing floor tile installation:

1. Remove adhesive and other blemishes from exposed surfaces.
2. Sweep and vacuum surfaces thoroughly.
3. Damp-mop surfaces to remove marks and soil.

C. Protect floor tile products from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.

D. Floor Polish: Remove soil, visible adhesive, and surface blemishes from floor tile surfaces before applying liquid floor polish.

E. Cover floor tile until Substantial Completion.

END OF SECTION 09651

SECTION 09653 - RESILIENT WALL BASE AND ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Resilient base.
2. Resilient molding accessories.

B. Related Sections:
1. Section 09651 "Resilient Floor Tile for resilient floor tile."

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Samples for Initial Selection: For each type of product indicated.

C. Product Schedule: For resilient products. Use same designations indicated on Drawings.

1.4 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Furnish not less than 10 linear feet for every 500 linear feet or fraction thereof, of each type, color, pattern, and size of resilient product installed.

1.5 QUALITY ASSURANCE

A. Fire-Test-Response Characteristics: As determined by testing identical products according to ASTM E 648 or NFPA 253 by a qualified testing agency.

1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Store resilient products and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 deg F (10 deg C) or more than 90 deg F (32 deg C).

1.7 PROJECT CONDITIONS

A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 70 deg F (21 deg C) or more than 95 deg F (35 deg C), in spaces to receive resilient products during the following time periods:

1. 48 hours before installation.
2. During installation.
3. 48 hours after installation.

B. Until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 deg F (13 deg C) or more than 95 deg F (35 deg C).

C. Install resilient products after other finishing operations, including painting, have been completed.

PART 2 - PRODUCTS

2.1 RESILIENT BASE

A. Resilient Base:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Burke Mercer Flooring Products; Division of Burke Industries, Inc.
   b. Johnsonite.
   c. Roppe Corporation, USA.

B. Resilient Base Standard: ASTM F 1861.

1. Material Requirement: Type TS (rubber, vulcanized thermoset) .
2. Manufacturing Method: Group I (solid, homogeneous).
3. Style: Cove (base with toe).

C. Minimum Thickness: 0.080 inch

D. Height: 4 inches.

E. Lengths: Coils in manufacturer's standard length.

F. Outside Corners: Preformed.

G. Inside Corners: Preformed.

H. Finish: Satin.

I. Colors and Patterns: As selected by Architect from full range of industry colors.

2.2 INSTALLATION MATERIALS

A. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement based or blended hydraulic-cement-based formulation provided or approved by manufacturer for applications indicated.

B. Adhesives: Water-resistant type recommended by manufacturer to suit resilient products and substrate conditions indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

B. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of resilient products.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Prepare substrates according to manufacturer's written instructions to ensure adhesion of resilient products.

B. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound and remove bumps and ridges to produce a uniform and smooth substrate.

C. Do not install resilient products until they are same temperature as the space where they are to be installed.

1. Move resilient products and installation materials into spaces where they will be installed at least 48 hours in advance of installation.

D. Sweep and vacuum clean substrates to be covered by resilient products immediately before installation.

3.3 RESILIENT BASE INSTALLATION

A. Comply with manufacturer's written instructions for installing resilient base.

B. Apply resilient base to walls, columns, pilasters, casework and cabinets in toe spaces, and other permanent fixtures in rooms and areas where base is required.

C. Install resilient base in lengths as long as practicable without gaps at seams and with tops of adjacent pieces aligned.

D. Tightly adhere resilient base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.

E. Do not stretch resilient base during installation.

F. On masonry surfaces or other similar irregular substrates, fill voids along top edge of resilient base with manufacturer's recommended adhesive filler material.

G. Preformed Corners: Install preformed corners before installing straight pieces.

3.4 CLEANING AND PROTECTION

A. Comply with manufacturer's written instructions for cleaning and protection of resilient products.

B. Perform the following operations immediately after completing resilient product installation:

1. Remove adhesive and other blemishes from exposed surfaces.
2. Sweep and vacuum surfaces thoroughly.
3. Damp-mop surfaces to remove marks and soil.

C. Protect resilient products from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.

D. Cover resilient products until Substantial Completion.

END OF SECTION 09653

SECTION 09681 - TILE CARPETING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes modular, tufted carpet tile.

B. Related Requirements:
   1. Section 096513 "Resilient Base and Accessories" Section 096519 "Resilient Tile Flooring" for resilient wall base and accessories installed with carpet tile.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

   1. Review methods and procedures related to carpet tile installation including, but not limited to, the following:

      a. Review delivery, storage, and handling procedures.
      b. Review ambient conditions and ventilation procedures.
      c. Review subfloor preparation procedures.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

   1. Include manufacturer's written data on physical characteristics, durability, and fade resistance.
   2. Include installation recommendations for each type of substrate.

B. Shop Drawings: Show the following:

   1. Columns, doorways, enclosing walls or partitions, built-in cabinets, and locations where cutouts are required in carpet tiles.
   2. Carpet tile type, color, and dye lot.
   3. Type of subfloor.
   4. Type of installation.
   5. Pattern of installation.
   6. Pattern type, location, and direction.
   7. Pile direction.
   8. Type, color, and location of insets and borders.
   9. Type, color, and location of edge, transition, and other accessory strips.
   10. Transition details to other flooring materials.

C. Samples: For each of the following products and for each color and texture required. Label each Sample with manufacturer's name, material description, color, pattern, and designation indicated on Drawings and in schedules.

1. Carpet Tile: Full-size Sample.
2. Exposed Edge, Transition, and Other Accessory Stripping: 12-inch- (300-mm-) long Samples.

D. Product Schedule: For carpet tile. Use same designations indicated on Drawings.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Product Test Reports: For carpet tile, for tests performed by a qualified testing agency.

C. Sample Warranty: For special warranty.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance Data: For carpet tiles to include in maintenance manuals. Include the following:

1. Methods for maintaining carpet tile, including cleaning and stain-removal products and procedures and manufacturer's recommended maintenance schedule.
2. Precautions for cleaning materials and methods that could be detrimental to carpet tile.

1.7 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Carpet Tile: Full-size units equal to 5 percent of amount installed for each type indicated, but not less than 10 sq. yd. (8.3 sq. m).

1.8 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who is certified by the International Certified Floorcovering Installers Association at the Commercial II certification level.

B. Fire-Test-Response Ratings: Where indicated, provide carpet tile identical to those of assemblies tested for fire response according to NFPA 253 by a qualified testing agency.

C. Mockups: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for fabrication and installation.

1. Build mockups at locations and in sizes shown on Drawings.
2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Comply with CRI 104.

1.10 FIELD CONDITIONS

A. Comply with CRI 104 for temperature, humidity, and ventilation limitations.

B. Environmental Limitations: Do not deliver or install carpet tiles until spaces are enclosed and weathertight, wet work in spaces is complete and dry, and ambient temperature and humidity conditions are maintained at occupancy levels during the remainder of the construction period.

C. Do not install carpet tiles over concrete slabs until slabs have cured and are sufficiently dry to bond with adhesive and concrete slabs have pH range recommended by carpet tile manufacturer.

D. Where demountable partitions or other items are indicated for installation on top of carpet tiles, install carpet tiles before installing these items.

1.11 WARRANTY

A. Special Warranty for Carpet Tiles: Manufacturer agrees to repair or replace components of carpet tile installation that fail in materials or workmanship within specified warranty period.

1. Warranty does not include deterioration or failure of carpet tile due to unusual traffic, failure of substrate, vandalism, or abuse.
2. Failures include, but are not limited to, more than 10 percent edge raveling, snags, runs, dimensional stability, excess static discharge, loss of tuft bind strength, loss of face fiber,and delamination.
3. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 CARPET TILE

A. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

1. Interface, Inc.

2. Shaw Industries Group, Inc.

3. Tandus US, Inc.

4. Mohawk Group

B. Color: As selected by Architect from manufacturer's full range.

C. Backing/Backcoating: Manufacturer's standard composite materials to Products under 2.1 (A). PVC-free

D. Size: Manufacturer's available sizes

E. Applied Soil-Resistance Treatment: Manufacturer's standard treatment meeting Performance requirements.

F. Antimicrobial Treatment: Manufacturer's standard treatment meeting Performance requirements.
   1. Antimicrobial Activity: Not less than 2-mm halo of inhibition of gram-positive bacteria, not less than 1-mm halo of inhibition for gram-negative bacteria, and no fungal growth, according to AATCC 174.

G. Performance Characteristics: Comparable to Products listed under 2.1A

2.2 INSTALLATION ACCESSORIES

A. Trowelable Leveling and Patching Compounds: Latex-modified, hydraulic-cement-based formulation provided or recommended by carpet tile manufacturer.

B. Adhesives: Water-resistant, mildew-resistant, nonstaining, pressure-sensitive type to suit products and subfloor conditions indicated, that complies with flammability requirements for installed carpet tile and is recommended by carpet tile manufacturer for releasable installation.

   1. Adhesives shall have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
   2. Adhesives shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

C. Metal Edge/Transition Strips: Extruded aluminum with mill finish of profile and width shown, of height required to protect exposed edge of carpet, and of maximum lengths to minimize running joints.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for maximum moisture content, alkalinity range, installation tolerances, and other conditions affecting carpet tile performance. Examine carpet tile for type, color, pattern, and potential defects.

B. Concrete Subfloors: Verify that concrete slabs comply with ASTM F 710 and the following:

   1. Slab substrates are dry and free of curing compounds, sealers, hardeners, and other materials that may interfere with adhesive bond. Determine adhesion and dryness characteristics by performing bond and moisture tests recommended by carpet tile manufacturer.
   2. Subfloor finishes comply with requirements specified in Section 033000 "Cast-in-Place Concrete" for slabs receiving carpet tile.
   3. Subfloors are free of cracks, ridges, depressions, scale, and foreign deposits.

C. For painted subfloors, verify the following:

1. Perform bond test recommended in writing by adhesive manufacturer.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. General: Comply with CRI 104, Section 6.2, "Site Conditions; Floor Preparation," and with carpet tile manufacturer's written installation instructions for preparing substrates indicated to receive carpet tile installation.

B. Use trowelable leveling and patching compounds, according to manufacturer's written instructions, to fill cracks, holes, depressions, and protrusions in substrates. Fill or level cracks, holes and depressions 1/8 inch (3 mm) wide or wider and protrusions more than 1/32 inch (0.8 mm) unless more stringent requirements are required by manufacturer's written instructions.

C. Remove coatings, including curing compounds, and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, without using solvents. Use mechanical methods recommended in writing by carpet tile manufacturer.

D. Clean metal substrates of grease, oil, soil and rust, and prime if directed by adhesive manufacturer. Rough sand painted metal surfaces and remove loose paint. Sand aluminum surfaces, to remove metal oxides, immediately before applying adhesive.

E. Broom and vacuum clean substrates to be covered immediately before installing carpet tile.

3.3 INSTALLATION

A. General: Comply with CRI 104, Section 14, "Carpet Modules," and with carpet tile manufacturer's written installation instructions.

B. Installation Method: As recommended in writing by carpet tile manufacturer.

C. Maintain dye lot integrity. Do not mix dye lots in same area.

D. Cut and fit carpet tile to butt tightly to vertical surfaces, permanent fixtures, and built-in furniture including cabinets, pipes, outlets, edgings, thresholds, and nosings. Bind or seal cut edges as recommended by carpet tile manufacturer.

E. Extend carpet tile into toe spaces, door reveals, closets, open-bottomed obstructions, removable flanges, alcoves, and similar openings.

F. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on finish flooring as marked on subfloor. Use nonpermanent, nonstaining marking device.

G. Install pattern parallel to walls and borders.

H. Stagger joints of carpet tiles so carpet tile grid is offset from access flooring panel grid. Do not fill seams of access flooring panels with carpet adhesive; keep seams free of adhesive.

3.4 CLEANING AND PROTECTION

A. Perform the following operations immediately after installing carpet tile:

1. Remove excess adhesive, seam sealer, and other surface blemishes using cleaner recommended by carpet tile manufacturer.
2. Remove yarns that protrude from carpet tile surface.
3. Vacuum carpet tile using commercial machine with face-beater element.

B. Protect installed carpet tile to comply with CRI 104, Section 16, "Protecting Indoor Installations."

C. Protect carpet tile against damage from construction operations and placement of equipment and fixtures during the remainder of construction period. Use protection methods indicated or recommended in writing by carpet tile manufacturer.

END OF SECTION 09681

SECTION 09911 - EXTERIOR PAINTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes surface preparation and the application of paint systems on exterior substrates. [**the following exterior substrates:**]

1. Concrete.
2. Clay masonry.
3. Concrete masonry units (CMU).
4. Steel.
5. Galvanized metal.
6. Aluminum (not anodized or otherwise coated).
7. Stainless-steel flashing.
8. Wood.
9. Plastic trim fabrications.
10. Exterior portland cement plaster (stucco).
11. Exterior gypsum board.

B. Related Requirements:

1. Section 05120 "Structural Steel" for shop priming of metal substrates with primers specified in this Section.
2. Section 09960 "High-Performance Coatings" for special-use coatings.
3. Section 09912 "Interior Painting" for surface preparation and the application of paint systems on interior substrates.
4. Section 09931 "Wood Stains and Transparent Finishes" for surface preparation and the application of wood stains and transparent finishes on exterior wood substrates.

1.3 DEFINITIONS

A. Gloss Level 1: Not more than 5 units at 60 degrees and 10 units at 85 degrees, according to ASTM D 523.

B. Gloss Level 3: 10 to 25 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.

C. Gloss Level 4: 20 to 35 units at 60 degrees and not less than 35 units at 85 degrees, according to ASTM D 523.

D. Gloss Level 5: 35 to 70 units at 60 degrees, according to ASTM D 523.

E. Gloss Level 6: 70 to 85 units at 60 degrees, according to ASTM D 523.

F. Gloss Level 7: More than 85 units at 60 degrees, according to ASTM D 523.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product. Include preparation requirements and application instructions.

B. Samples for Initial Selection: For each type of topcoat product.

C. Samples for Verification: For each type of paint system and each color and gloss of topcoat.

1. Submit Samples on rigid backing, 8 inches (200 mm) square.
2. Step coats on Samples to show each coat required for system.
3. Label each coat of each Sample.
4. Label each Sample for location and application area.

D. Product List: For each product indicated, include the following:

1. Cross-reference to paint system and locations of application areas. Use same designations indicated on Drawings and in schedules.
2. Printout of current "MPI Approved Products List" for each product category specified, with the proposed product highlighted.
3. VOC content.

1.5 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Paint: 5 percent, but not less than 1 gal. (3.8 L) of each material and color applied.

1.6 QUALITY ASSURANCE

A. Mockups: Apply mockups of each paint system indicated and each color and finish selected to verify preliminary selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Architect will select one surface to represent surfaces and conditions for application of each paint system specified in Part 3.

a. Vertical and Horizontal Surfaces: Provide samples of at least 100 sq. ft. (9 sq. m).
b. Other Items: Architect will designate items or areas required.

2. Final approval of color selections will be based on mockups.

a. If preliminary color selections are not approved, apply additional mockups of additional colors selected by Architect at no added cost to Owner.

3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F (7 deg C).

1. Maintain containers in clean condition, free of foreign materials and residue.
2. Remove rags and waste from storage areas daily.

1.8 FIELD CONDITIONS

A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F (10 and 35 deg C).

B. Do not apply paints in snow, rain, fog, or mist; when relative humidity exceeds 85 percent; at temperatures less than 5 deg F (3 deg C) above the dew point; or to damp or wet surfaces.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Benjamin Moore & Co.
2. PPG Architectural Finishes, Inc.
3. Sherwin-Williams Company (The).

2.2 PAINT, GENERAL

A. MPI Standards: Provide products that comply with MPI standards indicated and that are listed in its "MPI Approved Products List."

B. Material Compatibility:

1. Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
2. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.

C. VOC Content: Provide materials that comply with VOC limits of authorities having jurisdiction.

D. Colors: As selected by Architect from manufacturer's full range.

1. [**10**] [**20**] [**30**] <**Insert number**> percent of surface area will be painted with deep tones.

2.3 BLOCK FILLERS

A. Block Filler, Latex, Interior/Exterior:[**MPI #4.**]

1. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation**>.

2.4 PRIMERS/SEALERS

A. Primer, Alkali Resistant, Water Based:[**MPI #3.**]

1. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation**>.

B. Primer, Bonding, Water Based:[**MPI #17.**]

1. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation**>.

C. Primer, Bonding, Solvent Based:[**MPI #69.**]

1. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation**>.

D. Wood-Knot Sealer: Sealer recommended in writing by topcoat manufacturer for exterior use in paint system indicated.

1. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation**>.

2.5 METAL PRIMERS

A. Primer, Alkyd, Anti-Corrosive for Metal:[**MPI #79.**]

1. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation**>.

B. Primer, Alkyd, Quick Dry, for Metal:[**MPI #76.**]

1. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation**>.

C. Primer, Galvanized, Water Based:[**MPI #134.**]

1. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation**>.

D. Primer, Galvanized: As recommended in writing by topcoat manufacturer.

1. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation**>.

E. Primer, Quick Dry, for Aluminum:[**MPI #95.**]

1. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation**>.

2.6 WOOD PRIMERS

A. Primer, Latex for Exterior Wood:[**MPI #6.**]

1. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation**>.

B. Primer, Alkyd for Exterior Wood:[**MPI #5.**]

1. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation**>.

C. Primer, Oil for Exterior Wood:[**MPI #7.**]

1. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation**>.

2.7 WATER-BASED PAINTS

A. Latex, Exterior Flat (Gloss Level 1):[**MPI #10.**]

1. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation**>.

B. Latex, Exterior Semi-Gloss (Gloss Level 5):[**MPI #11.**]

1. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation**>.

C. Latex, Exterior, Gloss (Gloss Level 6:[**MPI #119.**]

1. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation**>.

D. Light Industrial Coating, Exterior, Water Based (Gloss Level 3):[**MPI #161.**]

1. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation**>.

E. Light Industrial Coating, Exterior, Water Based, Semi-Gloss (Gloss Level 5):[**MPI #163.**]

1. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation**>.

F. Light Industrial Coating, Exterior, Water Based, Gloss (Gloss Level 6):[**MPI #164.**]

1. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation**>.

2.8 SOLVENT-BASED PAINTS

A. Alkyd, Exterior Flat (Gloss Level 1):[**MPI #8.**]

1. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation**>.

B. Alkyd, Exterior, Semi-Gloss (Gloss Level 5):[**MPI #94.**]

1. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation**>.

C. Alkyd, Exterior Gloss (Gloss Level 6):[**MPI #9.**]

1. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation**>.

D. Alkyd, Quick Dry, Semi-Gloss (Gloss Level 5):[**MPI #81.**]

1. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation**>.

E. Alkyd, Quick Dry, Gloss (Gloss Level 7):[**MPI #96.**]

1. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation**>.

2.9 TEXTURED AND HIGH-BUILD COATINGS

A. Primer for Textured Coating, Latex, Flat: As recommended in writing by topcoat manufacturer.

1. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation**>.

B. Intermediate Coat for Textured Coating, Latex, Flat: As recommended in writing by topcoat manufacturer.

1. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation**>.

C. Textured Coating, Latex, Flat:[**MPI #42.**]

1. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation**>.

D. Primer for Latex, Exterior, High Build: As recommended in writing by topcoat manufacturer.

1. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation**>.

E. Intermediate Coat for Latex, Exterior, High Build: As recommended in writing by topcoat manufacturer.

1. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation**>.

F. Latex, Exterior, High Build:[**MPI #40.**]

1. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation**>.

2.10 ALUMINUM PAINT

A. Aluminum Paint:[**MPI #1.**]

1. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation**>.

2.11 FLOOR COATINGS

A. Sealer, Water Based, for Concrete Floors:[**MPI #99.**]

1. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation**>.

B. Sealer, Solvent Based, for Concrete Floors:[**MPI #104.**]

1. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation**>.

C. Floor Paint, Latex, Low Gloss (Maximum Gloss Level 3):[**MPI #60.**]

1. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation**>.

D. Floor Enamel, Alkyd, Gloss (Gloss Level 6):[**MPI #27.**]

1. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation**>.

2.12 SOURCE QUALITY CONTROL

A. Testing of Paint Materials: Owner reserves the right to invoke the following procedure:

1. Owner will engage the services of a qualified testing agency to sample paint materials. Contractor will be notified in advance and may be present when samples are taken. If paint materials have already been delivered to Project site, samples may be taken at Project site. Samples will be identified, sealed, and certified by testing agency.

2. Testing agency will perform tests for compliance with product requirements.
3. Owner may direct Contractor to stop applying paints if test results show materials being used do not comply with product requirements. Contractor shall remove noncomplying paint materials from Project site, pay for testing, and repaint surfaces painted with rejected materials. Contractor will be required to remove rejected materials from previously painted surfaces if, on repainting with complying materials, the two paints are incompatible.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:

1. Concrete: 12 percent.
2. Masonry (Clay and CMU): 12 percent.
3. Wood: 15 percent.
4. Portland Cement Plaster: 12 percent.
5. Gypsum Board: 12 percent.

C. Portland Cement Plaster Substrates: Verify that plaster is fully cured.

D. Exterior Gypsum Board Substrates: Verify that finishing compound is sanded smooth.

E. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.

F. Proceed with coating application only after unsatisfactory conditions have been corrected.

1. Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Comply with manufacturer's written instructions and recommendations in "MPI Manual" applicable to substrates and paint systems indicated.

B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.

1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection.

C. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.

1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce paint systems indicated.

D. Concrete Substrates: Remove release agents, curing compounds, efflorescence, and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.

E. Masonry Substrates: Remove efflorescence and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces or mortar joints exceeds that permitted in manufacturer's written instructions.

F. Steel Substrates: Remove rust, loose mill scale, and shop primer if any. Clean using methods recommended in writing by paint manufacturer[**.**] [**but not less than the following:**]

1. SSPC-SP 2, "Hand Tool Cleaning."
2. SSPC-SP 3, "Power Tool Cleaning."
3. SSPC-SP 7/NACE No. 4, "Brush-off Blast Cleaning."
4. SSPC-SP 11, "Power Tool Cleaning to Bare Metal."

G. Shop-Primed Steel Substrates: Clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material as used for shop priming to comply with SSPC-PA 1 for touching up shop-primed surfaces.

H. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.

I. Aluminum Substrates: Remove loose surface oxidation.

J. Wood Substrates:

1. Scrape and clean knots. Before applying primer, apply coat of knot sealer recommended in writing by topcoat manufacturer for exterior use in paint system indicated.
2. Sand surfaces that will be exposed to view, and dust off.
3. Prime edges, ends, faces, undersides, and backsides of wood.
4. After priming, fill holes and imperfections in the finish surfaces with putty or plastic wood filler. Sand smooth when dried.

K. Plastic Trim Fabrication Substrates: Remove dust, dirt, and other foreign material that might impair bond of paints to substrates.

3.3 APPLICATION

A. Apply paints according to manufacturer's written instructions and recommendations in "MPI Manual."

1. Use applicators and techniques suited for paint and substrate indicated.
2. Paint surfaces behind movable items same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed items with prime coat only.
3. Paint both sides and edges of exterior doors and entire exposed surface of exterior door frames.
4. Paint entire exposed surface of window frames and sashes.

5. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
6. Primers specified in painting schedules may be omitted on items that are factory primed or factory finished if acceptable to topcoat manufacturers.

B. Tint undercoats same color as topcoat, but tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Provide sufficient difference in shade of undercoats to distinguish each separate coat.

C. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.

D. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.

E. Painting Fire Suppression, Plumbing, HVAC, Electrical, Communication, and Electronic Safety and Security Work:

1. Paint the following work where exposed to view:

a. Equipment, including panelboards[**and switch gear**].
b. Uninsulated metal piping.
c. Uninsulated plastic piping.
d. Pipe hangers and supports.
e. Metal conduit.
f. Plastic conduit.
g. Tanks that do not have factory-applied final finishes.
h. <**Insert mechanical items to be painted**>.

3.4 FIELD QUALITY CONTROL

A. Dry Film Thickness Testing: Owner may engage the services of a qualified testing and inspecting agency to inspect and test paint for dry film thickness.

1. Contractor shall touch up and restore painted surfaces damaged by testing.
2. If test results show that dry film thickness of applied paint does not comply with paint manufacturer's written recommendations, Contractor shall pay for testing and apply additional coats as needed to provide dry film thickness that complies with paint manufacturer's written recommendations.

3.5 CLEANING AND PROTECTION

A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.

B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.

C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.

D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.6 EXTERIOR PAINTING SCHEDULE

A. Concrete Substrates, Nontraffic Surfaces:

1. Latex System:

a. Prime Coat: Latex, exterior, matching topcoat.
b. Prime Coat: Primer, alkali resistant, water based**[, MPI #3]**.
c. Intermediate Coat: Latex, exterior, matching topcoat.
d. Topcoat: Latex, exterior flat (Gloss Level 1)**[, MPI #10]**.
e. Topcoat: Latex, exterior, low sheen (Gloss Level 3-4)**[, MPI #15]**.
f. Topcoat: Latex, exterior semi-gloss (Gloss Level 5)**[, MPI #11]**.
g. Topcoat: Latex, exterior gloss (Gloss Level 6)**[, MPI #119]**.

2. Latex Aggregate/Latex System:

a. Prime Coat: Textured coating, latex, flat**[, MPI #42]**.
b. Intermediate Coat: Latex, exterior, matching topcoat.
c. Topcoat: Latex, exterior flat (Gloss Level 1)**[, MPI #10]**.
d. Topcoat: Latex, exterior, low sheen (Gloss Level 3-4)**[, MPI #15]**.
e. Topcoat: Latex, exterior semi-gloss (Gloss Level 5)**[, MPI #11]**.
f. Topcoat: Latex, exterior gloss (Gloss Level 6)**[, MPI #119]**.

3. High-Build Latex System: Dry film thickness not less than 10 mils (0.25 mm).

a. Prime Coat: As recommended in writing by topcoat manufacturer.
b. Intermediate Coat: As recommended in writing by topcoat manufacturer.
c. Topcoat: Latex, exterior, high build**[, MPI #40]**.

4. Latex Aggregate System:

a. Prime Coat: As recommended in writing by topcoat manufacturer.
b. Intermediate Coat: As recommended in writing by topcoat manufacturer.
c. Topcoat: Textured coating, latex, flat**[, MPI #42]**.

B. Concrete Substrates, Traffic Surfaces:

1. Latex Floor Paint System:

a. Prime Coat: Floor paint, latex, low gloss (maximum Gloss Level 3)**[, MPI #60]**.
b. Intermediate Coat: Floor paint, latex, low gloss (maximum Gloss Level 3)**[, MPI #60]**.
c. Topcoat: Floor paint, latex, low gloss (maximum Gloss Level 3)**[, MPI #60]**.

2. Alkyd Floor Enamel System:

a. Prime Coat: Floor enamel, alkyd, gloss (Gloss Level 6)**[, MPI #27]**.
b. Intermediate Coat: Floor enamel, alkyd, gloss (Gloss Level 6)**[, MPI #27]**.
c. Topcoat: Floor enamel, alkyd, gloss (Gloss Level 6)**[, MPI #27]**.

d. Additive: Manufacturer's standard additive to increase skid resistance of painted surface.

3. Water-Based Clear Sealer System:

a. Prime Coat: Sealer, water based, for concrete floors**[, MPI #99]**.
b. Intermediate Coat: Sealer, water based, for concrete floors**[, MPI #99]**.
c. Topcoat: Sealer, water based, for concrete floors**[, MPI #99]**.

4. Solvent-Based Clear Sealer System:

a. Prime Coat: Sealer, solvent based, for concrete floors**[, MPI #104]**.
b. Intermediate Coat: Sealer, solvent based, for concrete floors**[, MPI #104]**.
c. Topcoat: Sealer, solvent based, for concrete floors**[, MPI #104]**.

C. Clay-Masonry Substrates:

1. Latex System:

a. Prime Coat: Latex, exterior, matching topcoat.
b. Intermediate Coat: Latex, exterior, matching topcoat.
c. Topcoat: Latex, exterior flat (Gloss Level 1)**[, MPI #10]**.
d. Topcoat: Latex, exterior, low sheen (Gloss Level 3-4)**[, MPI #15]**.
e. Topcoat: Latex, exterior semi-gloss (Gloss Level 5)**[, MPI #11]**.
f. Topcoat: Latex, exterior gloss (Gloss Level 6)**[, MPI #119]**.

2. High-Build Latex System: Dry film thickness not less than 10 mils (0.25 mm).

a. Prime Coat: As recommended in writing by topcoat manufacturer.
b. Intermediate Coat: As recommended in writing by topcoat manufacturer.
c. Topcoat: Latex, exterior, high build**[, MPI #40]**.

3. Latex Aggregate System:

a. Prime Coat: As recommended in writing by topcoat manufacturer.
b. Intermediate Coat: As recommended in writing by topcoat manufacturer.
c. Topcoat: Textured coating, latex, flat**[, MPI #42]**.

D. CMU Substrates:

1. Latex System:

a. Prime Coat: Block filler, latex, interior/exterior**[, MPI #4]**.
b. Intermediate Coat: Latex, exterior, matching topcoat.
c. Topcoat: Latex, exterior flat (Gloss Level 1)**[, MPI #10]**.
d. Topcoat: Latex, exterior, low sheen (Gloss Level 3-4)**[, MPI #15]**.
e. Topcoat: Latex, exterior semi-gloss (Gloss Level 5)**[, MPI #11]**.
f. Topcoat: Latex, exterior gloss (Gloss Level 6)**[, MPI #119]**.

2. Latex over Alkali-Resistant Primer System:

a. Prime Coat: Primer, alkali resistant, water based**[, MPI #3]**.
b. Intermediate Coat: Latex, exterior, matching topcoat.
c. Topcoat: Latex, exterior flat (Gloss Level 1)**[, MPI #10]**.

d. Topcoat: Latex, exterior, low sheen (Gloss Level 3-4)**[, MPI #15]**.
e. Topcoat: Latex, exterior semi-gloss (Gloss Level 5)**[, MPI #11]**.
f. Topcoat: Latex, exterior gloss (Gloss Level 6)**[, MPI #119]**.

3. High-Build Latex System: Dry film thickness not less than 10 mils (0.25 mm).

a. Prime Coat: As recommended in writing by topcoat manufacturer.
b. Intermediate Coat: As recommended in writing by topcoat manufacturer.
c. Topcoat: Latex, exterior, high build**[, MPI #40]**.

4. Latex Aggregate System:

a. Prime Coat: As recommended in writing by topcoat manufacturer.
b. Intermediate Coat: As recommended in writing by topcoat manufacturer.
c. Topcoat: Textured coating, latex, flat**[, MPI #42]**.

E. Steel Substrates:

1. Water-Based Light Industrial Coating System:

a. Prime Coat: Primer, alkyd, anti-corrosive for metal**[, MPI #79]**.
b. Prime Coat: Shop primer specified in Section 05120 "Structural Steel" where substrate is specified.
c. Intermediate Coat: Light industrial coating, exterior, water based, matching topcoat.
d. Topcoat: Light industrial coating, exterior, water based (Gloss Level 3)**[, MPI #161]**.
e. Topcoat: Light industrial coating, exterior, water based, semi-gloss (Gloss Level 5)**[, MPI #163]**.
f. Topcoat: Light industrial coating, exterior, water based, gloss (Gloss Level 6)**[, MPI #164]**.

2. Alkyd System:

a. Prime Coat: Primer, alkyd, anticorrosive for metal**[, MPI #79]**.
b. Prime Coat: Shop primer specified in Section 05120 "Structural Steel" where substrate is specified.
c. Intermediate Coat: Exterior alkyd enamel matching topcoat.
d. Topcoat: Alkyd, exterior, flat (Gloss Level 1)**[, MPI #8]**.
e. Topcoat: Alkyd, exterior, semi-gloss (Gloss Level 5)**[, MPI #94]**.
f. Topcoat: Alkyd, exterior, gloss (Gloss Level 6)**[, MPI #9]**.

3. Quick-Drying Enamel System:

a. Prime Coat: Primer, alkyd, quick dry, for metal**[, MPI #76]**.
b. Intermediate Coat: Alkyd, quick dry, matching topcoat.
c. Topcoat: Alkyd, quick dry, semi-gloss (Gloss Level 5)**[, MPI #81]**.
d. Topcoat: Alkyd, quick dry, gloss (Gloss Level 7)**[, MPI #96]**.

4. Aluminum Paint System:

a. Prime Coat: Primer, alkyd, anti-corrosive for metal**[, MPI #79]**.
b. Prime Coat: Shop primer specified in Section 05120 "Structural Steel" where substrate is specified.

c. Intermediate Coat: Aluminum paint**[, MPI #1**].
d. Topcoat: Aluminum paint**[, MPI #1**].

F. Galvanized-Metal Substrates:

1. Latex System:

a. Prime Coat: Primer, galvanized, water based**[, MPI #134**].
b. Prime Coat: Primer, galvanized metal**[, as recommended in writing by topcoat manufacturer for exterior use on galvanized-metal substrates with topcoat indicated**].
c. Intermediate Coat: Latex, exterior, matching topcoat.
d. Topcoat: Latex, exterior flat (Gloss Level 1)**[, MPI #10**].
e. Topcoat: Latex, exterior, low sheen (Gloss Level 3-4)**[, MPI #15**].
f. Topcoat: Latex, exterior semi-gloss (Gloss Level 5)**[, MPI #11**].
g. Topcoat: Latex, exterior gloss (Gloss Level 6)**[, MPI #119**].

2. Water-Based Light Industrial Coating System:

a. Prime Coat: Primer, galvanized, water based**[, MPI #134**].
b. Prime Coat: Primer, galvanized metal**[, as recommended in writing by topcoat manufacturer for exterior use on galvanized-metal substrates with topcoat indicated**].
c. Intermediate Coat: Light industrial coating, exterior, water based, matching topcoat.
d. Topcoat: Light industrial coating, exterior, water based (Gloss Level 3)**[, MPI #161**].
e. Topcoat: Light industrial coating, exterior, water based, semi-gloss (Gloss Level 5)**[, MPI #163**].
f. Topcoat: Light industrial coating, exterior, water based, gloss (Gloss Level 6)**[, MPI #164**].

3. Alkyd System:

a. Prime Coat: Primer, galvanized metal**[, as recommended in writing by topcoat manufacturer for exterior use on galvanized-metal substrates with topcoat indicated**].
b. Intermediate Coat: Exterior alkyd enamel matching topcoat.
c. Topcoat: Alkyd, exterior, flat (Gloss Level 5)**[, MPI #8**].
d. Topcoat: Alkyd, exterior, semi-gloss (Gloss Level 5)**[, MPI #94**].
e. Topcoat: Alkyd, exterior, gloss (Gloss Level 5)**[, MPI #9**].

G. Aluminum Substrates:

1. Latex System:

a. Prime Coat: Primer, quick dry, for aluminum**[, MPI #95**].
b. Intermediate Coat: Latex, exterior, matching topcoat.
c. Topcoat: Latex, exterior flat (Gloss Level 1)**[, MPI #10**].
d. Topcoat: Latex, exterior, low sheen (Gloss Level 3-4)**[, MPI #15**].
e. Topcoat: Latex, exterior semi-gloss (Gloss Level 5)**[, MPI #11**].
f. Topcoat: Latex, exterior gloss (Gloss Level 6)**[, MPI #119**].

2. Water-Based Light Industrial Coating System:

a. Prime Coat: Primer, quick dry, for aluminum[**, MPI #95**].
b. Intermediate Coat: Light industrial coating, exterior, water based, matching topcoat.
c. Topcoat: Light industrial coating, exterior, water based (Gloss Level 3)[**, MPI #161**].
d. Topcoat: Light industrial coating, exterior, water based, semi-gloss (Gloss Level 5)[**, MPI #163**].
e. Topcoat: Light industrial coating, exterior, water based, gloss (Gloss Level 6)[**, MPI #164**].

3. Alkyd System:

a. Prime Coat: Primer, quick dry, for aluminum[**, MPI #95**].
b. Intermediate Coat: Exterior alkyd enamel matching topcoat.
c. Topcoat: Alkyd, exterior, flat (Gloss Level 5)[**, MPI #8**].
d. Topcoat: Alkyd, exterior, semi-gloss (Gloss Level 5)[**, MPI #94**].
e. Topcoat: Alkyd, exterior, gloss (Gloss Level 5)[**, MPI #9**].

H. Stainless-Steel Substrates:

1. Latex System:

a. Prime Coat: Primer, bonding, solvent based[**, MPI #69**].
b. Intermediate Coat: Latex, exterior, matching topcoat.
c. Topcoat: Latex, exterior flat (Gloss Level 1)[**, MPI #10**].
d. Topcoat: Latex, exterior, low sheen (Gloss Level 3-4)[**, MPI #15**].
e. Topcoat: Latex, exterior semi-gloss (Gloss Level 5)[**, MPI #11**].
f. Topcoat: Latex, exterior gloss (Gloss Level 6)[**, MPI #119**].

2. Water-Based Light Industrial Coating System:

a. Prime Coat: Primer, quick dry, for aluminum[**, MPI #95**].
b. Intermediate Coat: Light industrial coating, exterior, water based, matching topcoat.
c. Topcoat: Light industrial coating, exterior, water based (Gloss Level 3)[**, MPI #161**].
d. Topcoat: Light industrial coating, exterior, water based, semi-gloss (Gloss Level 5)[**, MPI #163**].
e. Topcoat: Light industrial coating, exterior, water based, gloss (Gloss Level 6)[**, MPI #164**].

I. Wood Substrates: Including [**wood trim**] [**architectural woodwork**] [**doors**] [**windows**] [**wood siding**] [**wood fences**] [**wood-based panel products**] [**glued-laminated construction**] [**exposed joists**] [**exposed beams**] [**wood shingles and shakes (excluding roofs)**] <**Insert description**>.

1. Latex System:

a. Prime Coat: Primer, latex for exterior wood[**, MPI #6**].
b. Intermediate Coat: Latex, exterior, matching topcoat.
c. Topcoat: Latex, exterior flat (Gloss Level 1)[**, MPI #10**].
d. Topcoat: Latex, exterior, low sheen (Gloss Level 3-4)[**, MPI #15**].
e. Topcoat: Latex, exterior semi-gloss (Gloss Level 5)[**, MPI #11**].
f. Topcoat: Latex, exterior gloss (Gloss Level 6)[**, MPI #119**].

2. Latex over Alkyd Primer System:

    a. Prime Coat: Primer, alkyd for exterior wood[**, MPI #5**].
    b. Prime Coat: Primer, oil for exterior wood[**, MPI #7**].
    c. Intermediate Coat: Latex, exterior, matching topcoat.
    d. Topcoat: Latex, exterior flat (Gloss Level 1)[**, MPI #10**].
    e. Topcoat: Latex, exterior, low sheen (Gloss Level 3-4)[**, MPI #15**].
    f. Topcoat: Latex, exterior semi-gloss (Gloss Level 5)[**, MPI #11**].
    g. Topcoat: Latex, exterior gloss (Gloss Level 6)[**, MPI #119**].

3. Alkyd System:

    a. Prime Coat: Primer, alkyd for exterior wood[**, MPI #5**].
    b. Prime Coat: Primer, oil for exterior wood[**, MPI #7**].
    c. Intermediate Coat: Exterior alkyd enamel matching topcoat.
    d. Topcoat: Alkyd, exterior, flat (Gloss Level 5)[**, MPI #8**].
    e. Topcoat: Alkyd, exterior, semi-gloss (Gloss Level 5)[**, MPI #94**].
    f. Topcoat: Alkyd, exterior, gloss (Gloss Level 5)[**, MPI #9**].

J. Wood Substrates, Traffic Surfaces: Including [**lumber decking**] [**stairs**] <**Insert description**>.

1. Latex System:

    a. Prime Coat: Primer, latex for exterior wood[**, MPI #6**].
    b. Intermediate Coat: Interior/exterior latex floor and porch (low gloss).
    c. Topcoat: Interior/exterior latex floor and porch (low gloss).

        1) With additive to increase skid resistance of painted surface.

2. Latex over Alkyd Primer System:

    a. Prime Coat: Primer, alkyd for exterior wood[**, MPI #5**].
    b. Intermediate Coat: Interior/exterior latex floor and porch (low gloss).
    c. Topcoat: Interior/exterior latex floor and porch (low gloss).

        1) With additive to increase skid resistance of painted surface.

3. Alkyd Floor Enamel System:

    a. Prime Coat: Floor enamel, alkyd, gloss (Gloss Level 6)[**, MPI #27**].
    b. Intermediate Coat: Floor enamel, alkyd, gloss (Gloss Level 6)[**, MPI #27**].
    c. Topcoat: Floor enamel, alkyd, gloss (Gloss Level 6)[**, MPI #27**].
    d. Additive: Manufacturer's standard additive to increase skid resistance of painted surface.

K. Plastic Trim Fabrication Substrates:

1. Latex System:

    a. Prime Coat: Primer, bonding, water based[**, MPI #17**].
    b. Prime Coat: Primer, bonding, solvent based[**, MPI #69**].
    c. Intermediate Coat: Latex, exterior, matching topcoat.
    d. Topcoat: Latex, exterior flat (Gloss Level 1)[**, MPI #10**].
    e. Topcoat: Latex, exterior, low sheen (Gloss Level 3-4)[**, MPI #15**].

f. Topcoat: Latex, exterior semi-gloss (Gloss Level 5)[**, MPI #11**].
g. Topcoat: Latex, exterior gloss (Gloss Level 6)[**, MPI #119**].

2. Alkyd System:

a. Prime Coat: Primer, bonding, water based[**, MPI #17**].
b. Prime Coat: Primer, bonding, solvent based[**, MPI #69**].
c. Intermediate Coat: Exterior alkyd enamel matching topcoat.
d. Topcoat: Alkyd, exterior, flat (Gloss Level 5)[**, MPI #8**].
e. Topcoat: Alkyd, exterior, semi-gloss (Gloss Level 5)[**, MPI #94**].
f. Topcoat: Alkyd, exterior, gloss (Gloss Level 5)[**, MPI #9**].

L. Portland Cement Plaster Substrates:

1. Latex System:

a. Prime Coat: Latex, exterior, matching topcoat.
b. Intermediate Coat: Latex, exterior, matching topcoat.
c. Topcoat: Latex, exterior flat (Gloss Level 1)[**, MPI #10**].
d. Topcoat: Latex, exterior, low sheen (Gloss Level 3-4)[**, MPI #15**].
e. Topcoat: Latex, exterior semi-gloss (Gloss Level 5)[**, MPI #11**].
f. Topcoat: Latex, exterior gloss (Gloss Level 6)[**, MPI #119**].

2. Latex over Alkali-Resistant Primer System:

a. Prime Coat: Primer, alkali resistant, water based[**, MPI #3**].
b. Intermediate Coat: Latex, exterior, matching topcoat.
c. Topcoat: Latex, exterior flat (Gloss Level 1)[**, MPI #10**].
d. Topcoat: Latex, exterior, low sheen (Gloss Level 3-4)[**, MPI #15**].
e. Topcoat: Latex, exterior semi-gloss (Gloss Level 5)[**, MPI #11**].
f. Topcoat: Latex, exterior gloss (Gloss Level 6)[**, MPI #119**].

3. High-Build Latex System: Dry film thickness not less than 10 mils (0.25 mm).

a. Prime Coat: As recommended in writing by topcoat manufacturer.
b. Intermediate Coat: As recommended in writing by topcoat manufacturer.
c. Topcoat: Latex, exterior, high build[**, MPI #40**].

M. Exterior Gypsum Board Substrates:

1. Latex System:

a. Prime Coat: Latex, exterior, matching topcoat.
b. Intermediate Coat: Latex, exterior, matching topcoat.
c. Topcoat: Latex, exterior flat (Gloss Level 1)[**, MPI #10**].
d. Topcoat: Latex, exterior, low sheen (Gloss Level 3-4)[**, MPI #15**].
e. Topcoat: Latex, exterior semi-gloss (Gloss Level 5)[**, MPI #11**].
f. Topcoat: Latex, exterior gloss (Gloss Level 6)[**, MPI #119**].

END OF SECTION 09911

SECTION 09912 - INTERIOR PAINTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes surface preparation and the application of paint systems on the following interior substrates:

1. Concrete.
2. Clay masonry.
3. Concrete masonry units (CMU).
4. Steel.
5. Cast iron.
6. Galvanized metal.
7. Aluminum (not anodized or otherwise coated).
8. Wood.
9. Gypsum board.
10. Plaster.
11. Spray-textured ceilings.
12. Cotton or canvas insulation covering.
13. ASJ insulation covering.

B. Related Requirements:

1. Section 05120 "Structural Steel" for shop priming of metal substrates with primers specified in this Section.
2. Section 09960 "High-Performance Coatings" for high-performance and special-use coatings. Section 09911 "Exterior Painting" for surface preparation and the application of paint systems on exterior substrates.

1.3 DEFINITIONS

A. Gloss Level 1: Not more than 5 units at 60 degrees and 10 units at 85 degrees, according to ASTM D 523.

B. Gloss Level 2: Not more than 10 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.

C. Gloss Level 3: 10 to 25 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.

D. Gloss Level 4: 20 to 35 units at 60 degrees and not less than 35 units at 85 degrees, according to ASTM D 523.

E. Gloss Level 5: 35 to 70 units at 60 degrees, according to ASTM D 523.

F. Gloss Level 6: 70 to 85 units at 60 degrees, according to ASTM D 523.

G. Gloss Level 7: More than 85 units at 60 degrees, according to ASTM D 523.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product. Include preparation requirements and application instructions.

B. LEED Submittals:

1. Product Data for Credit EQ 4.2: For paints and coatings, including printed statement of VOC content.
2. Laboratory Test Reports for Credit EQ 4: For paints and coatings, documentation indicating that they meet the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

C. Samples for Initial Selection: For each type of topcoat product.

D. Samples for Verification: For each type of paint system and in each color and gloss of topcoat.

1. Submit Samples on rigid backing, 8 inches (200 mm) square.
2. Step coats on Samples to show each coat required for system.
3. Label each coat of each Sample.
4. Label each Sample for location and application area.

E. Product List: For each product indicated, include the following:

1. Cross-reference to paint system and locations of application areas. Use same designations indicated on Drawings and in schedules.
2. Printout of current "MPI Approved Products List" for each product category specified in Part 2, with the proposed product highlighted.
3. VOC content.

1.5 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials**,** from the same product run**,** that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Paint: 5 percent, but not less than **1 gal.** of each material and color applied.

1.6 QUALITY ASSURANCE

A. Mockups: Apply mockups of each paint system indicated and each color and finish selected to verify preliminary selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Architect will select one surface to represent surfaces and conditions for application of each paint system specified in Part 3.

    a. Vertical and Horizontal Surfaces: Provide samples of at least 100 sq. ft.
    b. Other Items: Architect will designate items or areas required.

2. Final approval of color selections will be based on mockups.

    a. If preliminary color selections are not approved, apply additional mockups of additional colors selected by Architect at no added cost to Owner.

3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F (7 deg C).

1. Maintain containers in clean condition, free of foreign materials and residue.
2. Remove rags and waste from storage areas daily.

1.8 FIELD CONDITIONS

A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F (10 and 35 deg C).

B. Do not apply paints when relative humidity exceeds 85 percent; at temperatures less than 5 deg F (3 deg C) above the dew point; or to damp or wet surfaces.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Benjamin Moore & Co.
2. PPG Architectural Finishes, Inc.
3. Sherwin-Williams Company (The).

2.2 PAINT, GENERAL

A. MPI Standards: Provide products that comply with MPI standards indicated and that are listed in its "MPI Approved Products List."

B. Material Compatibility:

1. Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
2. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.

C. VOC Content: Products shall comply with VOC limits of authorities having jurisdiction[**and, for interior paints and coatings applied at Project site, the following VOC limits, exclusive of colorants added to a tint base, when calculated according to 40 CFR 59, Subpart D (EPA Method 24)**].

1. Flat Paints and Coatings: 50 g/L.
2. Nonflat Paints and Coatings: 150 g/L.
3. Dry-Fog Coatings: 400 g/L.
4. Primers, Sealers, and Undercoaters: 200 g/L.
5. Anticorrosive and Antirust Paints Applied to Ferrous Metals: 250 g/L.
6. Zinc-Rich Industrial Maintenance Primers: 340 g/L.
7. Pretreatment Wash Primers: 420 g/L.
8. Floor Coatings: 100 g/L.
9. Shellacs, Clear: 730 g/L.
10. Shellacs, Pigmented: 550 g/L.

D. Low-Emitting Materials: Interior paints and coatings shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

E. Colors: As selected by Architect from manufacturer's full range or Match Architect's samples

1. 30 percent of surface area will be painted with deep tones.

2.3 BLOCK FILLERS

A. Block Filler, Latex, Interior/Exterior:[**MPI #4.**]

1. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation**>.

2.4 PRIMERS/SEALERS

A. Primer Sealer, Latex, Interior:[**MPI #50.**]

1. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation**>.

B. Primer, Alkali Resistant, Water Based:[**MPI #3.**]

1. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation**>.

C. Primer Sealer, Interior, Institutional Low Odor/VOC:[**MPI #149.**]

1. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation**>.

D. Primer, Latex, for Interior Wood:[**MPI #39.**]

1. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation**>.

E. Primer Sealer, Alkyd, Interior:[**MPI #45.**]

1. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation**>.

F. Primer, Bonding, Water Based:[**MPI #17.**]

1. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation**>.

G. Primer, Bonding, Solvent Based:[**MPI #69.**]

1. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation**>.

H. Wood-Knot Sealer: Sealer recommended in writing by topcoat manufacturer for use in paint systems indicated.

1. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation**>.

2.5 METAL PRIMERS

A. Primer, Rust-Inhibitive, Water Based:[**MPI #107.**]

1. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation**>.

B. Primer, Alkyd, Anti-Corrosive, for Metal:[**MPI #79.**]

1. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation**>.

C. Primer, Alkyd, Quick Dry, for Metal:[**MPI #76.**]

1. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation**>.

D. Primer, Galvanized, Water Based:[**MPI #134.**]

1. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation**>.

E. Primer, Vinyl Wash:[**MPI #80.**]

1. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation**>.

F. Primer, Quick Dry, for Aluminum:[**MPI #95.**]

1. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation**>.

2.6 WATER-BASED PAINTS

A. Latex, Interior, Flat, (Gloss Level 1):[**MPI #53.**]

1. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation**>.

B. Latex, Interior, (Gloss Level 2):[**MPI #44.**]

1. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation**>.

C. Latex, Interior, (Gloss Level 3):[**MPI #52.**]

1. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation**>.

D. Latex, Interior, (Gloss Level 4):[**MPI #43.**]

1. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation**>.

E. Latex, Interior, Semi-Gloss, (Gloss Level 5):[**MPI #54.**]

1. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation**>.

F. Latex, Interior, Gloss, (Gloss Level 6, except minimum gloss of 65 units at 60 degrees):[**MPI #114.**]

1. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation**>.

G. Latex, Interior, Institutional Low Odor/VOC, Flat (Gloss Level 1):[**MPI #143.**]

1. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation**>.

H. Latex, Interior, Institutional Low Odor/VOC, (Gloss Level 2):[**MPI #144.**]

1. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation**>.

I. Latex, Interior, Institutional Low Odor/VOC, (Gloss Level 3):[**MPI #145.**]

1. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation**>.

J. Latex, Interior, Institutional Low Odor/VOC, Semi-Gloss (Gloss Level 5):[**MPI #147.**]

1. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation**>.

K. Latex, Interior, High Performance Architectural, (Gloss Level 2):[**MPI #138.**]

1. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation**>.

L. Latex, Interior, High Performance Architectural, (Gloss Level 3):[**MPI #139.**]

1. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation**>.

M. Latex, Interior, High Performance Architectural, (Gloss Level 4):[**MPI #140.**]

1. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation**>.

N. Latex, Interior, High Performance Architectural, Semi-Gloss (Gloss Level 5):[**MPI #141.**]

1. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation**>.

O. Light Industrial Coating, Interior, Water Based (Gloss Level 3):[**MPI #151.**]

1. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation**>.

P. Light Industrial Coating, Interior, Water Based, Semi-Gloss (Gloss Level 5):[**MPI #153.**]

1. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation**>.

Q. Light Industrial Coating, Interior, Water Based, Gloss (Gloss Level 6):[**MPI #154.**]

1. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation**>.

2.7 SOLVENT-BASED PAINTS

A. Alkyd, Interior, Flat (Gloss Level 1):[**MPI #49.**]

1. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation**>.

B. Alkyd, Interior, (Gloss Level 3):[**MPI #51.**]

1. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation**>.

C. Alkyd, Interior, Semi-Gloss (Gloss Level 5):[**MPI #47.**]

1. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation**>.

D. Alkyd, Interior, Gloss (Gloss Level 6):[**MPI #48.**]

1. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation**>.

E. Alkyd, Quick Dry, Semi-Gloss (Gloss Level 5):[**MPI #81.**]

1. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation**>.

F. Alkyd, Quick Dry, Gloss (Gloss Level 7):[**MPI #96.**]

1. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation**>.

2.8 TEXTURED COATING

A. Primer for Textured Coating, Latex, Flat: As recommended in writing by topcoat manufacturer.

1. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation**>.

B. Intermediate Coat for Textured Coating, Latex, Flat: As recommended in writing by topcoat manufacturer.

1. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation**>.

C. Textured Coating, Latex, Flat:[**MPI #42.**]

1. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation**>.

2.9 DRY FOG/FALL COATINGS

A. Dry Fall, Latex, Flat:[**MPI #118.**]

1. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation**>.

B. Dry Fall, Water Based, for Galvanized Steel, Flat (Gloss Level 1):[**MPI #133.**]

1. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation**>.

C. Dry Fall, Alkyd, Flat:[**MPI #55.**]

1. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation**>.

2.10 ALUMINUM PAINT

A. Aluminum Paint:[**MPI #1.**]

1. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation**>.

2.11 FLOOR COATINGS

A. Stain, Interior, for Concrete Floors:[**MPI #58.**]

1. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation**>.

B. Sealer, Water Based, for Concrete Floors:[**MPI #99.**]

1. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation**>.

C. Sealer, Solvent Based, for Concrete Floors:[**MPI #104.**]

1. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation**>.

D. Floor Paint, Latex, Low Gloss (Maximum Gloss Level 3):[**MPI #60.**]

1. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation**>.

E. Floor Enamel, Alkyd, Gloss (Gloss Level 6):[**MPI #27.**]

1. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation**>.

2.12 SOURCE QUALITY CONTROL

A. Testing of Paint Materials: Owner reserves the right to invoke the following procedure:

1. Owner will engage the services of a qualified testing agency to sample paint materials. Contractor will be notified in advance and may be present when samples are taken. If paint materials have already been delivered to Project site, samples may be taken at Project site. Samples will be identified, sealed, and certified by testing agency.
2. Testing agency will perform tests for compliance with product requirements.
3. Owner may direct Contractor to stop applying coatings if test results show materials being used do not comply with product requirements. Contractor shall remove noncomplying paint materials from Project site, pay for testing, and repaint surfaces

painted with rejected materials. Contractor will be required to remove rejected materials from previously painted surfaces if, on repainting with complying materials, the two paints are incompatible.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:

1. Concrete: 12 percent.
2. Masonry (Clay and CMU): 12 percent.
3. Wood: 15 percent.
4. Gypsum Board: 12 percent.
5. Plaster: 12 percent.

C. Gypsum Board Substrates: Verify that finishing compound is sanded smooth.

D. Plaster Substrates: Verify that plaster is fully cured.

E. Spray-Textured Ceiling Substrates: Verify that surfaces are dry.

F. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.

G. Proceed with coating application only after unsatisfactory conditions have been corrected.

1. Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Comply with manufacturer's written instructions and recommendations in "MPI Manual" applicable to substrates indicated.

B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.

1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.

C. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.

1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce paint systems indicated.

D. Concrete Substrates: Remove release agents, curing compounds, efflorescence, and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.

E. Masonry Substrates: Remove efflorescence and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces or mortar joints exceed that permitted in manufacturer's written instructions.

F. Steel Substrates: Remove rust, loose mill scale, and shop primer, if any. Clean using methods recommended in writing by paint manufacturer[**.**] [**but not less than the following:**]

1. SSPC-SP 2, "Hand Tool Cleaning."
2. SSPC-SP 3, "Power Tool Cleaning."
3. SSPC-SP 7/NACE No. 4, "Brush-off Blast Cleaning."
4. SSPC-SP 11, "Power Tool Cleaning to Bare Metal."

G. Shop-Primed Steel Substrates: Clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material as used for shop priming to comply with SSPC-PA 1 for touching up shop-primed surfaces.

H. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal fabricated from coil stock by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.

I. Aluminum Substrates: Remove loose surface oxidation.

J. Wood Substrates:

1. Scrape and clean knots, and apply coat of knot sealer before applying primer.
2. Sand surfaces that will be exposed to view, and dust off.
3. Prime edges, ends, faces, undersides, and backsides of wood.
4. After priming, fill holes and imperfections in the finish surfaces with putty or plastic wood filler. Sand smooth when dried.

K. Cotton or Canvas Insulation Covering Substrates: Remove dust, dirt, and other foreign material that might impair bond of paints to substrates.

3.3 APPLICATION

A. Apply paints according to manufacturer's written instructions and to recommendations in "MPI Manual."

1. Use applicators and techniques suited for paint and substrate indicated.
2. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
3. Paint front and backsides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.
4. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
5. Primers specified in painting schedules may be omitted on items that are factory primed or factory finished if acceptable to topcoat manufacturers.

B. Tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Tint undercoats to match color of topcoat, but provide sufficient difference in shade of undercoats to distinguish each separate coat.

C. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.

D. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.

E. Painting Fire Suppression, Plumbing, HVAC, Electrical, Communication, and Electronic Safety and Security Work:

1. Paint the following work where exposed in equipment rooms:

    a. Equipment, including panelboards and switch gear.
    b. Uninsulated metal piping.
    c. Uninsulated plastic piping.
    d. Pipe hangers and supports.
    e. Metal conduit.
    f. Plastic conduit.
    g. Tanks that do not have factory-applied final finishes.
    h. Duct, equipment, and pipe insulation having cotton or canvas insulation covering or other paintable jacket material.
    i. <**Insert mechanical items to be painted**>.

2. Paint the following work where exposed in occupied spaces:

    a. Equipment, including panelboards.
    b. Uninsulated metal piping.
    c. Uninsulated plastic piping.
    d. Pipe hangers and supports.
    e. Metal conduit.
    f. Plastic conduit.
    g. Duct, equipment, and pipe insulation having cotton or canvas insulation covering or other paintable jacket material.
    h. Other items as directed by Architect.
    i. <**Insert mechanical items to be painted**>.

3. Paint portions of internal surfaces of metal ducts, without liner, behind air inlets and outlets that are visible from occupied spaces.

3.4 FIELD QUALITY CONTROL

A. Dry Film Thickness Testing: Owner may engage the services of a qualified testing and inspecting agency to inspect and test paint for dry film thickness.

1. Contractor shall touch up and restore painted surfaces damaged by testing.
2. If test results show that dry film thickness of applied paint does not comply with paint manufacturer's written recommendations, Contractor shall pay for testing and apply additional coats as needed to provide dry film thickness that complies with paint manufacturer's written recommendations.

3.5 CLEANING AND PROTECTION

A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.

B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.

C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.

D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.6 INTERIOR PAINTING SCHEDULE

A. Concrete Substrates, Nontraffic Surfaces:

1. Latex System:

a. Prime Coat: Primer sealer, latex, interior[**, MPI #50**].
b. Prime Coat: Latex, interior, matching topcoat.
c. Intermediate Coat: Latex, interior, matching topcoat.
d. Topcoat: Latex, interior, flat, (Gloss Level 1)[**, MPI #53**].
e. Topcoat: Latex, interior, (Gloss Level 2)[**, MPI #44**].
f. Topcoat: Latex, interior, (Gloss Level 3)[**, MPI #52**].
g. Topcoat: Latex, interior, (Gloss Level 4)[**, MPI #43**].
h. Topcoat: Latex, interior, semi-gloss, (Gloss Level 5)[**, MPI #54**].
i. Topcoat: Latex, interior, gloss, (Gloss Level 6, except minimum gloss of 65 units at 60 degrees)[**, MPI #114**].

2. Latex over Latex Aggregate System:

a. Prime Coat: Textured coating, latex, flat[**, MPI #42**].
b. Intermediate Coat: Latex, interior, matching topcoat.
c. Topcoat: Latex, interior, flat, (Gloss Level 1)[**, MPI #53**].
d. Topcoat: Latex, interior, (Gloss Level 2)[**, MPI #44**].
e. Topcoat: Latex, interior, (Gloss Level 3)[**, MPI #52**].
f. Topcoat: Latex, interior, (Gloss Level 4)[**, MPI #43**].
g. Topcoat: Latex, interior, semi-gloss, (Gloss Level 5)[**, MPI #54**].
h. Topcoat: Latex, interior, gloss, (Gloss Level 6, except minimum gloss of 65 units at 60 degrees)[**, MPI #114**].

3. Institutional Low-Odor/VOC Latex System:

a. Prime Coat: Primer sealer, interior, institutional low odor/VOC[**, MPI #149**].
b. Intermediate Coat: Latex, interior, institutional low odor/VOC, matching topcoat.
c. Topcoat: Latex, interior, institutional low odor/VOC, flat (Gloss Level 1)[**, MPI #143**].
d. Topcoat: Latex, interior, institutional low odor/VOC, (Gloss Level 2)[**, MPI #144**].
e. Topcoat: Latex, interior, institutional low odor/VOC, (Gloss Level 3)[**, MPI #145**].

f. Topcoat: Latex, interior, institutional low odor/VOC, semi-gloss (Gloss Level 5)**[, MPI #147**].

4. High-Performance Architectural Latex System:

a. Prime Coat: Primer, alkali resistant, water based**[, MPI #3**].
b. Intermediate Coat: Latex, interior, high performance architectural, matching topcoat.
c. Topcoat: Latex, interior, high performance architectural, (Gloss Level 2)**[, MPI #138**].
d. Topcoat: Latex, interior, high performance architectural, (Gloss Level 3)**[, MPI #139**].
e. Topcoat: Latex, interior, high performance architectural, (Gloss Level 4)**[, MPI #140**].
f. Topcoat: Latex, interior, high performance architectural, semi-gloss (Gloss Level 5)**[, MPI #141**].

5. Water-Based Light Industrial Coating System:

a. Prime Coat: Primer, alkali resistant, water based**[, MPI #3**].
b. Intermediate Coat: Light industrial coating, interior, water based, matching topcoat.
c. Topcoat: Light industrial coating, interior, water based (Gloss Level 3)**[, MPI #151**].
d. Topcoat: Light industrial coating, interior, water based, semi-gloss (Gloss Level 5)**[, MPI #153**].
e. Topcoat: Light industrial coating, interior, water based, gloss (Gloss Level 6)**[, MPI #154**].

6. Alkyd System:

a. Prime Coat: Primer, alkali resistant, water based**[, MPI #3**].
b. Intermediate Coat: Alkyd, interior, matching topcoat.
c. Topcoat: Alkyd, interior, flat (Gloss Level 1)**[, MPI #49**].
d. Topcoat: Alkyd, interior, (Gloss Level 3)**[, MPI #51**].
e. Topcoat: Alkyd, interior, semi-gloss (Gloss Level 5)**[, MPI #47**].
f. Topcoat: Alkyd, interior, gloss (Gloss Level 6)**[, MPI #48**].

B. Concrete Substrates, Traffic Surfaces:

1. Latex Floor Enamel System:

a. Prime Coat: Floor paint, latex, low gloss (maximum Gloss Level 3)**[, MPI #60**].
b. Intermediate Coat: Floor paint, latex, low gloss (maximum Gloss Level 3)**[, MPI #60**].
c. Topcoat: Floor paint, latex, low gloss (maximum Gloss Level 3)**[, MPI #60**].

2. Alkyd Floor Enamel System:

a. Prime Coat: Floor enamel, alkyd, gloss (Gloss Level 6)**[, MPI #27**].
b. Intermediate Coat: Floor enamel, alkyd, gloss (Gloss Level 6)**[, MPI #27**].
c. Topcoat: Floor enamel, alkyd, gloss (Gloss Level 6)**[, MPI #27**].

3. Concrete Stain System:

a. First Coat: Stain, interior, for concrete floors**[, MPI #58]**.
b. Topcoat: Stain, interior, for concrete floors**[, MPI #58]**.

4. Water-Based Clear Sealer System:

a. First Coat: Sealer, water based, for concrete floors**[, MPI #99]**.
b. Topcoat: Sealer, water based, for concrete floors**[, MPI #99]**.

5. Solvent-Based Clear Sealer System:

a. First Coat: Sealer, solvent based, for concrete floors**[, MPI #104]**.
b. Topcoat: Sealer, solvent based, for concrete floors**[, MPI #104]**.

C. Clay-Masonry Substrates:

1. Latex System:

a. Prime Coat: Latex, interior, matching topcoat.
b. Intermediate Coat: Latex, interior, matching topcoat.
c. Topcoat: Latex, interior, flat, (Gloss Level 1)**[, MPI #53]**.
d. Topcoat: Latex, interior, (Gloss Level 2)**[, MPI #44]**.
e. Topcoat: Latex, interior, (Gloss Level 3)**[, MPI #52]**.
f. Topcoat: Latex, interior, (Gloss Level 4)**[, MPI #43]**.
g. Topcoat: Latex, interior, semi-gloss, (Gloss Level 5)**[, MPI #54]**.
h. Topcoat: Latex, interior, gloss, (Gloss Level 6, except minimum gloss of 65 units at 60 degrees)**[, MPI #114]**.

2. Latex Aggregate System:

a. Prime Coat: Primer for textured coating, latex, flat**[, as recommended in writing by topcoat manufacturer]**.
b. Intermediate Coat: Intermediate coat for textured coating, latex, flat**[, as recommended in writing by topcoat manufacturer]**.
c. Topcoat: Textured coating, latex, flat**[, MPI #42]**.

3. Institutional Low-Odor/VOC Latex System:

a. Prime Coat: Primer sealer, interior, institutional low odor/VOC**[, MPI #149]**.
b. Intermediate Coat: Latex, interior, institutional low odor/VOC, matching topcoat.
c. Topcoat: Latex, interior, institutional low odor/VOC, flat (Gloss Level 1)**[, MPI #143]**.
d. Topcoat: Latex, interior, institutional low odor/VOC, (Gloss Level 2)**[, MPI #144]**.
e. Topcoat: Latex, interior, institutional low odor/VOC, (Gloss Level 3)**[, MPI #145]**.
f. Topcoat: Latex, interior, institutional low odor/VOC, semi-gloss (Gloss Level 5)**[, MPI #147]**.

4. High-Performance Architectural Latex System:

a. Prime Coat: Primer, alkali resistant, water based**[, MPI #3]**.
b. Intermediate Coat: Latex, interior, high performance architectural, matching topcoat.
c. Topcoat: Latex, interior, high performance architectural, (Gloss Level 2)**[, MPI #138]**.

d. Topcoat: Latex, interior, high performance architectural, (Gloss Level 3)[**, MPI #139**].
e. Topcoat: Latex, interior, high performance architectural, (Gloss Level 4)[**, MPI #140**].
f. Topcoat: Latex, interior, high performance architectural, semi-gloss (Gloss Level 5)[**, MPI #141**].

5. Water-Based Light Industrial Coating System:

a. Prime Coat: Primer, alkali resistant, water based[**, MPI #3**].
b. Intermediate Coat: Light industrial coating, interior, water based, matching topcoat.
c. Topcoat: Light industrial coating, interior, water based (Gloss Level 3)[**, MPI #151**].
d. Topcoat: Light industrial coating, interior, water based, semi-gloss (Gloss Level 5)[**, MPI #153**].
e. Topcoat: Light industrial coating, interior, water based, gloss (Gloss Level 6)[**, MPI #154**].

6. Alkyd System:

a. Prime Coat: Primer sealer, latex, interior[**, MPI #50**].
b. Intermediate Coat: Alkyd, interior, matching topcoat.
c. Topcoat: Alkyd, interior, flat (Gloss Level 1)[**, MPI #49**].
d. Topcoat: Alkyd, interior, (Gloss Level 3)[**, MPI #51**].
e. Topcoat: Alkyd, interior, semi-gloss (Gloss Level 5)[**, MPI #47**].
f. Topcoat: Alkyd, interior, gloss (Gloss Level 6)[**, MPI #48**].

D. CMU Substrates:

1. Latex System:

a. Block Filler: Block filler, latex, interior/exterior[**, MPI #4**].
b. Intermediate Coat: Latex, interior, matching topcoat.
c. Topcoat: Latex, interior, flat, (Gloss Level 1)[**, MPI #53**].
d. Topcoat: Latex, interior, (Gloss Level 2)[**, MPI #44**].
e. Topcoat: Latex, interior, (Gloss Level 3)[**, MPI #52**].
f. Topcoat: Latex, interior, (Gloss Level 4)[**, MPI #43**].
g. Topcoat: Latex, interior, semi-gloss, (Gloss Level 5)[**, MPI #54**].
h. Topcoat: Latex, interior, gloss, (Gloss Level 6, except minimum gloss of 65 units at 60 degrees)[**, MPI #114**].

2. Institutional Low-Odor/VOC Latex System:

a. Block Filler: Block filler, latex, interior/exterior[**, MPI #4**].
b. Intermediate Coat: Latex, interior, institutional low odor/VOC, matching topcoat.
c. Topcoat: Latex, interior, institutional low odor/VOC, flat (Gloss Level 1)[**, MPI #143**].
d. Topcoat: Latex, interior, institutional low odor/VOC, (Gloss Level 2)[**, MPI #144**].
e. Topcoat: Latex, interior, institutional low odor/VOC, (Gloss Level 3)[**, MPI #145**].
f. Topcoat: Latex, interior, institutional low odor/VOC, semi-gloss (Gloss Level 5)[**, MPI #147**].

3. High-Performance Architectural Latex System:

a. Block Filler: Block filler, latex, interior/exterior[**, MPI #4**].
b. Intermediate Coat: Latex, interior, high performance architectural, matching topcoat.
c. Topcoat: Latex, interior, high performance architectural, (Gloss Level 2)[**, MPI #138**].
d. Topcoat: Latex, interior, high performance architectural, (Gloss Level 3)[**, MPI #139**].
e. Topcoat: Latex, interior, high performance architectural, (Gloss Level 4)[**, MPI #140**].
f. Topcoat: Latex, interior, high performance architectural, semi-gloss (Gloss Level 5)[**, MPI #141**].

4. Water-Based Light Industrial Coating System:

a. Block Filler: Block filler, latex, interior/exterior[**, MPI #4**].
b. Intermediate Coat: Light industrial coating, interior, water based, matching topcoat.
c. Topcoat: Light industrial coating, interior, water based (Gloss Level 3)[**, MPI #151**].
d. Topcoat: Light industrial coating, interior, water based, semi-gloss (Gloss Level 5)[**, MPI #153**].
e. Topcoat: Light industrial coating, interior, water based, gloss (Gloss Level 6)[**, MPI #154**].

5. Alkyd System:

a. Block Filler: Block filler, latex, interior/exterior[**, MPI #4**].
b. Sealer Coat: Primer sealer, latex, interior[**, MPI #50**].
c. Intermediate Coat: Alkyd, interior, matching topcoat.
d. Topcoat: Alkyd, interior, flat (Gloss Level 1)[**, MPI #49**].
e. Topcoat: Alkyd, interior, (Gloss Level 3)[**, MPI #51**].
f. Topcoat: Alkyd, interior, semi-gloss (Gloss Level 5)[**, MPI #47**].
g. Topcoat: Alkyd, interior, gloss (Gloss Level 6)[**, MPI #48**].

E. Steel Substrates:

1. Latex over Alkyd Primer System:

a. Prime Coat: Primer, alkyd, anti-corrosive, for metal[**, MPI #79**].
b. Prime Coat: Primer, alkyd, quick dry, for metal[**, MPI #76**].
c. Prime Coat: Primer, alkyd, anti-corrosive, for metal[**, MPI #79**] or primer, alkyd, quick dry, for metal[**, MPI #76**].
d. Prime Coat: Shop primer specified in Section 05120 "Structural Steel" where substrate is specified.
e. Intermediate Coat: Latex, interior, matching topcoat.
f. Topcoat: Latex, interior, flat, (Gloss Level 1)[**, MPI #53**].
g. Topcoat: Latex, interior, (Gloss Level 2)[**, MPI #44**].
h. Topcoat: Latex, interior, (Gloss Level 3)[**, MPI #52**].
i. Topcoat: Latex, interior, (Gloss Level 4)[**, MPI #43**].
j. Topcoat: Latex, interior, semi-gloss, (Gloss Level 5)[**, MPI #54**].
k. Topcoat: Latex, interior, gloss, (Gloss Level 6, except minimum gloss of 65 units at 60 degrees)[**, MPI #114**].

2. Water-Based Dry-Fall System:

a. Prime Coat: Primer, alkyd, anti-corrosive, for metal**[, MPI #79]**.
b. Prime Coat: Primer, alkyd, quick dry, for metal**[, MPI #76]**.
c. Prime Coat: Primer, alkyd, anti-corrosive, for metal**[, MPI #79]** or primer, alkyd, quick dry, for metal**[, MPI #76]**.
d. Prime Coat: Shop primer specified in Section 05120 "Structural Steel" where substrate is specified.
e. Topcoat: Dry fall, latex, flat**[, MPI #118]**.
f. Topcoat: Dry fall, water based, for galvanized steel, flat (Gloss Level 1)**[, MPI #133]**.

3. Institutional Low-Odor/VOC Latex System:

a. Prime Coat: Primer, rust-inhibitive, water based[**MPI #107**].
b. Intermediate Coat: Latex, interior, institutional low odor/VOC, matching topcoat.
c. Topcoat: Latex, interior, institutional low odor/VOC, flat (Gloss Level 1)**[, MPI #143]**.
d. Topcoat: Latex, interior, institutional low odor/VOC, (Gloss Level 2)**[, MPI #144]**.
e. Topcoat: Latex, interior, institutional low odor/VOC, (Gloss Level 3)**[, MPI #145]**.
f. Topcoat: Latex, interior, institutional low odor/VOC, semi-gloss (Gloss Level 5)**[, MPI #147]**.

4. High-Performance Architectural Latex System:

a. Prime Coat: Primer, alkyd, anti-corrosive, for metal**[, MPI #79]**.
b. Prime Coat: Primer, alkyd, quick dry, for metal**[, MPI #76]**.
c. Prime Coat: Primer, alkyd, anti-corrosive, for metal**[, MPI #79]** or primer, alkyd, quick dry, for metal**[, MPI #76]**.
d. Prime Coat: Shop primer specified in Section 05120 "Structural Steel" where substrate is specified.
e. Intermediate Coat: Latex, interior, high performance architectural, matching topcoat.
f. Topcoat: Latex, interior, high performance architectural, (Gloss Level 2)**[, MPI #138]**.
g. Topcoat: Latex, interior, high performance architectural, (Gloss Level 3)**[, MPI #139]**.
h. Topcoat: Latex, interior, high performance architectural, (Gloss Level 4)**[, MPI #140]**.
i. Topcoat: Latex, interior, high performance architectural, semi-gloss (Gloss Level 5)**[, MPI #141]**.

5. Water-Based Light Industrial Coating System:

a. Prime Coat: Primer, rust-inhibitive, water based[**MPI #107**].
b. Intermediate Coat: Light industrial coating, interior, water based, matching topcoat.
c. Topcoat: Light industrial coating, interior, water based (Gloss Level 3)**[, MPI #151]**.
d. Topcoat: Light industrial coating, interior, water based, semi-gloss (Gloss Level 5)**[, MPI #153]**.
e. Topcoat: Light industrial coating, interior, water based, gloss (Gloss Level 6)**[, MPI #154]**.

6. Alkyd System:

a. Prime Coat: Primer, alkyd, anti-corrosive, for metal**[, MPI #79]**.

b. Prime Coat: Primer, alkyd, quick dry, for metal[**, MPI #76**].
c. Prime Coat: Primer, alkyd, anti-corrosive, for metal[**, MPI #79**] or primer, alkyd, quick dry, for metal[**, MPI #76**].
d. Prime Coat: Shop primer specified in Section 05120 "Structural Steel" where substrate is specified.
e. Intermediate Coat: Alkyd, interior, matching topcoat.
f. Topcoat: Alkyd, interior, flat (Gloss Level 1)[**, MPI #49**].
g. Topcoat: Alkyd, interior, (Gloss Level 3)[**, MPI #51**].
h. Topcoat: Alkyd, interior, semi-gloss (Gloss Level 5)[**, MPI #47**].
i. Topcoat: Alkyd, interior, gloss (Gloss Level 6)[**, MPI #48**].

7. Quick-Drying Enamel System:

a. Prime Coat: Primer, alkyd, quick dry, for metal[**, MPI #76**].
b. Intermediate Coat: Alkyd, quick dry, matching topcoat.
c. Topcoat: Alkyd, quick dry, semi-gloss (Gloss Level 5)[**, MPI #81**].
d. Topcoat: Alkyd, quick dry, gloss (Gloss Level 7)[**, MPI #96**].

8. Alkyd Dry-Fall System:

a. Prime Coat: Primer, alkyd, anti-corrosive, for metal[**, MPI #79**].
b. Prime Coat: Primer, alkyd, quick dry, for metal[**, MPI #76**].
c. Prime Coat: Primer, alkyd, anti-corrosive, for metal[**, MPI #79**] or primer, alkyd, quick dry, for metal[**, MPI #76**].
d. Prime Coat: Shop primer specified in Section 05120 "Structural Steel" where substrate is specified.
e. Topcoat: Dry fall, alkyd, flat[**, MPI #55**].

9. Aluminum Paint System:

a. Prime Coat: Primer, alkyd, anti-corrosive, for metal[**, MPI #79**].
b. Prime Coat: Primer, alkyd, quick dry, for metal[**, MPI #76**].
c. Prime Coat: Primer, alkyd, anti-corrosive, for metal[**, MPI #79**] or primer, alkyd, quick dry, for metal[**, MPI #76**].
d. Prime Coat: Shop primer specified in Section 05120 "Structural Steel" where substrate is specified.
e. Intermediate Coat: Aluminum paint[**, MPI #1**].
f. Topcoat: Aluminum paint[**, MPI #1**].

F. Galvanized-Metal Substrates:

1. Latex over Waterborne Primer System:

a. Prime Coat: Primer, galvanized, water based[**, MPI #134**].
b. Intermediate Coat: Latex, interior, matching topcoat.
c. Topcoat: Latex, interior, flat, (Gloss Level 1)[**, MPI #53**].
d. Topcoat: Latex, interior, (Gloss Level 2)[**, MPI #44**].
e. Topcoat: Latex, interior, (Gloss Level 3)[**, MPI #52**].
f. Topcoat: Latex, interior, (Gloss Level 4)[**, MPI #43**].
g. Topcoat: Latex, interior, semi-gloss, (Gloss Level 5)[**, MPI #54**].
h. Topcoat: Latex, interior, gloss, (Gloss Level 6, except minimum gloss of 65 units at 60 degrees)[**, MPI #114**].

2. Water-Based Dry-Fall System:

a. Prime Coat: Dry fall, water based, for galvanized steel, flat (Gloss Level 1)**[, MPI #133**].
b. Topcoat: Dry fall, water based, for galvanized steel, flat (Gloss Level 1)**[, MPI #133**].

3. Institutional Low-Odor/VOC Latex System:

a. Prime Coat: Primer, galvanized, water based**[, MPI #134**].
b. Intermediate Coat: Latex, interior, institutional low odor/VOC, matching topcoat.
c. Topcoat: Latex, interior, institutional low odor/VOC, flat (Gloss Level 1)**[, MPI #143**].
d. Topcoat: Latex, interior, institutional low odor/VOC, (Gloss Level 2)**[, MPI #144**].
e. Topcoat: Latex, interior, institutional low odor/VOC, (Gloss Level 3)**[, MPI #145**].
f. Topcoat: Latex, interior, institutional low odor/VOC, semi-gloss (Gloss Level 5)**[, MPI #147**].

4. High-Performance Architectural Latex System:

a. Prime Coat: Primer, galvanized, water based**[, MPI #134**].
b. Intermediate Coat: Latex, interior, high performance architectural, matching topcoat.
c. Topcoat: Latex, interior, high performance architectural, (Gloss Level 2)**[, MPI #138**].
d. Topcoat: Latex, interior, high performance architectural, (Gloss Level 3)**[, MPI #139**].
e. Topcoat: Latex, interior, high performance architectural, (Gloss Level 4)**[, MPI #140**].
f. Topcoat: Latex, interior, high performance architectural, semi-gloss (Gloss Level 5)**[, MPI #141**].

5. Water-Based Light Industrial Coating Over Waterborne Primer System:

a. Prime Coat: Primer, galvanized, water based**[, MPI #134**].
b. Intermediate Coat: Light industrial coating, interior, water based, matching topcoat.
c. Topcoat: Light industrial coating, interior, water based (Gloss Level 3)**[, MPI #151**].
d. Topcoat: Light industrial coating, interior, water based, semi-gloss (Gloss Level 5)**[, MPI #153**].
e. Topcoat: Light industrial coating, interior, water based, gloss (Gloss Level 6)**[, MPI #154**].

6. Aluminum Paint System:

a. Prime Coat: Primer, galvanized metal, as recommended in writing by topcoat manufacturer for use on galvanized-metal substrates with topcoat indicated.
b. Intermediate Coat: Aluminum paint**[, MPI #1**].
c. Topcoat: Aluminum paint**[, MPI #1**].

G. Aluminum (Not Anodized or Otherwise Coated) Substrates:

1. Latex System:

a. Prime Coat: Primer, quick dry, for aluminum**[, MPI #95**].
b. Intermediate Coat: Latex, interior, matching topcoat.

c. Topcoat: Latex, interior, flat, (Gloss Level 1)[**, MPI #53**].
d. Topcoat: Latex, interior, (Gloss Level 2)[**, MPI #44**].
e. Topcoat: Latex, interior, (Gloss Level 3)[**, MPI #52**].
f. Topcoat: Latex, interior, (Gloss Level 4)[**, MPI #43**].
g. Topcoat: Latex, interior, semi-gloss, (Gloss Level 5)[**, MPI #54**].
h. Topcoat: Latex, interior, gloss, (Gloss Level 6, except minimum gloss of 65 units at 60 degrees)[**, MPI #114**].

2. Institutional Low-Odor/VOC Latex System:

a. Prime Coat: Primer, quick dry, for aluminum[**, MPI #95**].
b. Intermediate Coat: Latex, interior, institutional low odor/VOC, matching topcoat.
c. Topcoat: Latex, interior, institutional low odor/VOC, flat (Gloss Level 1)[**, MPI #143**].
d. Topcoat: Latex, interior, institutional low odor/VOC, (Gloss Level 2)[**, MPI #144**].
e. Topcoat: Latex, interior, institutional low odor/VOC, (Gloss Level 3)[**, MPI #145**].
f. Topcoat: Latex, interior, institutional low odor/VOC, semi-gloss (Gloss Level 5)[**, MPI #147**].

3. High-Performance Architectural Latex System:

a. Prime Coat: Primer, quick dry, for aluminum[**, MPI #95**].
b. Intermediate Coat: Latex, interior, high performance architectural, matching topcoat.
c. Topcoat: Latex, interior, high performance architectural, (Gloss Level 2)[**, MPI #138**].
d. Topcoat: Latex, interior, high performance architectural, (Gloss Level 3)[**, MPI #139**].
e. Topcoat: Latex, interior, high performance architectural, (Gloss Level 4)[**, MPI #140**].
f. Topcoat: Latex, interior, high performance architectural, semi-gloss (Gloss Level 5)[**, MPI #141**].

4. Water-Based Light Industrial Coating System:

a. Prime Coat: Primer, quick dry, for aluminum[**, MPI #95**].
b. Intermediate Coat: Light industrial coating, interior, water based, matching topcoat.
c. Topcoat: Light industrial coating, interior, water based (Gloss Level 3)[**, MPI #151**].
d. Topcoat: Light industrial coating, interior, water based, semi-gloss (Gloss Level 5)[**, MPI #153**].
e. Topcoat: Light industrial coating, interior, water based, gloss (Gloss Level 6)[**, MPI #154**].

5. Alkyd System:

a. Prime Coat: Primer, vinyl wash[**, MPI #80**].
b. Prime Coat: Primer, quick dry, for aluminum[**, MPI #95**].
c. Intermediate Coat: Alkyd, interior, matching topcoat.
d. Topcoat: Alkyd, interior, flat (Gloss Level 1)[**, MPI #49**].
e. Topcoat: Alkyd, interior, (Gloss Level 3)[**, MPI #51**].
f. Topcoat: Alkyd, interior, semi-gloss (Gloss Level 5)[**, MPI #47**].
g. Topcoat: Alkyd, interior, gloss (Gloss Level 6)[**, MPI #48**].

6. Aluminum Paint System:

    a. Prime Coat: Primer, vinyl wash[**, MPI #80**].
    b. Intermediate Coat: Aluminum paint[**, MPI #1**].
    c. Topcoat: Aluminum paint[**, MPI #1**].

H. Wood Substrates: Including wood trim, architectural woodwork, doors, windows, wood-based panel products

1. Latex System:

    a. Prime Coat: Primer, latex, for interior wood[**, MPI #39**].
    b. Intermediate Coat: Latex, interior, matching topcoat.
    c. Topcoat: Latex, interior, flat, (Gloss Level 1)[**, MPI #53**].
    d. Topcoat: Latex, interior, (Gloss Level 2)[**, MPI #44**].
    e. Topcoat: Latex, interior, (Gloss Level 3)[**, MPI #52**].
    f. Topcoat: Latex, interior, (Gloss Level 4)[**, MPI #43**].
    g. Topcoat: Latex, interior, semi-gloss, (Gloss Level 5)[**, MPI #54**].
    h. Topcoat: Latex, interior, gloss, (Gloss Level 6, except minimum gloss of 65 units at 60 degrees)[**, MPI #114**].

2. Latex over Alkyd Primer System:

    a. Prime Coat: Primer sealer, alkyd, interior[**, MPI #45**].
    b. Intermediate Coat: Latex, interior, matching topcoat.
    c. Topcoat: Latex, interior, flat, (Gloss Level 1)[**, MPI #53**].
    d. Topcoat: Latex, interior, (Gloss Level 2)[**, MPI #44**].
    e. Topcoat: Latex, interior, (Gloss Level 3)[**, MPI #52**].
    f. Topcoat: Latex, interior, (Gloss Level 4)[**, MPI #43**].
    g. Topcoat: Latex, interior, semi-gloss, (Gloss Level 5)[**, MPI #54**].
    h. Topcoat: Latex, interior, gloss, (Gloss Level 6, except minimum gloss of 65 units at 60 degrees)[**, MPI #114**].

3. Institutional Low-Odor/VOC Latex System:

    a. Prime Coat: Primer, latex, for interior wood[**, MPI #39**].
    b. Intermediate Coat: Latex, interior, institutional low odor/VOC, matching topcoat.
    c. Topcoat: Latex, interior, institutional low odor/VOC, flat (Gloss Level 1)[**, MPI #143**].
    d. Topcoat: Latex, interior, institutional low odor/VOC, (Gloss Level 2)[**, MPI #144**].
    e. Topcoat: Latex, interior, institutional low odor/VOC, (Gloss Level 3)[**, MPI #145**].
    f. Topcoat: Latex, interior, institutional low odor/VOC, semi-gloss (Gloss Level 5)[**, MPI #147**].

4. High-Performance Architectural Latex System:

    a. Prime Coat: Primer, latex, for interior wood[**, MPI #39**].
    b. Intermediate Coat: Latex, interior, high performance architectural, matching topcoat.
    c. Topcoat: Latex, interior, high performance architectural, (Gloss Level 2)[**, MPI #138**].
    d. Topcoat: Latex, interior, high performance architectural, (Gloss Level 3)[**, MPI #139**].

e. Topcoat: Latex, interior, high performance architectural, (Gloss Level 4)**[, MPI #140**].
f. Topcoat: Latex, interior, high performance architectural, semi-gloss (Gloss Level 5)**[, MPI #141**].

5. Alkyd System:

a. Prime Coat: Primer sealer, alkyd, interior**[, MPI #45**].
b. Intermediate Coat: Alkyd, interior, matching topcoat.
c. Topcoat: Alkyd, interior, flat (Gloss Level 1)**[, MPI #49**].
d. Topcoat: Alkyd, interior, (Gloss Level 3)**[, MPI #51**].
e. Topcoat: Alkyd, interior, semi-gloss (Gloss Level 5)**[, MPI #47**].
f. Topcoat: Alkyd, interior, gloss (Gloss Level 6)**[, MPI #48**].

I. Wood Substrates, Traffic Surfaces:

1. Latex Floor Paint System:

a. Prime Coat: Primer sealer, alkyd, interior**[, MPI #45**].
b. Intermediate Coat: Floor paint, latex, low gloss (maximum Gloss Level 3)**[, MPI #60**].
c. Topcoat: Floor paint, latex, low gloss (maximum Gloss Level 3)**[, MPI #60**].

2. Alkyd Floor Enamel System:

a. Prime Coat: Floor enamel, alkyd, gloss (Gloss Level 6)**[, MPI #27**].
b. Intermediate Coat: Floor enamel, alkyd, gloss (Gloss Level 6)**[, MPI #27**].
c. Topcoat: Floor enamel, alkyd, gloss (Gloss Level 6)**[, MPI #27**].

J. Fiberglass and Plastic Substrates:

1. Latex System:

a. Prime Coat: Primer, bonding, water based**[, MPI #17**].
b. Prime Coat: Primer, bonding, solvent based**[, MPI #69**].
c. Intermediate Coat: Latex, interior, matching topcoat.
d. Topcoat: Latex, interior, flat, (Gloss Level 1)**[, MPI #53**].
e. Topcoat: Latex, interior, (Gloss Level 2)**[, MPI #44**].
f. Topcoat: Latex, interior, (Gloss Level 3)**[, MPI #52**].
g. Topcoat: Latex, interior, (Gloss Level 4)**[, MPI #43**].
h. Topcoat: Latex, interior, semi-gloss, (Gloss Level 5)**[, MPI #54**].
i. Topcoat: Latex, interior, gloss, (Gloss Level 6, except minimum gloss of 65 units at 60 degrees)**[, MPI #114**].

2. Institutional Low-Odor/VOC Latex System:

a. Prime Coat: Primer, bonding, water based**[, MPI #17**].
b. Prime Coat: Primer, bonding, solvent based**[, MPI #69**].
c. Intermediate Coat: Latex, interior, institutional low odor/VOC, matching topcoat.
d. Topcoat: Latex, interior, institutional low odor/VOC, flat (Gloss Level 1)**[, MPI #143**].
e. Topcoat: Latex, interior, institutional low odor/VOC, (Gloss Level 2)**[, MPI #144**].
f. Topcoat: Latex, interior, institutional low odor/VOC, (Gloss Level 3)**[, MPI #145**].

g. Topcoat: Latex, interior, institutional low odor/VOC, semi-gloss (Gloss Level 5)[**, MPI #147**].

3. High-Performance Architectural Latex System:

a. Prime Coat: Primer, bonding, water based[**, MPI #17**].
b. Prime Coat: Primer, bonding, solvent based[**, MPI #69**].
c. Intermediate Coat: Latex, interior, high performance architectural, matching topcoat.
d. Topcoat: Latex, interior, high performance architectural, (Gloss Level 2)[**, MPI #138**].
e. Topcoat: Latex, interior, high performance architectural, (Gloss Level 3)[**, MPI #139**].
f. Topcoat: Latex, interior, high performance architectural, (Gloss Level 4)[**, MPI #140**].
g. Topcoat: Latex, interior, high performance architectural, semi-gloss (Gloss Level 5)[**, MPI #141**].

4. Water-Based Light Industrial Coating System:

a. Prime Coat: Primer, bonding, water based[**, MPI #17**].
b. Prime Coat: Primer, bonding, solvent based[**, MPI #69**].
c. Intermediate Coat: Light industrial coating, interior, water based, matching topcoat.
d. Topcoat: Light industrial coating, interior, water based (Gloss Level 3)[**, MPI #151**].
e. Topcoat: Light industrial coating, interior, water based, semi-gloss (Gloss Level 5)[**, MPI #153**].
f. Topcoat: Light industrial coating, interior, water based, gloss (Gloss Level 6)[**, MPI #154**].

5. Alkyd System:

a. Prime Coat: Primer, bonding, water based[**, MPI #17**].
b. Prime Coat: Primer, bonding, solvent based[**, MPI #69**].
c. Intermediate Coat: Alkyd, interior, matching topcoat.
d. Topcoat: Alkyd, interior, flat (Gloss Level 1)[**, MPI #49**].
e. Topcoat: Alkyd, interior, (Gloss Level 3)[**, MPI #51**].
f. Topcoat: Alkyd, interior, semi-gloss (Gloss Level 5)[**, MPI #47**].
g. Topcoat: Alkyd, interior, gloss (Gloss Level 6)[**, MPI #48**].

K. **Gypsum Board** Substrates:

1. Latex System:

a. Prime Coat: Primer sealer, latex, interior[**, MPI #50**].
b. Prime Coat: Latex, interior, matching topcoat.
c. Intermediate Coat: Latex, interior, matching topcoat.
d. Topcoat: Latex, interior, flat, (Gloss Level 1)[**, MPI #53**].
e. Topcoat: Latex, interior, (Gloss Level 2)[**, MPI #44**].
f. Topcoat: Latex, interior, (Gloss Level 3)[**, MPI #52**].
g. Topcoat: Latex, interior, (Gloss Level 4)[**, MPI #43**].
h. Topcoat: Latex, interior, semi-gloss, (Gloss Level 5)[**, MPI #54**].
i. Topcoat: Latex, interior, gloss, (Gloss Level 6, except minimum gloss of 65 units at 60 degrees)[**, MPI #114**].

2. Institutional Low-Odor/VOC Latex System:

    a. Prime Coat: Primer sealer, interior, institutional low odor/VOC**[, MPI #149**].
    b. Intermediate Coat: Latex, interior, institutional low odor/VOC, matching topcoat.
    c. Topcoat: Latex, interior, institutional low odor/VOC, flat (Gloss Level 1)**[, MPI #143**].
    d. Topcoat: Latex, interior, institutional low odor/VOC, (Gloss Level 2)**[, MPI #144**].
    e. Topcoat: Latex, interior, institutional low odor/VOC, (Gloss Level 3)**[, MPI #145**].
    f. Topcoat: Latex, interior, institutional low odor/VOC, semi-gloss (Gloss Level 5)**[, MPI #147**].

3. High-Performance Architectural Latex System:

    a. Prime Coat: Primer sealer, latex, interior**[, MPI #50**].
    b. Intermediate Coat: Latex, interior, high performance architectural, matching topcoat.
    c. Topcoat: Latex, interior, high performance architectural, (Gloss Level 2)**[, MPI #138**].
    d. Topcoat: Latex, interior, high performance architectural, (Gloss Level 3)**[, MPI #139**].
    e. Topcoat: Latex, interior, high performance architectural, (Gloss Level 4)**[, MPI #140**].
    f. Topcoat: Latex, interior, high performance architectural, semi-gloss (Gloss Level 5)**[, MPI #141**].

4. Water-Based Light Industrial Coating System:

    a. Prime Coat: Primer sealer, latex, interior**[, MPI #50**].
    b. Intermediate Coat: Light industrial coating, interior, water based, matching topcoat.
    c. Topcoat: Light industrial coating, interior, water based (Gloss Level 3)**[, MPI #151**].
    d. Topcoat: Light industrial coating, interior, water based, semi-gloss (Gloss Level 5)**[, MPI #153**].
    e. Topcoat: Light industrial coating, interior, water based, gloss (Gloss Level 6)**[, MPI #154**].

5. Alkyd over Latex Primer System:

    a. Prime Coat: Primer sealer, latex, interior**[, MPI #50**].
    b. Intermediate Coat: Alkyd, interior, matching topcoat.
    c. Topcoat: Alkyd, interior, flat (Gloss Level 1)**[, MPI #49**].
    d. Topcoat: Alkyd, interior, (Gloss Level 3)**[, MPI #51**].
    e. Topcoat: Alkyd, interior, semi-gloss (Gloss Level 5)**[, MPI #47**].
    f. Topcoat: Alkyd, interior, gloss (Gloss Level 6)**[, MPI #48**].

L. Spray-Textured Ceiling Substrates:

1. Latex (Flat) System: Spray applied.

    a. Prime Coat: Latex, interior, flat, (Gloss Level 1)**[, MPI #53**].
    b. Topcoat: Latex, interior, flat, (Gloss Level 1)**[, MPI #53**].

2. Latex System: Spray applied.

a. Prime Coat: Latex, interior, matching topcoat.
b. Intermediate Coat: Latex, interior, matching topcoat.
c. Topcoat: Latex, interior, flat, (Gloss Level 1)[**, MPI #53**].
d. Topcoat: Latex, interior, (Gloss Level 2)[**, MPI #44**].
e. Topcoat: Latex, interior, (Gloss Level 3)[**, MPI #52**].
f. Topcoat: Latex, interior, (Gloss Level 4)[**, MPI #43**].
g. Topcoat: Latex, interior, semi-gloss, (Gloss Level 5)[**, MPI #54**].
h. Topcoat: Latex, interior, gloss, (Gloss Level 6, except minimum gloss of 65 units at 60 degrees)[**, MPI #114**].

3. Latex over Alkyd Primer System:

a. Prime Coat: Primer sealer, alkyd, interior[**, MPI #45**].
b. Topcoat: Latex, interior, flat, (Gloss Level 1)[**, MPI #53**].
c. Topcoat: Latex, interior, (Gloss Level 2)[**, MPI #44**].
d. Topcoat: Latex, interior, (Gloss Level 3)[**, MPI #52**].
e. Topcoat: Latex, interior, (Gloss Level 4)[**, MPI #43**].
f. Topcoat: Latex, interior, semi-gloss, (Gloss Level 5)[**, MPI #54**].
g. Topcoat: Latex, interior, gloss, (Gloss Level 6, except minimum gloss of 65 units at 60 degrees)[**, MPI #114**].

4. Alkyd (Flat) System:

a. Prime Coat: Alkyd, interior, flat (Gloss Level 1)[**, MPI #49**].
b. Topcoat: Alkyd, interior, flat (Gloss Level 1)[**, MPI #49**].

5. Alkyd System:

a. Prime Coat: Primer sealer, alkyd, interior[**, MPI #45**].
b. Intermediate Coat: Alkyd, interior, matching topcoat.
c. Topcoat: Alkyd, interior, flat (Gloss Level 1)[**, MPI #49**].
d. Topcoat: Alkyd, interior, (Gloss Level 3)[**, MPI #51**].
e. Topcoat: Alkyd, interior, semi-gloss (Gloss Level 5)[**, MPI #47**].
f. Topcoat: Alkyd, interior, gloss (Gloss Level 6)[**, MPI #48**].

M. Cotton or Canvas and ASJ Insulation-Covering Substrates: Including pipe and duct coverings

1. Latex System:

a. Prime Coat: Primer sealer, latex, interior[**, MPI #50**].
b. Intermediate Coat: Latex, interior, matching topcoat.
c. Topcoat: Latex, interior, flat, (Gloss Level 1)[**, MPI #53**].
d. Topcoat: Latex, interior, (Gloss Level 2)[**, MPI #44**].
e. Topcoat: Latex, interior, (Gloss Level 3)[**, MPI #52**].
f. Topcoat: Latex, interior, (Gloss Level 4)[**, MPI #43**].
g. Topcoat: Latex, interior, semi-gloss, (Gloss Level 5)[**, MPI #54**].
h. Topcoat: Latex, interior, gloss, (Gloss Level 6, except minimum gloss of 65 units at 60 degrees)[**, MPI #114**].

2. Institutional Low-Odor/VOC Latex System:

a. Prime Coat: Primer sealer, latex, interior[**, MPI #50**].
b. Intermediate Coat: Latex, interior, institutional low odor/VOC, matching topcoat.

c. Topcoat: Latex, interior, institutional low odor/VOC, flat (Gloss Level 1)**[, MPI #143**].
d. Topcoat: Latex, interior, institutional low odor/VOC, (Gloss Level 2)**[, MPI #144**].
e. Topcoat: Latex, interior, institutional low odor/VOC, (Gloss Level 3)**[, MPI #145**].
f. Topcoat: Latex, interior, institutional low odor/VOC, semi-gloss (Gloss Level 5)**[, MPI #147**].

3. Alkyd over Latex Primer System:

a. Prime Coat: Primer sealer, latex, interior**[, MPI #50**].
b. Intermediate Coat: Alkyd, interior, matching topcoat.
c. Topcoat: Alkyd, interior, flat (Gloss Level 1)**[, MPI #49**].
d. Topcoat: Alkyd, interior, (Gloss Level 3)**[, MPI #51**].
e. Topcoat: Alkyd, interior, semi-gloss (Gloss Level 5)**[, MPI #47**].
f. Topcoat: Alkyd, interior, gloss (Gloss Level 6)**[, MPI #48**].

4. Aluminum Paint System:

a. Prime Coat: Primer sealer, latex, interior**[, MPI #50**].
b. Intermediate Coat: Aluminum paint**[, MPI #1**].
c. Topcoat: Aluminum paint**[, MPI #1**].

END OF SECTION 09912

SECTION 09960 – HIGH-PERFORMANCE COATINGS

PART 1 – GENERAL

1.02 RELATED DOCUMENTS

Drawings, Specifications and General Conditions of The Contract, including Special Conditions, are hereby made a part of this section.

1.03 MATERIALS

A. MATERIAL QUALITY: Finished and fully cured (28 days) materials shall have the following minimum performance characteristics:

Solvent Resistance: (10 minute soak)	
Water	No effect
Detergent	No effect
Ethanol	No effect
Paint Thinner	Temporary softening
Bleach (household)	No effect
Sodium Hypochlorite (Tile-X)	No effect
409 Cleaner	No effect
Vinegar	No effect

Stain Resistance (1 hour soak and wash with Cleaner and water)	
Water	No stain visible
Blood	No stain visible
Urine	No stain visible
Coffee	No stain visible
Tea	No stain visible
Blueberry	No stain visible
Mustard	No stain visible
Bleach (household)	No stain visible
Sodium Hypochlorite (Tile-X)	No stain visible

Mark Resistance (marked 24 hour cure, wash with brush cleaner and/or bleach)	
Pencil	No mark visible
Ball point pen	No mark visible
China Marker	No mark visible
Felt tip pen (non-permanent)	No mark visible

Abrasion Resistance: Taber Abraser ASTM D4060-90	Wear Index = 0.22
Scrub Test: ASTM D2486-89	3735 Cycles to failure

B. SPECIFICATIONS:

Water-base pure acrylic resin	
Inorganic fillers	
Perm Rating: 17 perms, ASTM-E96B	21.93 Perms, English perms
Film Thickness:	
FINECOAT 2	4 mils dry (6 mils wet)

TEXTURECOAT	6-10 mils wet, 4- 8 mils dry
ASTM-E84 Flame Spread	15 or less
ASTM E-84 Smoke contribution	0
Pigments VOC level	0
Product VOC level (ISO 11890-2)	< 20 grams/liter

C. COLOR:

Color Pigments: Pigments shall be high performance and contain a zero (0) VOC level and APEO free. All pigments shall be light fast and fade resistant to discoloration by common commercial cleaning agents.

Color Selection: Provide at least eighty factory colors and factory custom color service.

D. ENVIRONMENTAL

Product shall meet criteria defined under LEED IEQ 4.2 for Low VOC products and Green Seal GS-11, section 4.0.

Production facilities shall be ISO 14001 certified for environmental practices.

E. WARRANTY:

Provide 5-year materials integrity warranty and 5-year mold/mildew warranty from manufacturer for manufacturer’s approved substrates.

1.04 QUALITY ASSURANCE

A. COMPATIBILITY: Provide primers and other undercoat materials which are produced or are specifically recommended by the same manufacturer as the finish materials to ensure compatibility and use only within recommended limits.

B. COORDINATION OF WORK: Review other sections of these specifications in which prime paints, raw substrates, or other substances might be present to ensure compatibility of total coatings systems. Upon request from other trades, furnish information or characteristics of coating materials provided for use, to ensure compatible substrate materials and finishes are used.

C. FACTORY QUALIFIED INSTALLER: Application Contractor should have attended a factory product training session and should otherwise be qualified to apply the products prior to submitting the bid. Applicator should submit photocopy of factory documentation as proof of attendance.

D. Factory shall be ISO 9001:2000 certified.

1.05 SUBMITTALS:

A. PRODUCT DATA: Submit manufacturer's technical information including installation instructions, product description, and product test data conforming to the test performances required herein.

B. SAMPLES: Prior to beginning work, Contractor shall provide Architect with a complete color set as furnished by the manufacturer for color selection purposes. After architect's color selection, Contractor shall provide three samples of each color of the specified coating applied to 12" x 12" hardboard or drywall for review. Apply materials in the same manner and with the same equipment that will be used in the field.

1.06 DELIVERY AND STORAGE:

A. DELIVER MATERIALS to jobsite in original, new and unopened packages and containers bearing manufacturer's name and label, and following information: Name or title of materials, Manufacturer's stock and/or batch number, date of manufacture, Contents of containers including Color name and number.

B. STORE MATERIALS not in active use in tightly covered containers. Maintain containers in a clean condition, free from foreign materials and residue.

C. PROTECT from freezing and maintain temperatures below 100 degrees F. Keep materials stored in an orderly and organized manner to reduce the risk of error. Do not stack materials more than three containers high. Protect from fire hazards.

1.07 JOB CONDITIONS:

A. APPLY materials only when surface temperature is between 65 degrees F or higher. Relative humidity must be 85% or lower. Protect finishes from casual impact and rain for a period of twenty-four (24) hours after installation. Protect from heavy traffic for a period of at least three days. Protect all surfaces and adjacent areas not intended to be coated and clean immediately any spillage, drippings, or other extraneous contact of the materials with other surfaces.

B. REMOVE masking tape and clean all adjacent surfaces at the end of each work day. Do not leave masking tape or waste materials in place for more than 36 hours.

PART 2 - PRODUCTS

2.01 MANUFACTURER

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
   a. Provide PLEXTURE products as manufactured by TRIARCH, 1-800-537-6111, www.triarchinc.com, consistent with color and texture selected by Architect/Designer from full range.

PART 3 - EXECUTION

3.01 INSPECTION

Applicator shall examine areas and conditions under which coating work is to be applied and notify Contractor in writing of conditions detrimental to proper and timely completion of the work. Do not proceed with work until unsatisfactory conditions have been corrected in a manner acceptable to the applicator.

3.02 GENERAL

A. DESCRIPTION OF WORK

1. EXTENT of special acrylic coating work is indicated on drawings and schedules, as herein specified.

2. The work also includes masking, protection of adjacent surfaces, priming, finishing, and cleanup of all wall and/or ceiling areas throughout the project as designated on the drawings and finish schedules. Surface preparation, surface treatment, and shop-priming where specified under other sections of the work.

3. WORK SPECIFIED IN OTHER SECTIONS: Paint, primer, other specialty coatings, fire proofing, wall coverings, tile, paneling, fabrics, acoustical treatments, shop applied finishes, and laminated plastics.

3.03 SURFACE PREPARATION:

A. CEMENTITIOUS MATERIALS: Prepare cementious surfaces to be coated, such as: concrete, concrete block, cement and lime plaster by removing efflorescence, chalk, dust, dirt, grease, oils, and waxes (form release agents). Grind or fill and float smooth all holes, honeycombs, joints, seams and other imperfections using SKIMM® as manufactured by Triarch. Allow SKIMM® to dry 24 hours. Dampen dry plaster and concrete surfaces just prior to installation of materials, but wipe away any active condensation or water sufficient to cause a wet glaze.

B. FERROUS METALS: Clean free of oil and surface contaminants with non-petroleum based solvent. Prime all bare metal surfaces with a good quality rust inhibiting primer prior to application of any acrylic coating materials. Test adequacy of adhesion of primer to substrate prior to application. Be sure to document results.

C. GALVANIZED SURFACES: Clean free of oil and surface contaminants with non-petroleum based solvent. Test adequacy of adhesion of primer to substrate prior to application. Be sure to document results.

E. DRYWALL (new): Tape, float, and finish to achieve industry standards for a non defective surface sufficient to be painted.

F. With rapid-setting type drywall joint compound, float all holes and edges flush to restore wall surface to a smooth, paintable surface. Allow wall to dry twenty-four hours. Coat all raw joint compound with fixative. Allow to dry (approximately 1 hour).

3.02 MATERIALS PREPARATION

A. STIR MATERIALS before application with a power drill and a drywall compound paddle. Stir at approximately 350 RPM for three minutes while removing material from all sides and bottom of the container. Stir only as much material as will be used in a four hour period or re-stir material left sitting in excess of four hours. RETAIN LID on containers until the material is in actual use. Do not leave containers open for more than one hour. If hardened material accumulates on the sides of the container, remove the material to a clean container before use.

B. THINNING: Thinning, if required, should be done in accordance with manufacturer’s recommendations. Should storage or shipping expose materials to excessively high or low temperatures, viscosity may be affected.

3.04 APPLICATION

A. GENERAL: Apply materials, FineCoat 2 and Texture Coat, in accordance with the manufacturer's instructions and recommendations as required to achieve the appearance of the approved design control samples and to deliver performance as specified herein.

B. SURFACE TREATMENTS, and finishes, are indicated in "schedules" of the contract documents. Final finishes shall conform to the approved samples.

C. FINAL DRY FILM thickness of FINECOAT 2 shall be a minimum of 4 mils (DFT). Total system finish, including Texture Coat, shall average 8 mils thick. Coat surfaces behind movable equipment and furniture same as similar exposed surfaces.

D. WIPE WITH DAMP SPONGE the entire surface area within 2 hours of application to remove all rough spots, abrasive burrs, etc.

E. USE SANDING POLE with 100# grit sand paper to remove any burs within 24-48 hours of application.

F. COMPLETED WORK shall be uniform in appearance and coverage. It shall be free of holidays, spotting, laps, tool marks, runs, sags, abrasive burrs, or other surface imperfections.

3.05 CLEANUP AND PROTECTION

A. CLEANUP: During progress of work, remove from site discarded coating materials, rubbish, cans, and rags at the end of each work day in accordance with all local, state, and federal requirements.

B. PROTECTION: Protect work of other trades, whether to be coated or not, against damage by coating work. Correct any damage by cleaning, repairing or replacing, and refinishing, as acceptable to Architect.

C. PROVIDE SIGNS, barricades, etc. as required to protect new work from damage by others (see General section of this division for curing times).

D. AFTER COMPLETION of work of all other trades, remove all protection materials (including other trades' if provided by them) and clean/touchup as necessary to restore coating work to new and unblemished condition.

END OF SECTION 09960

SECTION 09963 - ELASTOMERIC COATINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes surface preparation and application of elastomeric coatings to the following exterior substrates:
   1. Stucco.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Samples for Verification: For each type of elastomeric coating indicated and in each color and gloss.

   1. Submit Samples on same type of substrate as that to receive application, 8 inches (200-mm) square.
   2. Step coats on Samples to show each separate coat, including primers and block fillers as applicable.
   3. Label each coat of each Sample.
   4. Label each Sample for location and application area.

C. Product List: For each product indicated, including the following:

   1. Cross-reference to coating system and locations of application areas. Use same designations indicated on Drawings and in schedules.
   2. Manufacturer's recommended spreading rate for each separate coat, including primers and block fillers for each type of substrate as applicable.
   3. Printout of current "MPI Approved Products List" for each product category specified in Part 2 that specifies coatings approved by MPI, with the proposed product highlighted.

1.4 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that are from same production run (batch mix) as materials applied and that are packaged for storage in unopened, factory-sealed containers and identified with labels describing contents.

1. Quantity: Furnish an additional 5 percent but not less than 1 gal. (3.8 L) of each material, color, and texture applied.

1.5 QUALITY ASSURANCE

A. MPI Standards: Comply with MPI standards indicated and provide elastomeric coatings listed in the "MPI Approved Products List."

1. Preparation and Workmanship: Comply with requirements in the "MPI Architectural Painting Specification Manual" for products and coating systems indicated.

B. Mockups: Prepare two mockups of each coating system indicated and each color and finish selected to verify preliminary selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Architect will select two wall surfaces of at least 100 sq. ft. (9.3 sq. m) to represent surfaces and conditions for application of each type and texture of elastomeric coating.
2. Final approval of color and texture selections will be based on mockups.

a. If preliminary color selections are not approved, prepare additional mockups of additional color and textures selected by Architect at no added cost to Owner.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F (7 deg C).

1. Maintain containers in clean condition, free of foreign materials and residue.
2. Remove rags and waste from storage areas daily.

1.7 PROJECT CONDITIONS

A. Apply coatings only when temperature of surfaces to be coated and ambient air temperatures are between 50 and 90 deg F (10 and 32 deg C) unless otherwise permitted by manufacturer's written instructions.

B. Do not apply coatings in snow, rain, fog, or mist; when relative humidity exceeds 85 percent; at temperatures less than 5 deg F (3 deg C) above the dew point; or to damp or wet surfaces.

C. Allow wet surfaces to dry thoroughly and attain temperature and conditions specified before starting or continuing coating operation.

1.8 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace elastomeric coatings that fail within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Water penetration through the coating.
b. Deterioration of coating beyond normal weathering.

2. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

A. Material Compatibility:

1. Provide elastomeric finish coatings and crack fillers, primers, and block fillers as applicable for use within elastomeric finish coatings that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
2. For each material or coat, provide products and spreading rates recommended in writing by elastomeric coating manufacturer for use on substrate indicated.

2.2 ELASTOMERIC FINISH COATINGS

A. Exterior Flat Waterborne, Pigmented Elastomeric Coating: MPI #113.

1. Products: Subject to compliance with requirements, Provide BASF Sonneborn Colorflex or comparable product by one of the following:
a. Coronado Paint Company; Elast-O-Meric Acrylic Membrane - 20 mil.
b. Diamond Vogel Paints; Permaflex Elastomeric Latex Coating.
c. ICI Paints; Decra-Flex Elastomeric Coating.
d. Kelly-Moore Paints; Kel-Seal Terpolymer 100% Acrylic Elastomeric.
e. Miller Paint Co.; Milastic Elastomeric Coating.
f. Mills Paint; Weather Flex Elastomeric Coating.
g. Modco Technology Ltd.; Elastocoat Acrylic Elastomeric Paint.
h. Parker Paint Mfg. Co. Inc., a subsidiary of PPI; EMC Elastomeric Coating.
i. PPG Industries; Pitt-Flex Elastomeric Coating.
j. Sherwin-Williams Company (The); Sherlastic Elastomeric Coating.
k. Spectra-Tone Paint Corporation; Elasto-Coat High Build Waterproofing Coating.
l. Teifs; Professional Coatings, TeifsLastic.
m. Vista Paint; Solotex.
n. Neogard, a division of Jones-Blair Company; Neoflex.
o. Pacific Polymers International, Inc.; Elasto-Tex Wallcoating.

p. Sto Corp.; Stolastic.

2. Surface Profile: Smooth texture.
3.
4. Moisture-Vapor Transmission: Minimum 11 perms wet and 2.12 perms dry based on testing according to ASTM D 1653.

2.3 OTHER MATERIALS

A. Crack Fillers: Elastomeric coating manufacturer's recommended, factory-formulated crack fillers or sealants, including crack filler primers, compatible with substrate and other materials indicated; VOC content complying with limits of authorities having jurisdiction.

B. Primer: Elastomeric coating manufacturer's recommended, factory-formulated, alkali-resistant primer compatible with substrate and other materials indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Applicator present, for compliance with manufacturer's requirements for maximum moisture content, alkalinity, and other conditions affecting performance of work.

B. Begin coating only when moisture content of substrate is 12 percent or less when measured with an electronic moisture meter.

C. Begin coating no sooner than 28 days after substrate is constructed and is visually dry on both sides.

D. Verify that substrate is within the range of alkalinity recommended by manufacturer.

E. Verify suitability of substrates including surface conditions and compatibility with existing finishes and primers.

F. Begin coating application only after unsatisfactory conditions have been corrected and surfaces are dry.

3.2 PREPARATION

A. Comply with manufacturer's written instructions and recommendations in the "MPI Architectural Painting Specification Manual" applicable to substrates and coating systems indicated.

B. Remove hardware and hardware accessories, plates, machined surfaces, light fixtures, and similar items already installed that are not to be coated. If removal is impractical or

impossible because of size or weight of item, provide surface-applied protection before surface preparation and coating.

1. After completing coating operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.

C. Clean substrates of substances that could impair bond of coatings, including dirt, oil, grease, and incompatible paints and encapsulants. Do not coat surfaces if moisture content or alkalinity of surfaces to be coated exceeds that permitted in manufacturer's written instructions.

1. Remove incompatible primers and reprime substrate with compatible primers as required to produce coating systems indicated.
2. Perform cleaning and coating application so dust and other contaminants from cleaning process will not fall on wet, newly coated surfaces.

D. Crack Repair: Fill cracks according to manufacturer's written instructions before coating surfaces.

3.3 APPLICATION

A. Apply elastomeric coatings according to manufacturer's written instructions.

1. Use equipment and techniques best suited for substrate and type of material being applied.
2. Coat surfaces behind movable items the same as similar exposed surfaces.
3. Apply each coat separately according to manufacturer's written instructions.

B. Primers: Apply at a rate to ensure complete coverage.

C. Block Fillers: Apply at a rate to ensure complete coverage with pores filled.

D. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform finish, color, and appearance.

E. Apply coatings to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.

F. Apply coatings to prepared surfaces as soon as practicable after preparation and before subsequent surface soiling or deterioration.

G. Spray Application: Use spray equipment for application only when permitted by authorities having jurisdiction. Wherever spray application is used, do not double back with spray equipment to build up film thickness of two coats in one pass.

3.4 FIELD QUALITY CONTROL

A. Testing of Paint Materials: Owner reserves the right to invoke the following testing procedures:

1. Owner will engage the services of a qualified testing agency to sample materials being used. Samples of material delivered to Project site will be taken, identified, sealed, and certified in presence of Contractor.
2. Testing agency will perform tests for compliance of materials with product requirements.
3. Owner may direct Contractor to stop coating application if test results show materials being used do not comply with requirements. Remove noncomplying materials from Project site, pay for testing, and recoat surfaces that were coated with rejected materials. Remove rejected materials from previously coated surfaces if, on recoating with complying materials, the two coatings are incompatible.

B. Field Testing and Inspection: Owner reserves the right to engage the services of a qualified testing agency to verify installed thickness of elastomeric coatings.

3.5 CLEANING AND PROTECTION

A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.

B. After completing coating application, clean spattered surfaces. Remove spattered coatings by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.

C. Protect work of other trades against damage from coating application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.

D. At completion of construction activities, touch up and restore damaged or defaced coated surfaces.

3.6 COATING SCHEDULE

A. Stucco Substrates:

1. Primer: Stucco primer if required by manufacturer.
2. Elastomeric Finish Coat(s): Minimum two coats with a total dry film thickness of 16 to 18 mils (0.41 to 0.45 mm) .
3. Finish-Coat Color: As selected by Architect from manufacturer's full range .

END OF SECTION 09963

SECTION 09981 - CEMENTITIOUS COATINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes surface preparation and application of cementitious coating systems on the following substrates:

1. Exterior concrete.
2. Exterior concrete masonry units.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Samples for Initial Selection: For each finish coat indicated.

C. Samples for Verification: In each color and gloss of finish coat indicated.

1. Submit Samples on actual substrate, not less than 4 by 8 inches (100 by 200 mm) , with mortar joint in center.
2. Step coats on Samples to show each coat required for system.
3. Label each coat of each Sample.

1.4 INFORMATIONAL SUBMITTALS

A. Material Certificates: For each cementitious coating, from manufacturer.

B. Product Test Reports: Based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified testing agency or by a qualified testing agency, for each product formulation.

1.5 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that are from same production run (batch mix) as materials applied and that are packaged with protective covering for storage and identified with labels describing contents.

1. Quantity: Furnish an additional 5 percent of each color applied.

1.6 QUALITY ASSURANCE

A. Source Limitations: Obtain cementitious coating materials from single source from single manufacturer.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to Project site in manufacturer's original, new, unopened packages and containers bearing manufacturer's name and label, and the following information:

1. Product name or title of material.
2. Manufacturer's stock number and date of manufacture.
3. Contents by volume, for pigment and vehicle constituents.
4. Application instructions.
5. Color name and number.
6. Handling instructions and precautions.

B. Store materials not in use in tightly covered containers in a well-ventilated area at a minimum ambient temperature of 45 deg F (7 deg C). Maintain containers used in storage of coatings in a clean condition, free of foreign materials and residue.

1. Protect cementitious coating materials from freezing. Keep materials dry and storage area neat and orderly. Remove waste daily. Take necessary measures to ensure that workers and work areas are protected from health hazards resulting from handling, mixing, and applying the coating.

1.8 PROJECT CONDITIONS

A. Apply coatings only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F (10 and 35 deg C).

B. Do not apply coatings when relative humidity exceeds 85 percent; at temperatures less than 5 deg F (3 deg C) above the dew point; or to damp or wet surfaces.

PART 2 - PRODUCTS

2.1 CEMENTITIOUS COATINGS

A. Polymer-Modified Cementitious Coating: Containing portland cement, polymer, and hydrated lime or aggregates.

1. Products: Subject to compliance with requirements, provide one of the following:

a. BASF Building Systems; Thoroseal with Acryl 60.

b. Bonsal American, an Oldcastle company; Sure-Coat.
c. Euclid Chemical Company, Tamms Industries; Tamoseal.
d. Gemite Products, Inc.; Cem-Kote ST.
e. Silpro Corporation; Seal Cote.

B. Performance Requirements: Comply with the following:

1. Compressive Strength: Not less than 6030 psi at 28 days according to ASTM C 109/C 109M.
2. Tensile Strength: Not less than 440 psi at 28 days according to ASTM C 109/C 109M.
3. Flexural Strength: 1027 psi according to ASTM C 348
4. Adhesion: 418 psi test by tensile bond
5. Permeance: 12 perms according to ASTM E96
6. Accelerated Weathering: 5000 hrs according to ASTM G 26
7. Salt-Spray Resistance: ASTM B 117

C. Other Materials: Provide crack fillers, block fillers, and related materials that are compatible with cementitious finish-coat materials and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.

D. Sources Using Small-Scale Environmental Chambers."

E. Colors: As selected by Architect from manufacturer's full range .

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Applicator present, for compliance with requirements and other conditions affecting performance of the Work.

B. Verify suitability of substrates, including surface conditions and compatibility.

C. Begin coating application only after unsatisfactory conditions have been corrected and surfaces are dry.

1. Beginning coating application constitutes Contractor's acceptance of substrates and conditions.

3.2 PREPARATION

A. Comply with manufacturer's written instructions for mixing and preparing materials and as applicable to substrates indicated.

B. Remove plates, machined surfaces, and similar items already in place that are not to be coated. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and coating.

1. After completing coating operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.

C. Clean substrates of substances that could impair bond of coatings, including dirt, oil, grease, incompatible coatings, and loose substrate materials.

D. Cementitious and Masonry Surfaces: Remove release agents, curing compounds, efflorescence, and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.

E. Crack Repair: Fill cracks according to manufacturer's written instructions before coating surfaces.

1. Cracks Larger Than 1/32 Inch (0.8 mm): Cut out static cracks, voids, or honeycombing larger than 1/32 inch (0.8 mm) and patch with materials recommended in writing by coating manufacturer. Identify dynamic cracks and treat according to manufacturer's written instructions before beginning application.

3.3 APPLICATION

A. Apply coatings according to manufacturer's written instructions. Use applicators and techniques suited for coating and substrate indicated.

1. Dampen substrate of surfaces to receive cementitious coatings one hour before beginning application to prevent surface drag. Immediately before applying coatings, redampen substrate. Substrates shall be saturated surface dry at time of application.
2. Brushes: Use tampico or masonry brushes best suited for material being applied.
3. Spray Equipment: Use spray equipment recommended in writing by manufacturer for material and texture required.

B. Apply each material at not less than manufacturer's recommended spreading rate. Provide total cured material thickness indicated or as recommended in writing by manufacturer.

C. Brush Application: Brush-out and work brush coats into surfaces in an even film, filling all pores and voids at rate recommended in writing by manufacturer to achieve cured material thickness indicated. Finish coat with smooth, horizontal strokes.

D. Spray Application: Apply each coat according to manufacturer's written instructions to provide the equivalent hiding of brush-applied coats. Follow spray application with a general light brooming of coated surface to impart a slight texture.

3.4 FIELD QUALITY CONTROL

A. Testing of Coating Materials: Owner reserves the right to invoke the following procedure at any time and as often as Owner deems necessary during the period when coating operations are being conducted:

1. Owner will engage the services of a qualified testing agency to sample coating materials being used. Samples of material delivered to Project site will be taken, identified, sealed, and certified in presence of Contractor.
2. Testing agency will perform tests for compliance with the following product requirements.

    a. Quantitative material analysis.
    b. Compressive strength.
    c. Tensile strength.
    d. Flexural strength.
    e. Permeance.
    f. Accelerated weathering.

3. Owner may direct Contractor to stop coating application if test results show materials being used do not comply with requirements. Contractor shall remove noncomplying materials from Project site, pay for testing, and recoat surfaces coated with rejected materials. Contractor will be required to remove rejected materials from previously coated surfaces if, on recoating with complying materials, the two coatings are incompatible.

3.5 CLEANING AND PROTECTION

A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.

B. After completing coating application, clean spattered surfaces. Remove spattered coatings by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.

C. Protect work of other trades against damage from coating application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.

D. At completion of construction activities of other trades, touch up and restore damaged or defaced coated surfaces.

3.6 COATING SCHEDULE

A. General: Apply additional coats when undercoats or other conditions show through final coat until cured film is of uniform coating finish, color, and appearance.

B. Above-Grade Concrete and Masonry: Two finish coats with total cured thickness not less than 40 mils (1.0 mm).

1. First Coat: Apply polymer-modified cementitious coating material at the rate of 2 lb/sq. yd. (1 kg/sq. m) to achieve a total cured thickness of 25 mils (0.6 mm).
2. Second Coat: Apply polymer-modified cementitious coating material at the rate of 1 lb/sq. yd. (0.5 kg/sq. m) to achieve a total cured thickness of 15 mils (0.4 mm).

C. .

END OF SECTION 09981

DIVISION 10

SECTION 10110 - VISUAL DISPLAY SURFACES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Markerboards.
2. Tackboards.
3. Visual display units.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

1. Include rated capacities, operating characteristics, electrical characteristics and individual panel weights for sliding visual display units.

B. Shop Drawings: For visual display surfaces. Include plans, elevations, sections, details, and attachments to other work.

1. Show locations of panel joints.
2. Include sections of typical trim members.
3. Wiring Diagrams: For power, signal, and control wiring.

C. Samples: For each exposed product and for each color and texture specified.

1.3 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified Installer.

B. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for surface-burning characteristics of fabrics.

C. Warranties: Sample of special warranties.

1.4 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For visual display surfaces and power-operated units to include in maintenance manuals.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of motor-operated, sliding visual display units required for this Project.

B. Surface-Burning Characteristics: As determined by testing identical products according to ASTM E 84 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Flame-Spread Index: 25 or less.
2. Smoke-Developed Index: 50 or less.

C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

D. Preinstallation Conference: Conduct conference at Project site.

1.6 WARRANTY

A. Special Warranty for Porcelain-Enamel Face Sheets: Manufacturer's standard form in which manufacturer agrees to repair or replace porcelain-enamel face sheets that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Surfaces lose original writing and erasing qualities.
b. Surfaces exhibit crazing, cracking, or flaking.

2. Warranty Period: 50 years from date of Substantial Completion.
3. Warranty Period: Life of the building.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

A. Porcelain-Enamel Face Sheet: Manufacturer's standard steel sheet with porcelain-enamel coating fused to steel; uncoated thickness indicated.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. Claridge Products and Equipment, Inc.
b. PolyVision Corporation; a Steelcase company.

B. Melamine: Thermally fused, melamine-impregnated decorative paper complying with LMA SAT-1.

C. High-Pressure Plastic Laminate: NEMA LD 3.

D. Natural Cork Sheet: Seamless, single-layer, compressed fine-grain cork sheet; bulletin board quality; face sanded for natural finish with surface-burning characteristics indicated.

E. Plastic-Impregnated Cork Sheet: Seamless, homogeneous, self-sealing sheet consisting of granulated cork, linseed oil, resin binders, and dry pigments that are mixed and calendared onto fabric backing; with washable vinyl finish and integral color throughout with surface-burning characteristics indicated.

F. Vinyl Fabric: Mildew resistant, washable, complying with FS CCC-W-408D, Type II, burlap weave; weighing not less than 13 oz./sq. yd. (440 g/sq. m); with surface-burning characteristics indicated.

G. Polyester Fabric: Nondirectional weave, 100 percent polyester; weighing not less than 15 oz./sq. yd. (508 g/sq. m); with surface-burning characteristics indicated.

H. Hardboard: ANSI A135.4, tempered.

I. Particleboard: ANSI A208.1, Grade M-1, that complies with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

J. Fiberboard: ASTM C 208.

K. Extruded Aluminum: ASTM B 221 (ASTM B 221M), Alloy 6063.

L. Laminating Adhesives: Manufacturer's standard product that complies with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

2.2 MARKERBOARD ASSEMBLIES

A. Porcelain-Enamel Markerboards: Balanced, high-pressure, factory-laminated markerboard assembly of three-ply construction consisting of backing sheet, core material, and 0.021-inch-(0.53-mm-) thick, porcelain-enamel face sheet with low-gloss finish.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

   a. AARCO Products, Inc.
   b. ADP Lemco, Inc.

c. Aywon.
d. Bangor Cork Company, Inc.
e. Best-Rite Manufacturing.
f. Claridge Products and Equipment, Inc.
g. Egan Visual Inc.
h. Ghent Manufacturing, Inc.
i. Marsh Industries, Inc.; Visual Products Group.
j. Platinum Visual Systems; a division of ABC School Equipment, Inc.
k. PolyVision Corporation; a Steelcase company.
l. Tri-Best Visual Display Products.
m. .

2. Hardboard Core: 1/4 inch (6 mm) thick; with 0.005-inch- (0.127-mm-) thick, aluminum foil backing.
3. Particleboard Core: 1/2 inch (13 mm) thick; with 0.013-inch- (0.35-mm-) thick, galvanized-steel sheet backing.
4. Fiberboard Core: 1/2 inch (13 mm) thick; with 0.013-inch- (0.35-mm-) thick, galvanized-steel sheet backing.
5. Manufacturer's Standard Core: Minimum 1/4 inch (6 mm) thick, with manufacturer's standard moisture-barrier backing.
6. Laminating Adhesive: Manufacturer's standard, moisture-resistant thermoplastic type.

B. Melamine Markerboards: Fabricated from 1/4-inch- (6-mm-) thick, sealed and primed hardboard panels permanently bonded with melamine or another high-pressure-laminate writing surface.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. AARCO Products, Inc.
b. Ghent Manufacturing, Inc.
c. Marsh Industries, Inc.; Visual Products Group.
d. .

C. High-Pressure-Laminate Markerboard Assembly: Balanced, high-pressure, factory-laminated chalkboard assembly of three-ply construction consisting of backing sheet, fiberboard core material, and high-pressure-laminate writing surface.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. Best-Rite Manufacturing.
b. EverProducts by Glenroy Inc.
c. Marsh Industries, Inc.; Visual Products Group.
d. .

2.3 TACKBOARD ASSEMBLIES

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. A-1 Visual Systems.
2. AARCO Products, Inc.
3. ADP Lemco, Inc.
4. Aywon.
5. Bangor Cork Company, Inc.
6. Best-Rite Manufacturing.
7. Claridge Products and Equipment, Inc.
8. Egan Visual Inc.
9. EverProducts by Glenroy Inc.
10. Ghent Manufacturing, Inc.
11. Marsh Industries, Inc.; Visual Products Group.
12. Platinum Visual Systems; a division of ABC School Equipment, Inc.
13. PolyVision Corporation; a Steelcase company.
14. Tri-Best Visual Display Products.
15. .

B. Natural-Cork Tackboard: 1/4-inch- (6-mm-) thick, natural cork sheet factory laminated to 1/4-inch- (6-mm-) thick hardboard backing.

C. .

2.4 MARKERBOARD AND TACKBOARD ACCESSORIES

A. Aluminum Frames and Trim: Fabricated from not less than 0.062-inch- (1.57-mm-) thick, extruded aluminum; standard size and shape.

1. Field-Applied Trim: Manufacturer's standard, screw-on trim with Phillips flat-head screws.
2. Factory-Applied Trim: Manufacturer's standard.

B. Factory-Applied Wood Trim: Red oak Walnut Manufacturer's standard species, not less than 1/2 inch (13 mm) thick; standard size and shape.

C. Field-Applied Wood Trim: Comply with requirements specified in Section 062000 "Finish Carpentry" Section 064023 "Interior Architectural Woodwork."

D. Map Rail: Provide the following accessories:

1. Display Rail: Continuous and integral with map rail; fabricated from cork approximately 1 to 2 inches (25 to 50 mm) wide.
2. End Stops: Located at each end of map rail.
3. Map Hooks: Two map hooks for every 48 inches (1219 mm) of map rail or fraction thereof.

4. Map Hooks and Clips: Two map hooks with flexible metal clips for every 48 inches (1219 mm) of map rail or fraction thereof.
5. Flag Holder: One for each room.
6. Paper Holder: Extruded aluminum; designed to hold paper by clamping action.

2.5 FABRICATION

A. Porcelain-Enamel Visual Display Assemblies: Laminate porcelain-enamel face sheet and backing sheet to core material under heat and pressure with manufacturer's standard flexible, waterproof adhesive.

B. Visual Display Boards: Factory assemble visual display boards unless otherwise indicated.

1. Where factory-applied trim is indicated, trim shall be assembled and attached to visual display boards at manufacturer's factory before shipment.

C. Factory-Assembled Visual Display Units: Coordinate factory-assembled units with trim and accessories indicated. Join parts with a neat, precision fit.

1. Make joints only where total length exceeds maximum manufactured length. Fabricate with minimum number of joints, as indicated on approved Shop Drawings.
2. Provide manufacturer's standard mullion trim at joints between markerboards and tackboards of combination units.
3. Where size of visual display boards or other conditions require support in addition to normal trim, provide structural supports or modify trim as indicated or as selected by Architect from manufacturer's standard structural support accessories to suit conditions indicated.

D. Modular Visual Display Boards: Fabricated with integral panel clips attached to core material.

E. Aluminum Frames and Trim: Fabricate units straight and of single lengths, keeping joints to a minimum. Miter corners to a neat, hairline closure.

1. Where factory-applied trim is indicated, trim shall be assembled and attached to visual display units at manufacturer's factory before shipment.

2.6 ALUMINUM FINISHES

A. Clear Anodic Finish: AAMA 611, AA-M12C22A31, Class II, 0.010 mm or thicker.

B. Color Anodic Finish: AAMA 611, AA-M12C22A32/A34, Class II, 0.010 mm or thicker.

C. Baked-Enamel or Powder-Coat Finish: AAMA 2603 except with a minimum dry film thickness of 1.5 mils (0.04 mm).

2.7 VISUAL DISPLAY SURFACE SCHEDULE

A. Visual Display Board: Factory assembled.

1. Markerboard: High-pressure-laminate markerboard assembly.

a. Color: As selected by Architect from full range of industry colors.

2. Corners: Square.
3. Width: As indicated on Drawings.
4. Height: As indicated on Drawings.
5. Mounting: Wall.
6. Mounting Height: As indicated on Drawings.
7. Factory Field-Applied Aluminum Trim: Manufacturer's standard Insert description with clear anodic color anodic baked-enamel powder-coat finish.

a. Color: As selected by Architect from full range of industry colors and color densities.

8. Factory-Applied Wood Trim: with opaque finish.
9. Factory-Applied Vinyl Trim: As selected by Architect from full range of industry colors.
10. Accessories:

a. Chalktray: Box type.
b. Map rail with display rail end stops map hooks map hooks and clips and flag holder.

B. Tackboard: Factory Field assembled.

1. Tack Surface: Natural-cork tackboard assembly.

a. Color: As selected by Architect from full range of industry colors.

2. Corners: Square.
3. Width: As indicated on Drawings.
4. Height: As indicated on Drawings.
5. Mounting: Wall.
6. Mounting Height: As indicated on Drawings.
7. Edges: Concealed by trim.

a. Factory Field-Applied Aluminum Trim: Manufacturer's standard style, with powder-coat finish.

1) Color: As selected by Architect from full range of industry colors and color densities.

b. Factory Field-Applied Wood Trim: with opaque finish.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Prepare surfaces to achieve a smooth, dry, clean surface free of flaking, unsound coatings, cracks, defects, projections, depressions, and substances that will impair bond between visual display surfaces and wall surfaces.

B. General: Install visual display surfaces in locations and at mounting heights indicated on Drawings. Keep perimeter lines straight, level, and plumb. Provide grounds, clips, backing materials, adhesives, brackets, anchors, trim, and accessories necessary for complete installation.

C. Field-Assembled Visual Display Units: Coordinate field-assembled units with grounds, trim, and accessories indicated. Join parts with a neat, precision fit.

1. Make joints only where total length exceeds maximum manufactured length. Fabricate with minimum number of joints, as indicated on approved Shop Drawings.
2. Provide manufacturer's standard vertical-joint spline H-trim system between abutting sections of chalkboards markerboards.

D. Visual Display Boards: Attach visual display boards to wall surfaces with egg-size adhesive gobs at 16 inches (400 mm) o.c., horizontally and vertically.

E. Visual Display Boards: Attach concealed clips, hangers, and grounds to wall surfaces and to visual display boards with fasteners at not more than 16 inches (400 mm) o.c. Secure both top and bottom of boards to walls.

1. Field-Applied Aluminum Trim: Attach trim over edges of visual display boards and conceal grounds and clips. Attach trim to boards with fasteners at not more than 24 inches (610 mm) o.c.

a. Attach chalktrays to boards with fasteners at not more than 12 inches (300 mm) o.c.

2. Field-Applied Wood Trim: Install trim according to requirements in Section 062000 "Finish Carpentry" Section 064023 "Interior Architectural Woodwork."

3. Mounting Height: [**72 inches (1829 mm)**] <**Insert dimension**> above finished floor to top of cabinet.

F. Clean visual display surfaces according to manufacturer's written instructions. Attach one cleaning label to visual display surface in each room. Cover and protect visual display surfaces.

END OF SECTION 101100

SECTION 10155 - TOILET COMPARTMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Steel toilet compartments configured as toilet enclosures entrance screens and urinal screens.

B. Related Sections:
1. Section 06105 "Miscellaneous Carpentry" for blocking .
2. Section 10801 "Toilet and Bath Accessories" for toilet tissue dispensers, grab bars, purse shelves, and similar accessories.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.

B. Shop Drawings: For toilet compartments. Include plans, elevations, sections, details, and attachments to other work.

1. Show locations of cutouts for compartment-mounted toilet accessories.
2. Show locations of reinforcements for compartment-mounted grab bars.
3. Show locations of centerlines of toilet fixtures.
4. Show overhead support or bracing locations.

C. Samples for Initial Selection: For each type of unit indicated. Include Samples of hardware and accessories involving material and color selection.

1.4 INFORMATIONAL SUBMITTALS

A. Product Certificates: For each type of toilet compartment, from manufacturer.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For toilet compartments to include in maintenance manuals.

1.6 QUALITY ASSURANCE

A. Comply with requirements in GSA's CID-A-A-60003, "Partitions, Toilets, Complete."

B. Regulatory Requirements: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA) and Architectural Barriers Act (ABA) Accessibility Guidelines for Buildings and Facilities" and ICC/ANSI A117.1 for toilet compartments designated as accessible.

1.7 PROJECT CONDITIONS

A. Field Measurements: Verify actual locations of toilet fixtures, walls, columns, ceilings, and other construction contiguous with toilet compartments by field measurements before fabrication.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Aluminum Castings: ASTM B 26/B 26M.

B. Aluminum Extrusions: ASTM B 221 (ASTM B 221M).

C. Steel Sheet: Commercial steel sheet for exposed applications; mill phosphatized and selected for smoothness.

D. Zamac: ASTM B 86, commercial zinc-alloy die castings.

2.2 STEEL UNITS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. ASI Accurate Partitions.
2. All American Metal Corp.
3. ASI Global Partitions
4. Bradley Corporation; Mills Partitions.
5. Flush Metal Partition Corp.
6. General Partitions Mfg. Corp.
7. Global Steel Products Corp.
8. Hadrian Manufacturing Inc.

9. Metpar Corp.
10. Rockville Partitions Incorporated.
11. Sanymetal; a Crane Plumbing company.

B. Toilet-Enclosure Style: Overhead braced Floor anchored .

C. Door, Panel, and Pilaster Construction: Seamless, metal facing sheets pressure laminated to core material; with continuous, interlocking molding strip or lapped-and-formed edge closures; corners secured by welding or clips and exposed welds ground smooth. Exposed surfaces shall be free of pitting, seam marks, roller marks, stains, discolorations, telegraphing of core material, or other imperfections.

1. Core Material: Manufacturer's standard sound-deadening honeycomb of resin-impregnated kraft paper in thickness required to provide finished thickness of 1 inch (25 mm) for doors and panels and 1-1/4 inches (32 mm) for pilasters.
2. Grab-Bar Reinforcement: Provide concealed internal reinforcement for grab bars mounted on units.
3. Tapping Reinforcement: Provide concealed reinforcement for tapping (threading) at locations where machine screws are used for attaching items to units.

D. Facing Sheets and Closures: Electrolytically coated steel sheet with nominal base-metal (uncoated) thicknesses as follows:

1. Pilasters, Braced at Both Ends: Manufacturer's standard thickness, but not less than 0.036 inch (0.91 mm).
2. Panels: Manufacturer's standard thickness, but not less than 0.030 inch (0.76 mm).
3. Doors: Manufacturer's standard thickness, but not less than 0.030 inch (0.76 mm).

E. Pilaster Shoes and Sleeves (Caps): Stainless-steel sheet, not less than 0.031-inch (0.79-mm) nominal thickness and 3 inches (76 mm) high, finished to match hardware.

F. Brackets (Fittings):

1. Stirrup Type: Ear or U-brackets; chrome-plated zamac stainless steelor chrome-plated brass.

G. Steel-Sheet Finish: Immediately after cleaning and pretreating, apply manufacturer's standard baked-on finish, including thermosetting, electrostatically applied, and powder coatings. Comply with coating manufacturer's written instructions for applying and baking. Apply one color in each room.

1. Color: As selected by Architect from manufacturer's full range.

2.3 ACCESSORIES

A. Hardware and Accessories: Manufacturer's standard design, heavy-duty operating hardware and accessories.

1. Material: Chrome-plated zamac Stainless steelor Chrome-plated brass.
2. Hinges: Manufacturer's standard paired, self-closing type that can be adjusted to hold doors open at any angle up to 90 degrees .
3. Latch and Keeper: Manufacturer's standard surface-mounted latch unit designed for emergency access and with combination rubber-faced door strike and keeper. Provide units that comply with regulatory requirements for accessibility at compartments designated as accessible.
4. Coat Hook: Manufacturer's standard combination hook and rubber-tipped bumper, sized to prevent in-swinging door from hitting compartment-mounted accessories.
5. Door Bumper: Manufacturer's standard rubber-tipped bumper at out-swinging doors.
6. Door Pull: Manufacturer's standard unit at out-swinging doors that complies with regulatory requirements for accessibility. Provide units on both sides of doors at compartments designated as accessible.

B. Overhead Bracing: Manufacturer's standard continuous, extruded-aluminum head rail with antigrip profile and in manufacturer's standard finish.

C. Anchorages and Fasteners: Manufacturer's standard exposed fasteners of stainless steel or chrome-plated steel or brass, finished to match the items they are securing, with theft-resistant-type heads. Provide sex-type bolts for through-bolt applications. For concealed anchors, use stainless steel, hot-dip galvanized steel, or other rust-resistant, protective-coated steel.

2.4 FABRICATION

A. Overhead-Braced Units: Provide manufacturer's standard corrosion-resistant supports, leveling mechanism, and anchors at pilasters to suit floor conditions. Provide shoes at pilasters to conceal supports and leveling mechanism.

B. Floor-Anchored Units: Provide manufacturer's standard corrosion-resistant anchoring assemblies with leveling adjustment nuts at pilasters for structural connection to floor. Provide shoes at pilasters to conceal anchorage.

C. Door Size and Swings: Unless otherwise indicated, 36-inch- (914-mm-) wide, out-swinging doors with a minimum 32-inch- (813-mm-) wide, clear opening for compartments designated as accessible.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General: Comply with manufacturer's written installation instructions. Install units rigid, straight, level, and plumb. Secure units in position with manufacturer's recommended anchoring devices.

1. Maximum Clearances:

   a. Pilasters and Panels: 1/2 inch (13 mm).
   b. Panels and Walls: 1 inch (25 mm).

2. Stirrup Brackets: Secure panels to walls and to pilasters with no fewer than three brackets attached at midpoint and near top and bottom of panel.

   a. Locate wall brackets so holes for wall anchors occur in masonry or tile joints.
   b. Align brackets at pilasters with brackets at walls.

B. Overhead-Braced Units: Secure pilasters to floor and level, plumb, and tighten. Set pilasters with anchors penetrating not less than 1-3/4 inches (44 mm) into structural floor unless otherwise indicated in manufacturer's written instructions. Secure continuous head rail to each pilaster with no fewer than two fasteners. Hang doors to align tops of doors with tops of panels, and adjust so tops of doors are parallel with overhead brace when doors are in closed position.

C. Floor-Anchored Units: Set pilasters with anchors penetrating not less than 2 inches (51 mm) into structural floor unless otherwise indicated in manufacturer's written instructions. Level, plumb, and tighten pilasters. Hang doors and adjust so tops of doors are level with tops of pilasters when doors are in closed position.

3.2 ADJUSTING

A. Hardware Adjustment: Adjust and lubricate hardware according to hardware manufacturer's written instructions for proper operation. Set hinges on in-swinging doors to hold doors open approximately 30 degrees from closed position when unlatched. Set hinges on out-swinging doors to return doors to fully closed position.

END OF SECTION 10155

SECTION 102600 - WALL AND DOOR PROTECTION

TIPS:

To view non-printing **Editor's Notes** that provide guidance for editing, click on MasterWorks/Single-File Formatting/Toggle/Editor's Notes.

To read **detailed research, technical information about products and materials, and coordination checklists**, click on MasterWorks/Supporting Information.

Content Requests:

<Double click here to submit questions, comments, or suggested edits to this Section.>

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Wall guards.
2. Impact-resistant handrails.
3. Bed locators.
4. Corner guards.
5. End-wall guards.
6. Abuse-resistant wall coverings.
7. Door-edge protection.
8. Door-frame protection.
9. Door-hardware protection.

B. Related Requirements:

1. Section 055000 "Metal Fabrications" for [**steel angle corner guards**] [**pipe guards**] [**and**] [**wheel guards**].
2. Section 057300 "Decorative Metal Railings" for metal handrails without plastic bumpers.
3. Section 064023 "Interior Architectural Woodwork for solid-wood handrails, bumper rails, chair rails, or corner moldings without plastic bumpers.
4. [**Section 087100 "Door Hardware"**] [**Section 087111 "Door Hardware (Descriptive Specification)"**] for metal[**and plastic**] protective trim units, according to BHMA A156.6, used for armor, kick, mop, and push plates.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, impact strength, dimensions of individual components and profiles, and finishes.
2. Include fire ratings of units recessed in fire-rated walls and listings for door-protection items attached to fire-rated doors.

B. Sustainable Design Submittals:

1. <Double click to insert sustainable design text for certified wood.>
2. <Double click to insert sustainable design text for certified wood.>
3. <Double click to insert sustainable design text for adhesives.>
4. <Double click to insert sustainable design text for composite wood.>

C. Shop Drawings: For each type of wall and door protection showing locations and extent.

1. Include plans, elevations, sections, and attachment details.[**Show handrail design and support spacing required to withstand structural loads.**]

D. Samples for Initial Selection: For each type of impact-resistant wall-protection unit indicated, in each color and texture specified.

1. Include Samples of accent strips and accessories to verify color selection.

E. Samples for Verification: For each type of exposed finish on the following products, prepared on Samples of size indicated below:

1. Wall Guards: 12 inches (300 mm) long. Include examples of joinery, corners, [**end caps,**] [**top caps,**] and field splices.
2. Handrails: 12 inches (300 mm) long. Include examples of joinery, corners, and field splices.
3. Bed Locators: 12 inches (300 mm) long. Include example of end caps.
4. [**Corner**] [**and**] [**End-Wall**] Guards: 12 inches (300 mm) long. Include example top caps.
5. Abuse-Resistant Wall Covering: 6 by 6 inches (150 by 150 mm) square.
6. Door-Surface Protection: 6 by 6 inches (150 by 150 mm) square.
7. Door[**-Edge**] [**and**] [**-Frame**] Protectors: 12 inches (300 mm) long.
8. Door-Knob and -Lever Protectors: Full-size unit of each type.

1.4 INFORMATIONAL SUBMITTALS

A. Product Certificates: For each type of handrail.

B. Material Certificates: For each type of exposed plastic material.

C. Sample Warranty: For special warranty.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For each type of wall and door protection product to include in maintenance manuals.

1. Include recommended methods and frequency of maintenance for maintaining best condition of plastic covers under anticipated traffic and use conditions. Include precautions against using cleaning materials and methods that may be detrimental to finishes and performance.

1.6 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials**[, from the same product run,]** that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. [**Wall-Guard**] [**and**] [**Handrail**] Covers: Full-size plastic covers of maximum length equal to [**2**] <**Insert number**> percent of each type, color, and texture of cover installed, but no fewer than [**two, 96-inch- (2400-mm-)**] <**Insert number and size**> long units.
2. Bed-Locator Covers: Full-size plastic covers equal to [**2**] <**Insert number**> percent of each type, color, and texture of cover installed, but no fewer than [**two**] <**Insert number**> units.
3. Corner-Guard Covers: Full-size plastic covers of maximum length equal to [**2**] <**Insert number**> percent of each type, color, and texture of cover installed, but no fewer than [**two, 48-inch- (1200-mm-)**] <**Insert number and size**> long units.
4. Mounting and Accessory Components: Amounts proportional to the quantities of extra materials. Package mounting and accessory components with each extra material.

1.7 QUALITY ASSURANCE

A. <Double click to insert sustainable design text for manufacturer qualifications.>

B. <Double click to insert sustainable design text for vendor qualifications.>

1.8 DELIVERY, STORAGE, AND HANDLING

A. Store wall and door protection in original undamaged packages and containers inside well-ventilated area protected from weather, moisture, soiling, extreme temperatures, and humidity.

1. Maintain room temperature within storage area at not less than 70 deg F (21 deg C) during the period plastic materials are stored.
2. Keep plastic materials out of direct sunlight.
3. Store plastic wall- and door-protection components for a minimum of 72 hours, or until plastic material attains a minimum room temperature of 70 deg F (21 deg C).

a. Store corner-guard covers in a vertical position.
b. Store [**wall-guard**] [**bed-locator**] [**and**] [**handrail**] covers in a horizontal position.

1.9 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of wall- and door-protection units that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Structural failures including detachment of components from each other or from the substrates, delamination, and permanent deformation beyond normal use.
b. Deterioration of metals, metal finishes, plastics, and other materials beyond normal use.

2. Warranty Period: [**Five**] <**Insert number**> years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations: Obtain wall- and door-protection products[**of each type**] from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

A. Surface Burning Characteristics: Comply with ASTM E84 or UL 723; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Flame-Spread Index: 25 or less.
2. Smoke-Developed Index: 450 or less.

B. Regulatory Requirements: Comply with applicable provisions in [**the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines for Buildings and Facilities**] [**and**] [**ICC A117.1**] <**Insert requirement**>.

2.3 WALL GUARDS

A. Crash Rail <**Insert drawing designation**>: Heavy-duty[**, PVC-free**] assembly consisting of continuous snap-on plastic cover installed over concealed retainer; designed to withstand impacts.

1. <Double click here to find, evaluate, and insert list of manufacturers and products.>
2. Cover: Extruded rigid plastic, minimum 0.100-inch (2.5-mm) wall thickness; [**as follows:**] [**in dimensions and profiles indicated on Drawings.**]

    a. Profile: [**Flat**] [**Convex**] <**Insert description**>.

        1) Dimensions: Nominal [**6 inches high by 1 inch deep (150 mm high by 25 mm deep)**] [**8 inches high by 1 inch deep (200 mm high by 25 mm deep)**] <**Insert dimensions**>.
        2) Surface: [**Uniform**] [**Uniform with coextruded accent inlay strip in contrasting color**] [**Grooved**] <**Insert description**>.

            a) Accent Inlay Strip: Nominal [**2 inches (50 mm)**] <**Insert dimension**> high by length of rail.

    b. Color and Texture: [**As indicated by manufacturer's designations**] [**Match Architect's sample**] [**As selected by Architect from manufacturer's full range**] <**Insert color and texture**>.

3. Continuous Retainer: Minimum 0.080-inch- (2.0-mm-) thick, one-piece, extruded aluminum.
4. Retainer Clips: Manufacturer's standard impact-absorbing clips designed for heavy-duty performance.
5. Bumper: Continuous, resilient bumper cushion(s).
6. End Caps and Corners: Prefabricated, injection-molded plastic; [**matching color**] [**contrasting with color**] <**Insert color**> cover; field adjustable for close alignment with snap-on cover.

7. Accessories: Concealed splices and mounting hardware.
8. Mounting: [**Surface mounted directly to wall**] [**Reveal mounted on bumper cushion(s)**] [**Extended mounting on injection-molded plastic mounting brackets**].

B. Bumper Rail <**Insert drawing designation**>: Standard-duty[**, PVC-free**] assembly consisting of continuous snap-on plastic cover installed over concealed retainer; designed to withstand impacts.

1. <Double click here to find, evaluate, and insert list of manufacturers and products.>
2. Cover: Extruded rigid plastic, minimum 0.078-inch (2.0-mm) wall thickness; [**as follows:**] [**in dimensions and profiles indicated on Drawings.**]

    a. Profile: [**Half-round profile, nominal 1 inch high by 1 inch deep (25 mm high by 25 mm deep)**] [**Rounded bullnose profile, nominal 4 inches high by 2 inches deep (100 mm high by 50 mm deep)**] [**Angled profile with rounded bullnose front edge, nominal 4 inches high by 2 inches deep (100 mm high by 50 mm deep)**] [**Flat profile, nominal 4 inches high by 1 inch deep (100 mm high by 25 mm deep)**] <**Insert profile and dimensions**>.
    b. Color and Texture: [**As indicated by manufacturer's designations**] [**Match Architect's sample**] [**As selected by Architect from manufacturer's full range**] <**Insert color and texture**>.

3. Continuous Retainer: Minimum 0.080-inch- (2.0-mm-) thick, one-piece, extruded aluminum.
4. Retainer Clips: Manufacturer's standard impact-absorbing clips.
5. Bumper: Continuous, resilient bumper cushion(s).
6. End Caps and Corners: Prefabricated, injection-molded plastic; [**matching color**] [**contrasting with color**] <**Insert color**> cover; field adjustable for close alignment with snap-on cover.
7. Accessories: Concealed splices and mounting hardware.
8. Mounting: [**Surface mounted directly to wall**] [**Reveal mounted on bumper cushions**] [**Extended mounting on injection-molded plastic mounting brackets**].

C. Rub Rail <**Insert drawing designation**>: Standard-duty[**, PVC-free**] assembly consisting of continuous snap-on cover installed over concealed, continuous retainer.

1. <Double click here to find, evaluate, and insert list of manufacturers and products.>
2. Cover: Extruded plastic, minimum 0.078-inch (2.0-mm) wall thickness; [**as follows:**] [**in dimensions and profiles indicated on Drawings.**]

    a. Profile: [**Half-round profile, nominal 1-1/8 inches high by 1-1/8 inches deep (30 mm high by 30 mm deep)**] [**Rounded bullnose profile, nominal 2 inches high by 1 inch deep (50 mm high by 25 mm deep)**] <**Insert profile and dimensions**>.
    b. Color and Texture: [**As indicated by manufacturer's designations**] [**Match Architect's sample**] [**As selected by Architect from manufacturer's full range**] <**Insert color and texture**>.

3. Retainer: Minimum 0.0625-inch- (1.6-mm-) thick, one-piece, extruded aluminum.
4. End Caps and Corners: Prefabricated, injection-molded plastic; color matching cover; field adjustable for close alignment with snap-on cover.
5. Accessories: Concealed splices and mounting hardware.
6. Mounting: [**Surface mounted directly to wall**] [**Reveal mounted on bumper cushions**].

D. Wood Chair Rail with Bumper <**Insert drawing designation**>: Standard-duty[**, PVC-free**] assembly consisting of continuous sculpted, solid-wood rail, with continuous bumper insert installed in continuous recessed retainer.

1. <Double click here to find, evaluate, and insert list of manufacturers and products.>
2. Wood Rail: [**3-1/2 inches high by 7/8 inch deep (89 mm high by 22 mm deep)**] [**5-1/2 inches high by 1-1/2 inches deep (140 mm high by 38 mm deep)**] [**Size and profile indicated on Drawings**] <**Insert dimensions**>.

    a. Wood Species: [**Red oak**] [**Maple**] [**Ash**] [**Beech**] <**Insert species**>.
    b. Finish: [**Clear**] [**Stained**].
    c. Color: [**As indicated by manufacturer's designations**] [**Match Architect's sample**] [**As selected by Architect from manufacturer's full range**] <**Insert color**>.

3. Bumper: Extruded plastic, minimum 0.078-inch (2.0-mm) wall thickness; [**as follows:**] [**in dimensions and profiles indicated on Drawings.**]

    a. Profile: [**Half-round profile, nominal 2 inches high by 1 inch deep (50 mm high by 25 mm deep)**] [**Small rounded profile, nominal 1-1/8 inches high by 1-1/8 inches deep (30 mm high by 30 mm deep)**] <**Insert profile and dimensions**>.
    b. Color and Texture: [**As indicated by manufacturer's designations**] [**Match Architect's sample**] [**As selected by Architect from manufacturer's full range**] <**Insert color and texture**>.
    c. End Caps and Corners: Prefabricated, injection-molded plastic; color matching bumper; field adjustable for close alignment with snap-on bumper.

4. Retainer: Minimum 0.0625-inch- (1.6-mm-) thick, one-piece, extruded aluminum.

    a. Finish: [**Mill**] [**Brass colored**].

5. Accessories: Concealed splices and mounting hardware.
6. Mounting: Surface mounted directly to wall.

E. Opaque-Plastic Chair Rail <**Insert drawing designation**>: Standard-duty[**, PVC-free**] assembly consisting of continuous snap-on cover installed over continuous retainer.

1. <Double click here to find, evaluate, and insert list of manufacturers and products.>
2. Cover: Extruded rigid plastic, minimum 0.070-inch (1.8-mm) wall thickness; [**as follows:**] [**in dimensions and profiles indicated on Drawings.**]

    a. Profile: [**Rounded bullnose profile, nominal 2 inches high by 1 inch deep (50 mm high by 25 mm deep)**] [**Half-round profile, nominal 1-1/8 inches high by 1-1/8 inches deep (30 mm high by 30 mm deep)**] <**Insert profile and dimensions**>.
    b. Color and Texture: [**As indicated by manufacturer's designations**] [**Match Architect's sample**] [**As selected by Architect from manufacturer's full range**] <**Insert color and texture**>.

3. Retainer: Minimum 0.060-inch- (1.5-mm-) thick, one-piece, extruded aluminum.
4. Bumper: Continuous, resilient bumper cushion(s).
5. End Caps and Corners: Prefabricated, injection-molded plastic; color matching cover; field adjustable for close alignment with snap-on cover.
6. Accessories: Concealed splices and mounting hardware.
7. Mounting: [**Surface mounted directly to wall**] [**Reveal mounted on bumper cushions**].

F. Transparent-Plastic Chair Rail <**Insert drawing designation**>: Consisting of clear polycarbonate plastic sheet.

1. <Double click here to find, evaluate, and insert list of manufacturers and products.>
2. Height: [**3 inches (75 mm) nominal**] [**4 inches (100 mm) nominal**] [**As indicated on Drawings**] <**Insert dimension**>.
3. Mounting: Surface mounted using flat-head countersunk screws through factory-drilled mounting holes.

G. Rub Strip <**Insert drawing designation**>: Continuous[**, PVC-free**] strip, consisting of minimum [**0.040-inch- (1.0-mm-)**] [**0.060-inch- (1.5-mm-)**] <**Insert dimension**> thick, semirigid, plastic sheet wall-covering material.

1. <Double click here to find, evaluate, and insert list of manufacturers and products.>
2. Height: [**8 inches (200 mm) nominal**] <**Insert dimension**>.
3. Color and Texture: [**As indicated by manufacturer's designations**] [**Match Architect's sample**] [**As selected by Architect from manufacturer's full range**] <**Insert color and texture**>.
4. Mounting: Surface mounted with adhesive.

2.4 IMPACT-RESISTANT HANDRAILS

A. Structural Performance: Handrails, including attachment to building construction, shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:

1. Uniform load of 50 lbf/ft. (0.73 kN/m) <**Insert requirement**> applied in any direction.
2. Concentrated load of 200 lbf (0.89 kN) applied in any direction.
3. Uniform and concentrated loads need not be assumed to act concurrently.

B. Plastic, Impact-Resistant Handrails <**Insert drawing designation**>: Manufacturer's standard[**, PVC-free**] assembly consisting of snap-on plastic cover installed over continuous retainer.

1. <Double click here to find, evaluate, and insert list of manufacturers and products.>
2. Cover: Minimum [**0.078-inch- (2.0-mm-)**] [**0.100-inch- (2.5-mm-)**] <**Insert dimension**> thick, extruded rigid plastic; [**as follows:**] [**in dimensions and profiles indicated on Drawings.**]

    a. Single Handrail: Cylindrical tube profile cover with continuous retainer; with mounting brackets supporting bottom of rail.

        1) Tube Diameter: <**Insert dimension**>.

    b. Bumper Rail: Cover with [**flat**] [**sculpted with contoured thumb recess on**] <**Insert description**> front side; with 1-1/2-inch- (38-mm-) diameter gripping surface and finger recess on back side; supported by concealed, continuous retainer and extended mounting brackets.

        1) Bumper-Rail Dimensions: Nominal [**5-1/2 inches high by 1-1/2 inches deep (140 mm high by 38 mm deep)**] [**5-1/2 inches high by 2 inches deep (140 mm high by 50 mm deep)**] <**Insert dimensions**>.

2) Bumper Surface: [**Smooth**] [**Smooth with coextruded accent inlay strip in contrasting color**] [**Smooth with coextruded accent inlay strips in contrasting color**] [**Grooved**] <**Insert description**>.
3) Accent Inlay Strip(s): [**One strip**] [**Two strips**], nominal [**2 inches (50 mm)**] <**Insert dimension**> high by length of rail.

c. Double Handrail with Bumper-Rail Profile: Two tubes mounted above and below nominal, flat-faced bumper rail; each tube with 1-1/2-inch- (38-mm-) diameter gripping surface and finger recess on back side; supported by concealed, continuous retainer and extended mounting brackets.

1) Bumper-Rail Dimensions: Nominal [**4 inches high by 1-1/2 inches deep (100 mm high by 38 mm deep)**] <**Insert dimensions**>.
2) Bumper Surface: [**Smooth**] [**Smooth with coextruded accent inlay strip in contrasting color**] [**Smooth with coextruded accent inlay strips in contrasting color**] [**Grooved**] <**Insert description**>.
3) Accent Inlay Strip(s): [**One strip**] [**Two strips**], nominal [**2 inches (50 mm)**] <**Insert dimension**> high by length of rail.

d. Color and Texture: [**As indicated by manufacturer's designations**] [**Match Architect's sample**] [**As selected by Architect from manufacturer's full range**] <**Insert color and texture**>.

3. Retainer: Minimum 0.080-inch- (2.0-mm-) thick, one-piece, extruded aluminum.
4. Mounting Bracket: Extended mounting on [**injection-molded plastic**] [**anodized-aluminum**] <**Insert description**> mounting brackets.
5. End Caps and Corners: Prefabricated, injection-molded plastic; [**matching color**] [**contrasting with color**] <**Insert color**> cover; field adjustable for close alignment with snap-on cover.
6. Accessories: Concealed splices, cushions, and mounting hardware.

C. Combination Wood-Plastic Bumper Handrail <**Insert drawing designation**>: Manufacturer's standard[**, PVC-free**] assembly consisting of solid-wood handrail mounted above plastic bumper rail, both mounted on continuous retainer; with reveal between handrail and bumper serving as thumb recess on front side; with 1-1/2-inch- (38-mm-) diameter gripping surface and finger recess on back side.

1. <Double click here to find, evaluate, and insert list of manufacturers and products.>
2. Wood Handrail: 1-1/2 inches (38 mm) in diameter; with matching end caps and corners.

a. Wood Species: [**Red oak**] [**Maple**] [**Ash**] [**Beech**] <**Insert species**>.
b. Finish: [**Clear**] [**Stained**].
c. Color: [**As indicated by manufacturer's designations**] [**Match Architect's sample**] [**As selected by Architect from manufacturer's full range**] <**Insert color**>.

3. Bumper: Extruded rigid plastic, minimum [**0.078-inch- (2.0-mm-)**] [**0.100-inch- (2.5-mm-)**] wall thickness; [**as follows:**] [**in dimensions and profiles indicated on Drawings.**]

a. Profile: [**Flat**] [**Convex**] <**Insert profile**> profile, nominal [**4 inches high by 1 inch deep (100 mm high by 25 mm deep)**] <**Insert profile and dimensions**>.
b. Accent Inlay Strip: Nominal [**2 inches (50 mm)**] <**Insert dimension**> high by length of rail.

c. Color and Texture: [**As indicated by manufacturer's designations**] [**Match Architect's sample**] [**As selected by Architect from manufacturer's full range**] <**Insert color and texture**>.
d. End Caps and Corners: Prefabricated, injection-molded plastic; color matching bumper; field adjustable for close alignment with snap-on bumper.

4. Retainer: Minimum 0.0625-inch- (1.6-mm-) thick, one-piece, extruded aluminum.
5. Reveal: Extruded rigid plastic over aluminum retainer.

a. Color: [**Brass**] [**Chrome**] [**As indicated by manufacturer's designations**] [**Match Architect's sample**] [**As selected by Architect from manufacturer's full range**] <**Insert color**>.

6. Accessories: Concealed splices, cushion(s), and mounting hardware.

D. Wood Handrail with Bumper <**Insert drawing designation**>: Manufacturer's standard[**, PVC-free**] assembly consisting of continuous sculpted, solid-wood handrail, with bumper insert installed in continuous retainer recessed into the face of the wood.

1. <Double click here to find, evaluate, and insert list of manufacturers and products.>
2. Wood Handrail: [**As indicated on Drawings**] <**Insert dimensions**> with 1-1/2-inch- (38-mm-) diameter gripping surface.

a. End Caps, Returns, Corners, and Mounting Brackets: Solid wood that matches rail.
b. Wood Species: [**Red oak**] [**Maple**] [**Ash**] [**Beech**] [**Bamboo**] <**Insert species**>.
c. Finish: [**Clear**] [**Stained**].
d. Color: [**As indicated by manufacturer's designations**] [**Match Architect's sample**] [**As selected by Architect from manufacturer's full range**] <**Insert color**>.

3. Bumper: Extruded plastic, minimum 0.078-inch (2.0-mm) wall thickness; [**as follows:**] [**in dimensions and profiles indicated on Drawings**].

a. Profile: [**Half-round profile, nominal 2 inches high by 1 inch deep (50 mm high by 25 mm deep)**] [**Small rounded profile, nominal 1-1/8 inches high by 1-1/8 inches deep (30 mm high by 30 mm deep)**] <**Insert profile and dimensions**>.
b. Color and Texture: [**As indicated by manufacturer's designations**] [**Match Architect's sample**] [**As selected by Architect from manufacturer's full range**] <**Insert color and texture**>.
c. End Caps and Corners: Prefabricated, injection-molded plastic; color matching bumper; field adjustable for close alignment with snap-on bumper.

4. Retainer: Minimum 0.0625-inch- (1.6-mm-) thick, one-piece, extruded aluminum.

a. Finish: [**Mill**] [**Brass colored**].

5. Accessories: Concealed splices and mounting hardware.

2.5 BED LOCATORS

A. Bed Locators <**Insert drawing designation**>: Manufacturer's standard[**, PVC-free**] assembly consisting of continuous snap-on plastic cover installed over continuous retainer; with two bed-locator end caps and mounting hardware; cover designed to spring back when hit.

1. <Double click here to find, evaluate, and insert list of manufacturers and products.>
2. Cover: Extruded rigid plastic, minimum [**0.078-inch (2.0-mm)**] <**Insert dimension**> wall thickness.

    a. Profile: Large, rounded [**angled**] [**bullnose**] profile, nominal 4 inches high by 2 inches deep (100 mm high by 50 mm deep).
    b. Color and Texture: [**As indicated by manufacturer's designations**] [**Match Architect's sample**] [**As selected by Architect from manufacturer's full range**] <**Insert color and texture**>.

3. Retainer: Minimum 0.080-inch- (2.0-mm-) thick, one-piece, extruded aluminum.
4. Bed-Locator End Caps: Prefabricated, injection-molded plastic; color matching cover; field adjustable for close alignment with snap-on cover.
5. Mounting Type: [**Surface mounted on 1/2-inch- (13-mm-) thick cushion spacers**] [**Extended mounting on injection-molded plastic mounting brackets**] [**Extended mounting on aluminum mounting brackets**].

2.6 CORNER GUARDS

A. Surface-Mounted, Plastic-Cover Corner Guards <**Insert drawing designation**>: Manufacturer's standard[**, PVC-free**] assembly consisting of snap-on, resilient plastic cover installed over retainer; including mounting hardware; fabricated with 90- or 135-degree turn to match wall condition.

1. <Double click here to find, evaluate, and insert list of manufacturers and products.>
2. Cover: Extruded rigid plastic, minimum [**0.078-inch (2.0-mm)**] [**0.100-inch (2.5-mm)**] <**Insert dimension**> wall thickness; [**as follows:**] [**in dimensions and profiles indicated on Drawings.**]

    a. Profile: Nominal [**2-inch- (50-mm-) long leg and 1/4-inch (6-mm) corner radius**] [**3-inch- (75-mm-) long leg and 1/4-inch (6-mm) corner radius**] [**3-inch- (75-mm-) long leg and 1-1/4-inch (32-mm) corner radius**] <**Insert dimensions**>.
    b. Height: [**4 feet (1.2 m)**] [**8 feet (2.4 m)**] <**Insert dimension**>.
    c. Color and Texture: [**As indicated by manufacturer's designations**] [**Match Architect's sample**] [**As selected by Architect from manufacturer's full range**] <**Insert color and texture**>.

3. Continuous Retainer: [**Minimum 0.060-inch- (1.5-mm-) thick, one-piece, extruded aluminum**] [**One-piece extruded plastic**].
4. Retainer Clips: Manufacturer's standard impact-absorbing clips.
5. Top and Bottom Caps: Prefabricated, injection-molded plastic; color matching cover; field adjustable for close alignment with snap-on cover.

B. Flush-Mounted, Plastic-Cover Corner Guards <**Insert drawing designation**>: Manufacturer's standard[**, PVC-free**] assembly consisting of snap-on, resilient plastic cover that is flush with adjacent wall surface, installed over retainer; including mounting hardware; fabricated with 90- or 135-degree turn to match wall condition; full wall height.

1. <Double click here to find, evaluate, and insert list of manufacturers and products.>
2. Cover: Extruded rigid plastic, minimum [**0.078-inch (2.0-mm)**] [**0.100-inch (2.5-mm)**] <**Insert dimension**> wall thickness; [**as follows:**] [**in dimensions and profiles indicated on Drawings.**]

a. Profile: Nominal [**2-inch- (50-mm-) long leg and 1/4-inch (6-mm) corner radius**] [**3-inch- (75-mm-) long leg and 1/4-inch (6-mm) corner radius**] [**3-inch- (75-mm-) long leg and 1-1/4-inch (32-mm) corner radius**] <**Insert dimensions**>.
b. Height: [**4 feet (1.2 m)**] [**8 feet (2.4 m)**] <**Insert dimension**>.
c. Color and Texture: [**As indicated by manufacturer's designations**] [**Match Architect's sample**] [**As selected by Architect from manufacturer's full range**] <**Insert color and texture**>.

3. Continuous Retainer: Minimum 0.060-inch- (1.5-mm-) thick, one-piece, extruded aluminum.
4. Retainer Clips: Manufacturer's standard impact-absorbing clips.
5. Aluminum Cove Base: Nominal [**4 inches (100 mm)**] [**6 inches (150 mm)**] <**Insert dimension**> high.

C. Fire-Rated, Flush-Mounted, Plastic-Cover Corner Guards <**Insert drawing designation**>: Manufacturer's standard[**, PVC-free**] assembly consisting of snap-on, resilient plastic cover that is flush with adjacent wall surface, installed over continuous retainer and intumescent fire barrier; including mounting hardware; fabricated with 90- or 135-degree turn to match wall condition; full wall height.

1. <Double click here to find, evaluate, and insert list of manufacturers and products.>
2. Fire Rating: [**1 hour**] [**2 hours**] [**Same rating as wall in which corner guard is installed**]; UL listed and labeled according to ASTM E1966 or UL 2079.

a. L-Rating at Smoke Barriers: Not exceeding 5.0 cfm/ft. (0.00775 cu. m/s x m) of joint at 0.30 inch wg (74.7 Pa) at both ambient and elevated temperatures according to UL 2079.

3. Cover: Extruded rigid plastic, minimum [**0.078-inch (2.0-mm)**] [**0.100-inch (2.5-mm)**] <**Insert dimension**> wall thickness; [**as follows:**] [**in dimensions and profiles indicated on Drawings.**]

a. Leg: Nominal [**2 inches (50 mm)**] [**3 inches (75 mm)**].
b. Corner Radius: [**1/4 inch (6 mm)**] [**1-1/4 inches (32 mm)**].
c. Color and Texture: [**As indicated by manufacturer's designations**] [**Match Architect's sample**] [**As selected by Architect from manufacturer's full range**] <**Insert color and texture**>.

4. Retainer: Minimum 0.070-inch- (1.8-mm-) thick, one-piece, extruded aluminum.
5. Aluminum Cove Base: Nominal [**4 inches (100 mm)**] [**6 inches (150 mm)**] <**Insert dimension**> high.

D. Surface-Mounted, Opaque-Plastic Corner Guards <**Insert drawing designation**>: Fabricated as one piece from [**PVC plastic**] [**PVC-free plastic**] [**acrylic-modified vinyl sheet**] [**or**] [**opaque polycarbonate sheet**]; with formed edges; fabricated with 90- or 135-degree turn to match wall condition.

1. <Double click here to find, evaluate, and insert list of manufacturers and products.>
2. Wing Size: Nominal [**3/4 by 3/4 inch (20 by 20 mm)**] [**1-1/8 by 1-1/8 inches (30 by 30 mm)**] [**2-1/2 by 2-1/2 inches (65 by 65 mm)**] <**Insert dimensions**>.
3. Mounting: [**Countersunk screws through factory-drilled mounting holes**] [**Adhesive**].
4. Color and Texture: [**As indicated by manufacturer's designations**] [**Match Architect's sample**] [**As selected by Architect from manufacturer's full range**] <**Insert color and texture**>.

E. Surface-Mounted, Transparent-Plastic Corner Guards <**Insert drawing designation**>: Fabricated as one piece from clear polycarbonate plastic sheet; with formed edges; fabricated with 90- or 135-degree turn to match wall condition.

1. <Double click here to find, evaluate, and insert list of manufacturers and products.>
2. Wing Size: Nominal [**3/4 by 3/4 inch (20 by 20 mm)**] [**1-1/8 by 1-1/8 inches (30 by 30 mm)**] [**2-1/2 by 2-1/2 inches (65 by 65 mm)**] <**Insert dimensions**>.
3. Thickness: Minimum [**0.050 inch (1.3 mm)**] [**0.075 inch (1.9 mm)**] [**0.100 inch (2.5 mm)**] <**Insert dimension**>.
4. Mounting: [**Countersunk screws through factory-drilled mounting holes**] [**Corner clips**].

F. Surface-Mounted, Metal Corner Guards <**Insert drawing designation**>: Fabricated as one piece from formed or extruded metal with formed edges; with 90- or 135-degree turn to match wall condition.

1. <Double click here to find, evaluate, and insert list of manufacturers and products.>
2. Material: Stainless-steel sheet, [**Type 304**] [**Type 430**].
    a. Thickness: Minimum [**0.0500 inch (1.3 mm)**] [**0.0625 inch (1.6 mm)**] [**0.0781 inch (2.0 mm)**] <**Insert dimension**>.
    b. Finish: [**Directional satin, No. 4**] [**Bright annealed**].
3. Material: Extruded aluminum, minimum 0.0625 inch (1.6 mm) thick, with clear anodic finish.
4. Material: Brass sheet, minimum 0.0500 inch (1.3 mm) thick, with [**buffed, smooth specular**] [**fine satin**] finish.
5. Wing Size: Nominal [**1-1/2 by 1-1/2 inches (38 by 38 mm)**] [**2-1/2 by 2-1/2 inches (65 by 65 mm)**] [**3-1/2 by 3-1/2 inches (90 by 90 mm)**] <**Insert dimensions**>.
6. Corner Radius: [**1/8 inch (3 mm)**] [**3/4 inch (19 mm)**] <**Insert dimension**>.
7. Mounting: [**Flat-head, countersunk screws through factory-drilled mounting holes**] [**Oval head, countersunk screws through factory-drilled mounting holes**] [**Adhesive**].

2.7 END-WALL GUARDS

A. Surface-Mounted, Plastic-Cover, End-Wall Guard <**Insert drawing designation**>: Manufacturer's standard[**, PVC-free**] assembly consisting of snap-on, resilient plastic cover installed over [**continuous retainer**] [**continuous retainer at each corner, with end of wall covered by semirigid, abuse-resistant wall covering**]; including mounting hardware.

1. <Double click here to find, evaluate, and insert list of manufacturers and products.>
2. Cover: Extruded rigid plastic, minimum [**0.078-inch (2.0-mm)**] [**0.100-inch (2.5-mm)**] wall thickness; [**as follows:**] [**in dimensions and profiles indicated on Drawings.**]
    a. Profile: Nominal [**2-inch- (50-mm-) long leg and 1/4-inch (6-mm) corner radius**] [**3-inch- (75-mm-) long leg and 1/4-inch (6-mm) corner radius**] [**3-inch- (75-mm-) long leg and 1-1/4-inch (32-mm) corner radius**] <**Insert dimensions**>.
    b. Height: [**4 feet (1.2 m)**] [**8 feet (2.4 m)**] <**Insert dimension**>.
    c. Color and Texture: [**As indicated by manufacturer's designations**] [**Match Architect's sample**] [**As selected by Architect from manufacturer's full range**] [**Match corner guards**] <**Insert color and texture**>.
3. Retainer: Minimum 0.060-inch- (1.5-mm-) thick, one-piece, extruded aluminum.

4. Top and Bottom Caps: Prefabricated, injection-molded plastic; color matching cover; field adjustable for close alignment with snap-on cover.

B. Flush-Mounted, Plastic-Cover, End-Wall Guard <**Insert drawing designation**>: Manufacturer's standard[**, PVC-free**] assembly consisting of snap-on, resilient plastic cover that is flush with adjacent wall surface and that covers entire end of wall, installed over [**continuous retainer**] [**continuous retainer at each corner, with end of wall covered by semirigid, abuse-resistant wall covering**]; including mounting hardware.

1. <Double click here to find, evaluate, and insert list of manufacturers and products.>
2. Cover: Extruded rigid plastic, minimum [**0.078-inch (2.0-mm)**] [**0.100-inch (2.5-mm)**] <**Insert dimension**> wall thickness; [**as follows:**] [**in dimensions and profiles indicated on Drawings.**]

    a. Profile: Nominal [**2-inch- (50-mm-) long leg and 1/4-inch (6-mm) corner radius**] [**3-inch- (75-mm-) long leg and 1/4-inch (6-mm) corner radius**] [**3-inch- (75-mm-) long leg and 1-1/4-inch (32-mm) corner radius**] <**Insert dimensions**>.
    b. Height: [**4 feet (1.2 m)**] [**8 feet (2.4 m)**] <**Insert dimension**>.
    c. Color and Texture: [**As indicated by manufacturer's designations**] [**Match Architect's sample**] [**As selected by Architect from manufacturer's full range**] [**Match corner guards**] <**Insert color and texture**>.

3. Retainer: Minimum 0.060-inch- (1.5-mm-) thick, one-piece, extruded aluminum.
4. Aluminum Cove Base: Nominal [**4 inches (100 mm)**] [**6 inches (150 mm)**] <**Insert dimension**> high.

C. Fire-Rated, Flush-Mounted, Plastic-Cover, End-Wall Guard <**Insert drawing designation**>: Manufacturer's standard[**, PVC-free**] assembly consisting of snap-on, resilient plastic cover that is flush with adjacent wall surface and that covers entire end of wall, installed over continuous retainer and intumescent fire barrier; including mounting hardware; full wall height.

1. <Double click here to find, evaluate, and insert list of manufacturers and products.>
2. Fire Rating: [**1 hour**] [**2 hours**] [**Same rating as wall in which end guard is installed**]; UL listed and labeled according to UL 2079.
3. Cover: Extruded rigid plastic, minimum [**0.078-inch (2.0-mm)**] [**0.100-inch (2.5-mm)**] <**Insert dimension**> wall thickness; [**as follows:**] [**in dimensions and profiles indicated on Drawings.**]

    a. Leg: Nominal [**2 inches (50 mm)**] [**3 inches (75 mm)**] <**Insert dimension**>.
    b. Corner Radius: [**1/4 inch (6 mm)**] [**1-1/4 inches (32 mm)**] <**Insert dimension**>.
    c. Color and Texture: [**As indicated by manufacturer's designations**] [**Match Architect's sample**] [**As selected by Architect from manufacturer's full range**] [**Match corner guards**] <**Insert color and texture**>.

4. Retainer: Minimum 0.070-inch- (1.8-mm-) thick, one-piece, extruded aluminum.
5. Aluminum Cove Base: Nominal [**4 inches (100 mm)**] [**6 inches (150 mm)**] <**Insert dimension**> high.

D. Surface-Mounted, Metal, End-Wall Guards <**Insert drawing designation**>: Fabricated from one-piece, formed or extruded metal that covers entire end of wall; with formed edges.

1. <Double click here to find, evaluate, and insert list of manufacturers and products.>
2. Material: Stainless-steel sheet, [**Type 304**] [**Type 430**].

a. Thickness: Minimum [**0.0500 inch (1.3 mm)**] [**0.0625 inch (1.6 mm)**] [**0.0781 inch (2.0 mm)**] <**Insert dimension**>.
b. Finish: [**Directional satin, No. 4**] [**Bright annealed**].

3. Material: Extruded aluminum, minimum 0.0625 inch (1.6 mm) thick, with clear anodic finish.
4. Material: Brass sheet, minimum 0.0500 inch (1.3 mm) thick, with [**buffed, smooth specular**] [**fine satin**] finish.
5. Wing Size: Nominal [**1-1/2 by 1-1/2 inches (38 by 38 mm)**] [**2-1/2 by 2-1/2 inches (65 by 65 mm)**] [**3-1/2 by 3-1/2 inches (90 by 90 mm)**] <**Insert dimensions**>.
6. Corner Radius: [**1/8 inch (3 mm)**] [**3/4 inch (19 mm)**] <**Insert dimension**>.
7. Mounting: [**Flat-head, countersunk screws through factory-drilled mounting holes**] [**Oval head, countersunk screws through factory-drilled mounting holes**] [**Adhesive**].

2.8 ABUSE-RESISTANT WALL COVERINGS

A. Abuse-Resistant Sheet Wall Covering <**Insert drawing designation**>: Fabricated from semirigid, plastic sheet wall-covering material.

1. <Double click here to find, evaluate, and insert list of manufacturers and products.>
2. Size: [**48 by 96 inches (1219 by 2438 mm) for sheet**] [**48 by 120 inches (1219 by 3048 mm) for roll**] [**As indicated**] <**Insert dimensions**>.
3. Sheet Thickness: [**0.022 inch (0.56 mm)**] [**0.028 inch (0.7 mm)**] [**0.040 inch (1.0 mm)**] [**0.060 inch (1.5 mm)**] [**0.080 inch (2.0 mm)**] [**0.093 inch (2.4 mm)**] [**0.125 inch (3.0 mm)**] <**Insert dimension**>.
4. Color and Texture: [**As indicated by manufacturer's designations**] [**Match Architect's sample**] [**As selected by Architect from manufacturer's full range**] <**Insert color and texture**>.
5. Height: [**Full wall**] [**Wainscot**] [**As indicated**] <**Insert dimension**>.
6. Trim and Joint Moldings: Extruded rigid plastic that matches wall-covering color.
7. Mounting: Adhesive.

B. Laminated, Impact-Resistant Wall Panels <**Insert drawing designation**>: Rigid wall panels consisting of semirigid, plastic sheet wall covering material factory laminated to high-impact-resistant core, with moisture-resistant vapor barrier factory laminated to reverse side of panel for stability.

1. <Double click here to find, evaluate, and insert list of manufacturers and products.>
2. Composition: [**0.028-inch- (0.70-mm-) thick plastic sheet laminated to 3/8-inch- (9.5-mm-) thick particleboard or medium-density fiberboard core**] [**0.04-inch- (1.02-mm-) thick plastic sheet laminated to 3/8-inch- (9.5-mm-) thick particleboard or medium-density fiberboard core**] <**Insert description**>.
3. Sheet Size: [**48 by 96 inches (1219 by 2438 mm)**] [**48 by 108 inches (1219 by 2743 mm)**] [**48 by 120 inches (1219 by 3048 mm)**] [**As indicated**] <**Insert dimensions**>.
4. Height: [**Full wall**] [**Wainscot**] [**As indicated**] <**Insert dimension**>.
5. Sheet Edge: [**Square**] [**Beveled**].
6. Trim and Joint Moldings: Extruded rigid plastic that matches wall-covering color.
7. Color and Texture: [**As indicated by manufacturer's designations**] [**Match Architect's sample**] [**As selected by Architect from manufacturer's full range**] <**Insert color and texture**>.
8. Mounting: Adhesive.

2.9 PLASTIC DOOR-PROTECTION PLATES

A. General: Manufacturer's standard plastic products of thicknesses and sizes indicated.

1. <Double click here to find, evaluate, and insert list of manufacturers and products.>
2. Fire-Rated Doors: Where the tops of door-protection plates indicated for field installation on fire-rated doors are more than 16 inches (406 mm) above the door bottoms, provide door-protection plates complying with NFPA 80 that are listed and labeled by a qualified testing and inspection agency acceptable to authorities having jurisdiction.

B. Full-Height Door-Surface Protection <**Insert drawing designation**>: Minimum [**0.040-inch (1.0-mm)**] [**0.060-inch (1.5-mm)**] [**0.080-inch (2.0-mm)**] <**Insert dimension**> wall thickness; with 90-degree bend for edge return to protect door edge.

1. Color and Texture: [**As indicated by manufacturer's designations**] [**Match Architect's sample**] [**As selected by Architect from manufacturer's full range**] <**Insert color and texture**>.
2. Mounting: [**Adhesive**] [**Countersunk screws through factory-drilled mounting holes**].

C. Armor Plates <**Insert drawing designation**>: Minimum [**0.040-inch (1.0-mm)**] [**0.060-inch (1.5-mm)**] [**0.080-inch (2.0-mm)**] <**Insert dimension**> wall thickness; beveled four sides.

1. Size: [**32 inches (813 mm)**] [**36 inches (914 mm)**] [**40 inches (1016 mm)**] [**42 inches (1067 mm)**] <**Insert dimension**> high by door width, with allowance for frame stops.
2. Color and Texture: [**As indicated by manufacturer's designations**] [**Match Architect's sample**] [**As selected by Architect from manufacturer's full range**] <**Insert color and texture**>.
3. Mounting: [**Adhesive**] [**Countersunk screws through factory-drilled mounting holes**].

D. Kick Plates <**Insert drawing designation**>: Minimum [**0.040-inch (1.0-mm)**] [**0.060-inch (1.5-mm)**] [**0.080-inch (2.0-mm)**] <**Insert dimension**> wall thickness; beveled four sides.

1. Size: [**8 inches (203 mm)**] [**10 inches (254 mm)**] [**12 inches (305 mm)**] <**Insert dimension**> high by door width, with allowance for frame stops.
2. Color and Texture: [**As indicated by manufacturer's designations**] [**Match Architect's sample**] [**As selected by Architect from manufacturer's full range**] <**Insert color and texture**>.
3. Mounting: [**Adhesive**] [**Countersunk screws through factory-drilled mounting holes**].

E. Mop Plates <**Insert drawing designation**>: Minimum [**0.040-inch (1.0-mm)**] [**0.060-inch (1.5-mm)**] [**0.080-inch (2.0-mm)**] <**Insert dimension**> wall thickness; beveled four sides.

1. Size: [**4 inches (102 mm)**] [**6 inches (152 mm)**] <**Insert dimension**> high by 1 inch (25 mm) less than door width.
2. Color and Texture: [**As indicated by manufacturer's designations**] [**Match Architect's sample**] [**As selected by Architect from manufacturer's full range**] <**Insert color and texture**>.
3. Mounting: [**Adhesive**] [**Countersunk screws through factory-drilled mounting holes**].

F. Stretcher Plates <**Insert drawing designation**>: Minimum [**0.040-inch (1.0-mm)**] [**0.060-inch (1.5-mm)**] [**0.080-inch (2.0-mm)**] <**Insert dimension**> wall thickness; beveled four sides.

1. Size: [**6 inches (152 mm)**] [**8 inches (203 mm)**] <**Insert dimension**> high by door width, with allowance for frame stops.

2. Color and Texture: [**As indicated by manufacturer's designations**] [**Match Architect's sample**] [**As selected by Architect from manufacturer's full range**] <**Insert color and texture**>.
3. Mounting: [**Adhesive**] [**Countersunk screws through factory-drilled mounting holes**].

G. Push Plates <**Insert drawing designation**>: Minimum [**0.040-inch (1.0-mm)**] [**0.060-inch (1.5-mm)**] [**0.080-inch (2.0-mm)**] <**Insert dimension**> wall thickness; beveled four sides.

1. Size: [**12 inches high by 4 inches wide (305 mm high by 102 mm wide)**] [**16 inches high by 4 inches wide (406 mm high by 102 mm wide)**] <**Insert dimensions**>.
2. Color and Texture: [**As indicated by manufacturer's designations**] [**Match Architect's sample**] [**As selected by Architect from manufacturer's full range**] <**Insert color and texture**>.
3. Mounting: [**Adhesive**] [**Countersunk screws through factory-drilled mounting holes**].

2.10 DOOR-EDGE PROTECTION

A. Door Edging <**Insert drawing designation**>: Fabricated from extruded rigid plastic, minimum [**0.040-inch (1.0-mm)**] [**0.060-inch (1.5-mm)**] <**Insert dimension**> wall thickness; formed to fit over door edge without mortising.

1. <Double click here to find, evaluate, and insert list of manufacturers and products.>
2. Shape: [**L**] [**U**].
3. Color and Texture: [**As indicated by manufacturer's designations**] [**Match Architect's sample**] [**As selected by Architect from manufacturer's full range**] <**Insert color and texture**>.
4. Mounting: [**Adhesive**] [**Countersunk screws through factory-drilled mounting holes**].

2.11 DOOR-FRAME PROTECTION

A. Door-Frame Protector <**Insert drawing designation**>: One piece fabricated from extruded rigid plastic, minimum [**0.040-inch (1.0-mm)**] [**0.050-inch (1.3-mm)**] [**0.060-inch (1.5-mm)**] <**Insert dimension**> wall thickness; formed to fit entire door-frame profile.

1. <Double click here to find, evaluate, and insert list of manufacturers and products.>
2. Height: [**36 inches (914 mm)**] [**48 inches (1219 mm)**] <**Insert dimension**>.
3. Color and Texture: [**As indicated by manufacturer's designations**] [**Match Architect's sample**] [**As selected by Architect from manufacturer's full range**] <**Insert color and texture**>.
4. Mounting: [**Adhesive**] [**Countersunk screws through factory-drilled mounting holes**].

B. Door-Frame Protector Assembly <**Insert drawing designation**>: Assembly consisting of snap-on plastic cover installed over continuous retainer; formed to fit half of door frame on opposite side of door swing.

1. <Double click here to find, evaluate, and insert list of manufacturers and products.>
2. Cover: Extruded rigid plastic, minimum 0.080-inch (2.0-mm) wall thickness; in dimensions and profiles indicated.

a. Height: [**36 inches (914 mm)**] [**48 inches (1219 mm)**] <**Insert dimension**>.
b. Corner Radius: [**1/4 inch (6 mm)**] [**1-1/4 inches (32 mm)**].

c. Color and Texture: [**As indicated by manufacturer's designations**] [**Match Architect's sample**] [**As selected by Architect from manufacturer's full range**] <**Insert color and texture**>.

3. Retainer: Minimum 0.080-inch- (2.0-mm-) thick, one-piece, extruded aluminum.

2.12 DOOR-HARDWARE PROTECTION

A. Door[**-Knob**] [**and**] [**-Lever**] Protector <**Insert drawing designation**>: Fabricated from injection-molded plastic, minimum 0.060-inch (1.5-mm) wall thickness.

1. <Double click here to find, evaluate, and insert list of manufacturers and products.>
2. Color and Texture: [**As indicated by manufacturer's designations**] [**Match Architect's sample**] [**As selected by Architect from manufacturer's full range**] <**Insert color and texture**>.
3. Mounting: Countersunk screws through factory-drilled mounting holes.

2.13 MATERIALS

A. Plastic Materials: Chemical- and stain-resistant, high-impact-resistant plastic with integral color throughout; extruded and sheet material as required, thickness as indicated.

B. Polycarbonate Plastic Sheet: ASTM D6098, S-PC01, Class 1 or Class 2, abrasion resistant; with a minimum impact-resistance rating of 15 ft.-lbf/in. (800 J/m) of notch when tested according to ASTM D256, Test Method A.

C. Solid Wood: Clear hardwood lumber of species indicated, free of appearance defects, and selected for compatible grain and color.

1. <Double click to insert sustainable design text for certified wood.>

D. <Double click to insert sustainable design text for composite wood products.>

E. Fasteners: Aluminum, nonmagnetic stainless-steel, or other noncorrosive metal screws, bolts, and other fasteners compatible with items being fastened. Use security-type fasteners where exposed to view.

F. Adhesive: As recommended by protection product manufacturer.

1. <Double click to insert sustainable design text for VOC content of adhesive.>
2. <Double click to insert sustainable design text for low emitting adhesives.>

2.14 FABRICATION

A. Fabricate wall and door protection according to requirements indicated for design, performance, dimensions, and member sizes, including thicknesses of components.

B. Curved Panels: Preform curved semirigid, abuse-resistant sheet wall covering in factory for radius and sheet thickness as follows:

1. Sheet Thickness of 0.040 Inch (1.0 mm): 24-inch (610-mm) radius.
2. Sheet Thickness of 0.060 Inch (1.5 mm): 36-inch (914-mm) radius.

3. <**Insert thickness and radius**>.

C. Factory Assembly: Assemble components in factory to greatest extent possible to minimize field assembly. Disassemble only as necessary for shipping and handling.

D. Quality: Fabricate components with uniformly tight seams and joints and with exposed edges rolled. Provide surfaces free of wrinkles, chips, dents, uneven coloration, and other imperfections. Fabricate members and fittings to produce flush, smooth, and rigid hairline joints.

E. Wood Handrails: Miter corners and ends of wood handrails for returns.

2.15 FINISHES

A. Protect finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and wall areas, with Installer present, for compliance with requirements for installation tolerances[**, fire rating,**] and other conditions affecting performance of the Work.

B. Examine walls to which wall and door protection will be attached for blocking, grounds, and other solid backing that have been installed in the locations required for secure attachment of support fasteners.

1. For wall and door protection attached with adhesive, verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Complete finishing operations, including painting, before installing wall and door protection.

B. Before installation, clean substrate to remove dust, debris, and loose particles.

3.3 INSTALLATION

A. Installation Quality: Install wall and door protection according to manufacturer's written instructions, level, plumb, and true to line without distortions. Do not use materials with chips, cracks, voids, stains, or other defects that might be visible in the finished Work.

B. Mounting Heights: Install wall and door protection in locations and at mounting heights indicated on Drawings.[**If not indicated on Drawings, install at heights indicated below:**]

1. Crash Rails: <**Insert dimension**> above finished floor.
2. Bumper Rails: <**Insert dimension**> above finished floor.
3. Rub Rails: <**Insert dimension**> above finished floor.
4. Chair Rails: <**Insert dimension**> above finished floor.
5. Handrails: <**Insert dimension**> above finished floor.
6. Bed Locators: <**Insert dimension**> above finished floor.

C. Accessories: Provide splices, mounting hardware, anchors, trim, joint moldings, and other accessories required for a complete installation.

1. Provide anchoring devices and suitable locations to withstand imposed loads.
2. Where splices occur in horizontal runs of more than 20 feet (6.1 m), splice aluminum retainers and plastic covers at different locations along the run, but no closer than 12 inches (305 mm) apart.
3. Adjust [**end**] [**and**] [**top**] caps as required to ensure tight seams.

D. Abuse-Resistant Wall Covering: Install top and edge moldings, corners, and divider bars as required for a complete installation.

E. Door-Frame Protectors: Install on both door jams.

F. Fire Doors: Install protection according to the listing of each item.

3.4 CLEANING

A. Immediately after completion of installation, clean plastic covers and accessories using a standard ammonia-based household cleaning agent.

B. Remove excess adhesive using methods and materials recommended in writing by manufacturer.

END OF SECTION 102600

SECTION 10431 - SIGNAGE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Plaques.
2. Panel signs.

B. Related Sections include the following:

1. Division 1 Section "Temporary Facilities and Controls" for temporary Project identification signs and for temporary information and directional signs.
2. Division 14 Section "Electric Traction Elevators" for code-required elevator signage.
3. Division 15 Section "Mechanical Identification" for labels, tags, and nameplates for mechanical equipment.
4. Division 16 Sections for electrical service and connections for illuminated signs.
5. Division 16 Section "Electrical Identification" for labels, tags, and nameplates for electrical equipment.
6. Division 16 Section "Interior Lighting" for illuminated Exit signs.

1.3 DEFINITIONS

A. ADA-ABA Accessibility Guidelines: U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities; Architectural Barriers Act (ABA) Accessibility Guidelines."

1.4 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: Show fabrication and installation details for signs.

1. Show sign mounting heights, locations of supplementary supports to be provided by others, and accessories.
2. Provide message list, typestyles, graphic elements, including tactile characters and Braille, and layout for each sign.
3. Wiring Diagrams: Power, signal, and control wiring.

C. Samples for Initial Selection: Manufacturer's color charts consisting of actual units or sections of units showing the full range of colors available.

D. Samples for Verification: For each of the following products and for the full range of color, texture, and sign material indicated, of sizes indicated:

1. Plaque[Casting]: 6 inches square including border.
2. Panel Signs: Not less than 12 inches square including border.

E. Sign Schedule: Use same designations indicated on Drawings.

F. Qualification Data: For Installer and fabricator.

G. Maintenance Data: For signs to include in maintenance manuals.

H. Warranty: Special warranty specified in this Section.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Fabricator of products

B. Fabricator Qualifications: Shop that employs skilled workers who custom-fabricate products similar to those required for this Project and whose products have a record of successful in-service performance.

C. Source Limitations for Signs: Obtain each sign type indicated from one source from a single manufacturer.

D. Regulatory Requirements: Comply with applicable provisions in [ADA-ABA Accessibility Guidelines] [and] [ICC/ANSI A117.1].

E. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

1.6 PROJECT CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit installation of signs in exterior locations to be performed according to manufacturers' written instructions and warranty requirements.

B. Field Measurements: Verify recess openings by field measurements before fabrication and indicate measurements on Shop Drawings.

1.7 COORDINATION

A. Coordinate placement of anchorage devices with templates for installing signs.

1.8 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of signs that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

   a. Deterioration of metal finishes beyond normal weathering.
   b. Deterioration of embedded graphic image colors and sign lamination

2. Warranty Period: **Five** years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Aluminum Castings: ASTM B 26/B 26M, of alloy and temper recommended by sign manufacturer for casting process used and for use and finish indicated.

B. Aluminum Sheet and Plate: ASTM B 209 (ASTM B 209M), alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated, and with at least the strength and durability properties of Alloy 5005-H32.

C. Aluminum Extrusions: ASTM B 221 (ASTM B 221M), alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated, and with at least the strength and durability properties of Alloy 6063-T5.

D. Brass Castings: ASTM B 584, Alloy UNS No. C85200 (high-copper yellow brass).

E. Brass, Yellow, Sheet: ASTM B 36/B 36M, Alloy UNS No. C26000.

F. Bronze Castings: ASTM B 584, Alloy UNS No. C86500 (No. 1 manganese bronze).

G. Bronze Plate: ASTM B 36/B 36M.

H. Copper Sheet: ASTM B 152/B 152M.

I. Steel:

1. Galvanized Steel Sheet: ASTM A 653/A 653M, G90 (Z275) coating, either commercial or forming steel.
2. Stainless-Steel Sheet: ASTM A 240/A 240M or ASTM A 666, Type [**304**] [**316**], stretcher-leveled standard of flatness.
3. Steel Members Fabricated from Plate or Bar Stock: ASTM A 529/A 529M or ASTM A 572/A 572M, 42,000-psi (290-MPa) minimum yield strength.
4. For steel exposed to view on completion, provide materials having flat, smooth surfaces without blemishes. Do not use materials whose surfaces exhibit pitting, seam marks, roller marks, rolled trade names, or roughness.

J. Fiberglass Sheet: Molded, seamless, thermosetting, glass-fiber-reinforced polyester panels with a minimum tensile strength of 15,000 psi (103 MPa) when tested according to ASTM D 638 and with a minimum flexural strength of 30,000 psi (207 MPa) when tested according to ASTM D 790.

K. Acrylic Sheet: ASTM D 4802, Category A-1 (cell-cast sheet), Type UVA (UV absorbing).

L. Polycarbonate Sheet: Of thickness indicated, manufactured by extrusion process, coated on both surfaces with abrasion-resistant coating:

1. Impact Resistance: 16 ft-lbf/in. (854 J/m) per ASTM D 256, Method A.
2. Tensile Strength: 9000 lbf/sq. in. (62 MPa) per ASTM D 638.
3. Flexural Modulus of Elasticity: 340,000 lbf/sq. in. (2345 MPa) per ASTM D 790.
4. Heat Deflection: 265 deg F (129 deg C) at 264 lbf/sq. in. (1.82 MPa) per ASTM D 648.
5. Abrasion Resistance: 1.5 percent maximum haze increase for 100 revolutions of a Taber abraser with a load of 500 g per ASTM D 1044.

M. Applied Vinyl: Die-cut characters from vinyl film of nominal thickness of 3 mils (0.076 mm) with pressure-sensitive adhesive backing, suitable for exterior applications.

2.2 PLAQUES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Advance Corporation; Braille-Tac Division.
2. A. R. K. Ramos.
3. Gemini Incorporated.
4. Matthews International Corporation; Bronze Division.
5. Metal Arts; Div. of L&H Mfg. Co.
6. Mills Manufacturing Company.
7. Nelson-Harkins Industries.
8. Southwell Company (The).

B. Cast Plaques: Provide castings free of pits, scale, sand holes, and other defects, as follows:

1. Plaque Material: Bronze.
2. Background Texture: Manufacturer's standard leatherette > texture.
3. Border Style: Square, polished >.
4. Mounting: Concealed studs**,** noncorroding for substrates encountered.

C. Plaque Schedule:

1. Plaque Type Entry Vestibule:

   a. Plaque Size: 24”w x 36”h X 3/4” d
   b. Character Size: TBD
   c. Character Finish/Color: Dark oxidized background/satin bronze raised areas.
   d. Text/Message: TBD
   e. Location: Entry Vestibule
   f. Quantity: 1

2.3 PANEL SIGNS

1. Basis-of-Design Product: Provide ASI InTouch from ASI Signage Innovations or comparable products by one of the following**;** ASI Signage Innovations, Inc.
2. Best Sign Systems Inc.
3. Gemini Incorporated.
4. Innerface Sign Systems, Inc.
5. Mohawk Sign Systems.

2.4 SIGN MATERIALS

A. Sign Face: High impact P95 frosted cast acrylic with 3d printed text and braille.

B. Tactile Graphics and Text: Provide tactile copy (and Grade II braille) raised 1/32" minimum from plaque surface using manufacturer's 3d printing technology
   1. Provide lettering and graphics precisely formed, uniformly opaque to comply with relevant ADA regulations and requirements indicated for size, style, spacing, content, position, and colors.
   2. Colors: Background color is second surface painted. Text Color is Intregrally colored and printed first surface. Silkscreened text is not allowed.
   3. Non- climate-controlled environments (stairwells, exterior, etc.) to use ASIntac method with applied characters and raster braille or ASI SPE Series

C. Sign Types and Quantities
   1. Restroom ID
      a. ASIntouch III
      b. 8"h x 6"wx 3/8" thick
      c. Taped mounted
   2. Room ID signs for Electrical, Mechanical and Janitor Spaces
      a. ASIntouch III
      b. 8"h x 8"wx 3/8" thick
      c. Taped Mounted
   3. Office/Room Signs
      a. ASIntouch III
      b. 9.5" w x 7" h x 3/8" thick
      c. Tape Mounted
   4. Projecting Restroom Sign
      a. ASIntouch II Sign w/ T-Fixture Bracket
      b. 8"h x 8"w x .064" thick ASIntouch III Plaque
      c. Screw mount
   5. Directional ID (2 quantity)
      a. ASIntouch III
      b. 10" h x 10" w x 3/8" thick
      c. Tape Mounted
   6. Changeable Message Sign (4 quantity)
      a. ASItouch III
      b. 10" h x 10" w x 3/8" thick
      c. Tape Mounted
   7. Maximum Occupancy (4 quantity)
      a. ASIntouch III
      b. 8" w x 8" h x 3/8" thick
      c. Tape Mounted

D. FABRICATION – GENERAL
   1. General: Comply with requirements indicated for materials, thicknesses, finishes, colors, designs, shapes, and details of construction.
   2. Preassemble signs in the shop o the greatest extend possible to minimize field assembly.

Disassemble signs only as necessary for shipping and handling limitations. Clearly mark units for reassembly and installation, in a location not exposed to view after final assembly.

3. Conceal fasteners if possible; otherwise, locate fasteners to appear inconspicuous.
4. Form panels to require size and shape. Comply with requirements indicated for design, dimensions, finish, color and details of construction.
5. Coordinate dimensions and attachment methods to produce message panels with closely fitting joints. Align edges and surfaces with one another in the relationship indicated.

E. INSTALLATION METHOD

1. Panel Signage:

Tape Mount or Screw Mount w/ Counter Sunk Holes and Silicone. Signs on glass to have vinyl backer. Backers to have counter sunk holes with face piece tape mounted over backer to conceal mounting.

F.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Site Verification of Conditions: Verify installation conditions previously established under other sections area acceptable for product installation in accordance with the manufacturer's instructions.performance of work.

B. Scheduling of installation by Owner or its representative implies that substrate and conditions are prepared and ready for product installation. Proceeding with installation implied installer's acceptance of substrate and conditions.

3.2 INSTALLATION

A. Install product in accordance with supplier's instruction

B. Install product in locations indicated using mounting methods recommended by manufacturers and free from distortion, warp, or defect adversely affecting appearance.

C. Install product at heights to conform to Americans with Disabilities Act Accessibility Guidelines (ADAAG) and applicable local amendments and regulations.

D. Install signs within the following tolerances and in accordance with manufacturer's recommendations.

1. Within ¼" vertically and horizontally of intended location.

E. Cast-Metal Plaques: Mount plaques using standard fastening methods to comply with manufacturer's written instructions for type of wall surface indicated.

1. Concealed Mounting: Mount plaques by inserting threaded studs into tapped lugs on back of plaque. Set in predrilled holes filled with quick-setting cement.
2. Face Mounting: Mount plaques using exposed fasteners with rosettes attached through face of plaque into wall surface.

3.3 CLEANING AND PROTECTION

A. Repair scratched and other damage which might have occurred during installation. Replace components where repairs were made but are still visible to the unaided eye from a distance of 5 feet.

B. Remove temporary coverings and protection to adjacent work areas. Clean installed products in accordance with manufacturer’s instructions prior to Owner’s acceptance. Remove construction debris from project in accordance with provisions in Division 1.

C. After installation, clean soiled sign surfaces according to manufacturer's written instructions. Protect signs from damage until acceptance by Owner.

SECTION 10432 - DIMENSIONAL LETTER SIGNAGE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Exterior Cast dimensional characters.

1.3 ACTION SUBMITTALS

A. Shop Drawings: For dimensional letter signs.

1. Include fabrication and installation details and attachments to other work.
2. Show sign mounting heights, locations of supplementary supports to be provided by others, and accessories.
3. Show message list, typestyles, graphic elements, and layout for each sign at least half size.

B. Samples for Verification: For each type of sign assembly showing all components and with the required finish(es), in manufacturer's standard size unless otherwise indicated and as follows:

1. Dimensional Characters: Half-size Sample of dimensional character.
2. Exposed Accessories: Half-size Sample of each accessory type.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer and manufacturer.

B. Sample Warranty: For special warranty.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For signs to include in maintenance manuals.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.

1.7 FIELD CONDITIONS

A. Field Measurements: Verify locations of electrical service embedded in permanent construction by other installers by field measurements before fabrication, and indicate measurements on Shop Drawings.

1.8 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of signs that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Deterioration of finishes beyond normal weathering.
b. Separation or delamination of sheet materials and components.

2. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 DIMENSIONAL LETTER SIGNS, GENERAL

2.2 DIMENSIONAL CHARACTERS

A. Cast Characters for signage on Main Entrance Courtyard Fence: Characters with uniform faces, sharp corners, and precisely formed lines and profiles, and as follows:
1. Basis-of-Design Product: Subject to compliance with requirements, provide A.R.K. Ramos Cast metal letters or comparable product by one of the following:

a. ACE Sign Systems, Inc.
b. Allen Markings International.
c. APCO Graphics, Inc.
d. ASI Sign Systems, Inc.
e. Diskey Sign Company.
f. Gemini Incorporated.
g. Matthews International Corporation; Bronze Division.
h. Metal Arts; Division of L & H Mfg. Co.
i. Metallic Arts.
j. Seton Identification Products.
k. Southwell Company (The).

2. Character Material: Cast aluminum.
3. Character Height: As indicated.
4. Thickness: Manufacturer's standard for size of character.
5. Finishes:
   a. Integral Aluminum Finish: Clear anodized .

6. Mounting: Projected mount bolted from the rear.
7. Typeface: Futura or architect approved equal.

2.3 DIMENSIONAL CHARACTER MATERIALS

A. Aluminum Castings: ASTM B 26/B 26M, alloy and temper recommended by sign manufacturer for casting process used and for type of use and finish indicated.

B. Aluminum Sheet and Plate: ASTM B 209 (ASTM B 209M), alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated.

C. Aluminum Extrusions: ASTM B 221 (ASTM B 221M), alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated.

2.4 ACCESSORIES

A. Fasteners and Anchors: Manufacturer's standard as required for secure anchorage of signage, noncorrosive and compatible with each material joined, and complying with the following:

1. Use concealed fasteners and anchors unless indicated to be exposed.
2. For exterior exposure, furnish stainless-steel devices unless otherwise indicated.
3. Exposed Metal-Fastener Components, General:

   a. Fabricated from same basic metal and finish of fastened metal unless otherwise indicated.
   b. Fastener Heads: For nonstructural connections, use flathead screws and bolts with tamper-resistant slots unless otherwise indicated.

4. Sign Mounting Fasteners:
   a. Projecting Studs: Threaded studs with sleeve spacer, welded or brazed to back of sign material, screwed into back of sign assembly, or screwed into tapped lugs cast integrally into back of cast sign material, unless otherwise indicated.
   b. Through Fasteners: Exposed metal fasteners matching sign finish, with type of head indicated, installed in predrilled holes.

B. Adhesives: As recommended by sign manufacturer and that comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

2.5 FABRICATION

A. General: Provide manufacturer's standard sign assemblies according to requirements indicated.

1. Preassemble signs and assemblies in the shop to greatest extent possible. Disassemble signs and assemblies only as necessary for shipping and handling limitations. Clearly mark units for reassembly and installation; apply markings in locations concealed from view after final assembly.
2. Mill joints to a tight, hairline fit. Form assemblies and joints exposed to weather to resist water penetration and retention.
3. Comply with AWS for recommended practices in welding and brazing. Provide welds and brazes behind finished surfaces without distorting or discoloring exposed side. Clean exposed welded and brazed connections of flux, and dress exposed and contact surfaces.
4. Conceal connections if possible; otherwise, locate connections where they are inconspicuous.
5. Internally brace signs for stability and for securing fasteners.
6. Provide rebates, lugs, and brackets necessary to assemble components and to attach to existing work. Drill and tap for required fasteners. Use concealed fasteners where possible; use exposed fasteners that match sign finish.
7. Castings: Fabricate castings free of warp, cracks, blowholes, pits, scale, sand holes, and other defects that impair appearance or strength. Grind, wire brush, sandblast, and buff castings to remove seams, gate marks, casting flash, and other casting marks before finishing.

B. Brackets: Fabricate brackets, fittings, and hardware for bracket-mounted signs to suit sign construction and mounting conditions indicated. Modify manufacturer's standard brackets as required.

2.6 GENERAL FINISH REQUIREMENTS

A. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

C. Directional Finishes: Run grain with long dimension of each piece and perpendicular to long dimension of finished trim or border surface unless otherwise indicated.

D. Organic, Anodic, and Chemically Produced Finishes: Apply to formed metal after fabrication but before applying contrasting polished finishes on raised features unless otherwise indicated.

2.7 ALUMINUM FINISHES

A. Clear Anodic Finish: AAMA 611, Class I, 0.018 mm or thicker.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of signage work.

B. Verify that sign-support surfaces are within tolerances to accommodate signs without gaps or irregularities between backs of signs and support surfaces unless otherwise indicated.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. General: Install signs using mounting methods indicated and according to manufacturer's written instructions.

1. Install signs level, plumb, true to line, and at locations and heights indicated, with sign surfaces free of distortion and other defects in appearance.
2. Before installation, verify that sign surfaces are clean and free of materials or debris that would impair installation.
3. Corrosion Protection: Coat concealed surfaces of exterior aluminum in contact with grout, concrete, masonry, wood, or dissimilar metals, with a heavy coat of bituminous paint.

B. Mounting Methods:

1. Projecting Studs: Using a template, drill holes in substrate aligning with studs on back of sign. Remove loose debris from hole and substrate surface.
   a. Thin or Hollow Surfaces: Place spacers on studs, place sign in position with spacers pinched between sign and substrate, and install washers and nuts on stud ends projecting through opposite side of surface, and tighten.

2. Through Fasteners: Drill holes in substrate using predrilled holes in sign as template. Countersink holes in sign if required. Place sign in position and flush to surface. Install through fasteners and tighten.

3.3 ADJUSTING AND CLEANING

A. Remove and replace damaged or deformed characters and signs that do not comply with specified requirements. Replace characters with damaged or deteriorated finishes

or components that cannot be successfully repaired by finish touchup or similar minor repair procedures.

B. Remove temporary protective coverings and strippable films as signs are installed.

C. On completion of installation, clean exposed surfaces of signs according to manufacturer's written instructions, and touch up minor nicks and abrasions in finish. Maintain signs in a clean condition during construction and protect from damage until acceptance by Owner.

END OF SECTION 10432

SECTION 10522 - FIRE EXTINGUISHER CABINETS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Fire protection cabinets for the following:

a. Portable fire extinguishers.

B. Related Sections:
1. Section 10523 "Fire Extinguishers."

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for fire protection cabinets.

1. Fire Protection Cabinets: Include roughing-in dimensions, details showing mounting methods, relationships of box and trim to surrounding construction, door hardware, cabinet type, trim style, and panel style.

1.4 CLOSEOUT SUBMITTALS

A. Maintenance Data: For fire protection cabinets to include in maintenance manuals.

1.5 COORDINATION

A. Coordinate size of fire protection cabinets to ensure that type and capacity of fire extinguishers indicated are accommodated.

B. Coordinate sizes and locations of fire protection cabinets with wall depths.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B.

B. Aluminum: Alloy and temper recommended by aluminum producer and manufacturer for type of use and finish indicated, and as follows:

1. Sheet: ASTM B 209 (ASTM B 209M).
2. Extruded Shapes: ASTM B 221 (ASTM B 221M).

C. Tempered Float Glass: ASTM C 1048, Kind FT, Condition A, Type I, Quality q3, 3 mm thick, Class 1 (clear).

2.2 FIRE PROTECTION CABINET

A. Cabinet Type: Suitable for fire extinguisher.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
   a. J. L. Industries, Inc., a division of Activar Construction Products Group; Ambassador or Academy Series.

B. Cabinet Construction: Nonrated.

C. Cabinet Material: Steel or Aluminum sheet.

1. Shelf: Same metal and finish as cabinet.

D. Recessed Cabinet: Cabinet box recessed in walls of sufficient depth to suit style of trim indicated.
1. Exposed Flat Trim: One-piece combination trim and perimeter door frame overlapping surrounding wall surface with exposed trim face and wall return at outer edge (backbend).

E. Cabinet Trim Material: Same material and finish as door.

F. Door Material: Steel sheet or Aluminum sheet .

G. Door Style: Vertical duo panel with frame .

H. Door Glazing: Tempered float glass (clear) .

I. Door Hardware: Manufacturer's standard door-operating hardware of proper type for cabinet type, trim style, and door material and style indicated.

1. Provide manufacturer's standard.
2. Provide manufacturer's standard hinge permitting door to open 180 degrees.

J. Accessories:

1. Mounting Bracket: Manufacturer's standard steel, designed to secure fire extinguisher to fire protection cabinet, of sizes required for types and capacities of fire extinguishers indicated, with plated or baked-enamel finish.
2. Door Lock: Cam lock that allows door to be opened during emergency by pulling sharply on door handle.
3. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location. Locate as indicated.

    a. Identify fire extinguisher in fire protection cabinet with the words "FIRE EXTINGUISHER."

        1) Location: Applied to cabinet door .
        2) Application Process: Engraved.
        3) Lettering Color: Red.
        4) Orientation: Horizontal.

4. Alarm: Manufacturer's standard alarm that actuates when fire protection cabinet door is opened and that is powered by low voltage, complete with transformer.

K. Finishes:

1. Manufacturer's standard baked-enamel paint for the following:

    a. Exterior of cabinet, door, and trim except for those surfaces indicated to receive another finish.
    b. Interior of cabinet and door.

2. Aluminum: Clear anodic .
3. Steel: Baked enamel or powder coat.

2.3 FABRICATION

A. Fire Protection Cabinets: Provide manufacturer's standard box (tub) with trim, frame, door, and hardware to suit cabinet type, trim style, and door style indicated.

1. Weld joints and grind smooth.
2. Provide factory-drilled mounting holes.
3. Prepare doors and frames to receive locks.
4. Install door locks at factory.

B. Cabinet Doors: Fabricate doors according to manufacturer's standards, from materials indicated and coordinated with cabinet types and trim styles selected.

1. Fabricate door frames with tubular stiles and rails and hollow-metal design, minimum 1/2 inch (13 mm) thick.
2. Miter and weld perimeter door frames.

C. Cabinet Trim: Fabricate cabinet trim in one piece with corners mitered, welded, and ground smooth.

2.4 GENERAL FINISH REQUIREMENTS

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Protect mechanical finishes on exposed surfaces of fire protection cabinets from damage by applying a strippable, temporary protective covering before shipping.

C. Finish fire protection cabinets after assembly.

D. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.5 ALUMINUM FINISHES

A. Clear Anodic Finish: AAMA 611, AA-M12C22A41, Class I, 0.018 mm or thicker.

2.6 STEEL FINISHES

A. Surface Preparation: Remove mill scale and rust, if present, from uncoated steel, complying with SSPC-SP 5/NACE No. 1, "White Metal Blast Cleaning" . After cleaning, apply a conversion coating suited to the organic coating to be applied over it.

B. Factory Prime Finish: Apply manufacturer's standard, fast-curing, lead- and chromate-free, universal primer immediately after surface preparation and pretreatment.

C. Baked-Enamel or Powder-Coat Finish: Immediately after cleaning and pretreating, apply manufacturer's standard two-coat, baked-on finish consisting of prime coat and thermosetting topcoat. Comply with coating manufacturer's written instructions for applying and baking to achieve a minimum dry film thickness of 2 mils (0.05 mm).

1. Color and Gloss: As selected by Architect from manufacturer's full range.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine walls and partitions for suitable framing depth and blocking where recessed and semirecessed cabinets will be installed.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Prepare recesses for recessed and semirecessedfire protection cabinets as required by type and size of cabinet and trim style.

3.3 INSTALLATION

A. General: Install fire protection cabinets in locations and at mounting heights indicated or, if not indicated, at heights acceptable to authorities having jurisdiction.

1. Fire Protection Cabinets: 54 inches (1372 mm) above finished floor to top of cabinet.

B. Fire Protection Cabinets: Fasten cabinets to structure, square and plumb.

1. Unless otherwise indicated, provide recessed fire protection cabinets. If wall thickness is not adequate for recessed cabinets, provide semirecessed fire protection cabinets.
2. Provide inside latch and lock for break-glass panels.
3. Fasten mounting brackets to inside surface of fire protection cabinets, square and plumb.

3.4 ADJUSTING AND CLEANING

A. Remove temporary protective coverings and strippable films, if any, as fire protection cabinets are installed unless otherwise indicated in manufacturer's written installation instructions.

B. Adjust fire protection cabinet doors to operate easily without binding. Verify that integral locking devices operate properly.

C. On completion of fire protection cabinet installation, clean interior and exterior surfaces as recommended by manufacturer.

D. Touch up marred finishes, or replace fire protection cabinets that cannot be restored to factory-finished appearance. Use only materials and procedures recommended or furnished by fire protection cabinet and mounting bracket manufacturers.

E. Replace fire protection cabinets that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 10522

SECTION 10523 - FIRE EXTINGUISHERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes portable, hand-carried fire extinguishers and mounting brackets for fire extinguishers.

B. Related Sections:

1. Section 10522 "Fire Extinguisher Cabinets."
2. Section 15870 "Commercial Kitchen Hoods" for fire extinguishing systems provided as part of commercial kitchen exhaust hoods.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated. Include rating and classification, material descriptions, dimensions of individual components and profiles, and finishes for fire extinguisher and mounting brackets.

B. Product Schedule: For fire extinguishers. Coordinate final fire extinguisher schedule with fire protection cabinet schedule to ensure proper fit and function.

1.4 INFORMATIONAL SUBMITTALS

A. Warranty: Sample of special warranty.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For fire extinguishers to include in maintenance manuals.

1.6 QUALITY ASSURANCE

A. NFPA Compliance: Fabricate and label fire extinguishers to comply with NFPA 10, "Portable Fire Extinguishers."

B. Fire Extinguishers: Listed and labeled for type, rating, and classification by an independent testing agency acceptable to authorities having jurisdiction.

1. Provide fire extinguishers approved, listed, and labeled by FMG.

1.7 COORDINATION

A. Coordinate type and capacity of fire extinguishers with fire protection cabinets to ensure fit and function.

1.8 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace fire extinguishers that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Failure of hydrostatic test according to NFPA 10.
b. Faulty operation of valves or release levers.

2. Warranty Period: Six years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PORTABLE, HAND-CARRIED FIRE EXTINGUISHERS

A. Fire Extinguishers: Type, size, and capacity for each fire protection cabinet and mounting bracket indicated.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. Amerex Corporation.
b. Ansul Incorporated; Tyco International Ltd.
c. Badger Fire Protection; a Kidde company.
d. Buckeye Fire Equipment Company.
e. Fire End & Croker Corporation.
f. J. L. Industries, Inc.; a division of Activar Construction Products Group.
g. Kidde Residential and Commercial Division; Subsidiary of Kidde plc.
h. Larsen's Manufacturing Company.
i. Moon-American.
j. Pem All Fire Extinguisher Corp.; a division of PEM Systems, Inc.
k. Potter Roemer LLC.
l. Pyro-Chem; Tyco Safety Products.

2. Valves: Manufacturer's standard.
3. Handles and Levers: Manufacturer's standard.
4. Instruction Labels: Include pictorial marking system complying with NFPA 10, Appendix B and bar coding for documenting fire extinguisher location, inspections, maintenance, and recharging.

B. Stored-Pressure Water Type: UL-rated 2-A, 2.5-gal. (9.5-L) nominal capacity, with water in stainless-steel container; with pressure-indicating gage.

2.2 MOUNTING BRACKETS

A. Mounting Brackets: Manufacturer's standard steel, designed to secure fire extinguisher to wall or structure, of sizes required for types and capacities of fire extinguishers indicated, with plated or red baked-enamel finish.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. Amerex Corporation.
b. Ansul Incorporated; Tyco International Ltd.
c. Badger Fire Protection; a Kidde company.
d. Buckeye Fire Equipment Company.
e. Fire End & Croker Corporation.
f. J. L. Industries, Inc.; a division of Activar Construction Products Group.
g. Larsen's Manufacturing Company.
h. Potter Roemer LLC.

B. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location. Locate as indicated by Architect.

1. Identify bracket-mounted fire extinguishers with the words "FIRE EXTINGUISHER" in red letter decals applied to mounting surface.

a. Orientation: Vertical.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine fire extinguishers for proper charging and tagging.

1. Remove and replace damaged, defective, or undercharged fire extinguishers.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. General: Install fire extinguishers and mounting brackets in locations indicated and in compliance with requirements of authorities having jurisdiction.

1. Mounting Brackets: 54 inches (1372 mm) above finished floor to top of fire extinguisher.

B. Mounting Brackets: Fasten mounting brackets to surfaces, square and plumb, at locations indicated.

END OF SECTION 10523

INSERT OPERABLE PANEL PARTITIONS

SECTION 10651 - OPERABLE PANEL PARTITIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Manually operated, acoustical panel partitions.

B. Related Requirements:

1. Section 07 "Metal Fabrications" for supports that attach supporting tracks to overhead structural system.
2. Section 09 "Gypsum Board" for fire-rated assemblies and sound barrier construction above the ceiling at track.

1.3 DEFINITIONS

A. NIC: Noise Isolation Class.

B. NRC: Noise Reduction Coefficient.

C. STC: Sound Transmission Class.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For operable panel partitions.

1. Include plans, elevations, sections, details, numbered panel installation sequence, and attachments to other work.
2. Indicate stacking and operating clearances. Indicate location and installation requirements for hardware and track, blocking, and direction of travel.

C. Samples for Initial Selection: For each type of exposed material, finish, covering, or facing.

1. Include Samples of accessories involving color selection.

D. Samples for Verification: For each type of exposed material, finish, covering, or facing, prepared on Samples of size indicated below:
1. Panel Facing Material: Manufacturer's standard-size unit, not less than 3 inches (75 mm) square.
2. Panel Edge Material: Not less than 3 inches (75 mm) long.
3. Chair Rail: Manufacturer's standard-size unit, 6 inches (150 mm) long.
4. Hardware: One of each exposed door-operating device.
5. Color samples demonstrating full range of finishes and available to architect. Verification samples will be available in same thickness and material indicated for Work.

E. Delegated-Design Submittal: For operable panel partitions.

1. Include design calculations for seismic restraints.

1.6 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Reflected ceiling plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:

1. Partition track, track supports and bracing, switches, turning space, and storage layout.
2. Suspended ceiling components.
3. Structural members to which suspension systems are attached.
4. Size and location of initial access modules for acoustical tile.
5. Items penetrating finished ceiling, including the following:

a. Lighting fixtures.
b. HVAC ductwork, outlets, and inlets.
c. Speakers.
d. Sprinklers.
e. Smoke detectors.
f. Access panels.

6. Plenum acoustical barriers.

1. Setting Drawings: For embedded items and cutouts required in other work, including support-beam, mounting-hole template, including support beam punching template.

B. Qualification Data: For qualified Installer manufacturer and vendor.

C. Seismic Qualification Certificates: For operable panel partitions, tracks, accessories, and components, from manufacturer. Include seismic capacity of partition assemblies to remain in vertical position during a seismic event and the following:

1. Basis for Certification: Indicate whether certification is based on analysis, testing, or experience data, according to ASCE/SEI 7.
2. Detailed description of partition anchorage devices on which the certification is based and their installation requirements.

D. Product Certificates: For each type of operable panel partition.

1. Include approval letter signed by manufacturer acknowledging Owner-furnished panel facing material complies with requirements.

E. Product Test Reports: For each operable panel partition, for tests performed by a qualified testing agency.

F. Field quality-control reports.

G. Sample Warranty: For manufacturer's special warranty.

1.7 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For operable panel partitions to include in maintenance manuals.

1. In addition to items specified in Section 01770 "Closeout Procedures," include the following:

a. Panel finish facings and finishes for exposed trim and accessories. Include precautions for cleaning materials and methods that could be detrimental to finishes and performance.
b. Seals, hardware, track, track switches, carriers, and other operating components.

1.8 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials, from the same production run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Panel Finish-Facing Material: Furnish full width in quantity to cover both sides of two panels when installed.

1.9 QUALITY ASSURANCE

A. Manufacturer Qualifications: A qualified manufacturer that is certified for chain of custody by an FSC-accredited certification body.

B. Vendor Qualifications: A vendor that is certified for chain of custody by an FSC-accredited certification body.

C. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.

D. Acoustical Performance: Test operable partitions in an independent acoustical laboratory in accordance with ASTM E90 test procedure to attain no less than the STC rating specified. Provide a complete and unedited written test report by the testing laboratory upon request.

E. Preparation of the opening shall conform to the criteria set forth per ASTM E557 “Standard Practice for Architectural Application and Installation of Operable Partitions.”

1.10 DELIVERY, STORAGE, AND HANDLING

A. Protectively package and sequence panels in order for installation. Clearly mark packages and panels with numbering system used on Shop Drawings. Do not use permanent markings on panels.

1.11 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of operable panel partitions that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

   a. Faulty operation of operable panel partitions.
   b. Deterioration of metals, metal finishes, and other materials beyond normal use.

2. Warranty Period: Two years from date of Substantial Completion. Track warranty: 5 years from date of substantial completion

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer, as defined in Section 01400 "Quality Requirements," to design seismic bracing of tracks to structure above.

B. Acoustical Performance: Provide operable panel partitions tested by a qualified testing agency for the following acoustical properties according to test methods indicated:

1. Sound-Transmission Requirements: Operable panel partition assembly tested for laboratory sound-transmission loss performance according to ASTM E 90, determined by ASTM E 413, and rated for not less than the STC indicated.
2. Noise-Reduction Requirements: Operable panel partition assembly, identical to partition tested for STC, tested for sound-absorption performance according to ASTM C 423, and rated for not less than the NRC indicated.
3. Noise-Isolation Requirements: Installed operable panel partition assembly, identical to partition tested for STC, tested for NIC according to ASTM E 336, determined by ASTM E 413, and rated for 10 dB less than STC value indicated.

C. Fire-Test-Response Characteristics: Provide panels with finishes complying with one of the following as determined by testing identical products by UL or another testing and inspecting agency acceptable to authorities having jurisdiction:

1. Surface-Burning Characteristics: Comply with ASTM E 84 or UL 723; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

   a. Flame-Spread Index: 25 or less.
   b. Smoke-Developed Index: 450 or less.

2. Fire Growth Contribution: Complying with acceptance criteria of local code and authorities having jurisdiction when tested according to NFPA 265 Method B Protocol or NFPA 286.

2.2 OPERABLE ACOUSTICAL PANELS

A. Operable Acoustical Panels: Partition system, including panels, seals, finish facing, suspension system, operators, and accessories.

1. Basis of Design Product: Provide Modernfold, Inc Acousti-Seal Paired Panel Systems 932 or comparable product of one of the following:

   a. FolDoor.
   b. Hulcor Inc
   c. KWIK-WALL Company.

Panel Operation: Manually operated, paired panels, top supported with operable floor seals

B. Panel Construction: As required to support panel from suspension components and with reinforcement for hardware attachment. Fabricate panels with tight hairline joints and concealed fasteners. Fabricate panels so finished in-place partition is rigid; level; plumb; aligned, with tight joints and uniform appearance; and free of bow, warp, twist, deformation, and surface and finish irregularities.

C. Dimensions: Fabricate operable acoustical panel partitions to form an assembled system of dimensions indicated and verified by field measurements.

1. Panel Width: Standard widths.

D. STC: Not less than 52.

E. NRC: Not less than 0.65.

F. Panel Weight: not less than 12 lb/sq. ft. maximum (40 kg/sq. m).

G. Panel Thickness: Not less than 3 inches
1. Steel Frame: Steel sheet, manufacturer’s standard nominal minimum thickness for uncoated steel

H. Panel Materials:

1. Steel Frame: Steel sheet, manufacturer's standard .
2. Steel Face/Liner Sheets: Tension-leveled steel sheet, manufacturer's standard .
3. Medium-Density Fiberboard: ANSI A208.2

I. Panel Closure: Manufacturer's standard unless otherwise indicated.

J. Hardware: Manufacturer's standard as required to operate operable panel partition and accessories; with decorative, protective finish.

1. Hinges: Manufacturer's standard.

K. Finish Facing: Fabric Wall covering

2.3 SEALS

A. General: Provide seals that produce operable panel partitions complying with performance requirements and the following:

1. Manufacturer's standard seals unless otherwise indicated.
2. Seals made from materials and in profiles that minimize sound leakage.
3. Seals fitting tight at contact surfaces and sealing continuously between adjacent panels and between operable panel partition perimeter and adjacent surfaces, when operable panel partition is extended and closed.

B. Vertical Seals: Deep-nesting, interlocking steel astragals mounted on each edge of panel, with continuous PVC acoustical seal.

C. Horizontal Top Seals: Continuous-contact, extruded-PVC seal exerting uniform constant pressure on track or PVC faced, mechanical, retractable, constant-force-contact seal exerting uniform constant pressure on track when extended.

D. Horizontal Bottom Seals: Manufacturer's standard continuous-contact seal exerting uniform constant pressure on floor.

E. Horizontal Bottom Seals: PVC-faced, mechanical, retractable, constant-force-contact seal exerting uniform constant pressure on floor when extended, ensuring horizontal and vertical sealing and resisting panel movement.

1. Mechanically Operated for Acoustical Panels: Extension and retraction of bottom seal by operating handle or built-in operating mechanism, with operating range not less than 2 inches between retracted seal and floor finish.

2.4 PANEL FINISH FACINGS

A. General: Provide finish facings for panels that comply with indicated fire-test-response characteristics and that are factory applied to operable panel partitions with appropriate backing,

using mildew-resistant nonstaining adhesive as recommended by facing manufacturer's written instructions.

1. Apply one-piece, seamless facings free of air bubbles, wrinkles, blisters, and other defects, with edges tightly butted, with invisible seams complying with Shop Drawings for location, and with no gaps or overlaps. Horizontal seams are not permitted. Tightly secure and conceal raw and selvage edges of facing for finished appearance.
2. Where facings with directional, repeating patterns or repeating, or matching grain are indicated, mark facing top and attach facing in same direction.
3. Match facing pattern 72 inches (1830 mm) above finished floor.

B. Fabric Wall Covering: 100 Percent polyolefin woven fabric, from same dye lot, treated to resist staining.
1. Color/Pattern: As selected by Architect from manufacturer full range

C. Trimless Edges: Fabricate exposed panel edges so finish facing wraps uninterrupted around panel, covering edge and resulting in an installed partition with facing visible on vertical panel edges, without trim, for minimal sightlines at panel-to-panel joints.

2.5 SUSPENSION SYSTEMS

A. Tracks: Steel or aluminum with adjustable steel hanger rods for overhead support, designed for operation, size, and weight of operable panel partition indicated. Size track to support partition operation and storage without damage to suspension system, operable panel partitions, or adjacent construction. Limit track deflection to no more than 0.10 inch (2.54 mm) between bracket supports. Provide a continuous system of track sections and accessories to accommodate configuration and layout indicated for partition operation and storage.

1. Panel Guide: Aluminum guide on both sides of the track to facilitate straightening of the panels; finished with factory-applied, decorative, protective finish.
2. Head Closure Trim: As required for acoustical performance; with factory-applied, decorative, protective finish.

B. Carriers: Trolley system as required for configuration type, size, and weight of partition and for easy operation; with ball-bearing wheels.

C. Track Intersections, Switches, and Accessories: As required for operation, storage, track configuration, and layout indicated for operable panel partitions, and compatible with partition assembly specified. Fabricate track intersections and switches from steel or aluminum.
1.
2.
3.
4.

D. Steel Finish: Manufacturer's standard, factory-applied, corrosion-resistant, protective coating unless otherwise indicated.

2.6 ACCESSORIES

A. Pass Doors: Swinging door built into and matching panel materials, construction, acoustical qualities, finish and thickness, complete with frames and operating hardware. Hinges finished to match other exposed hardware.

1. Accessibility Standard: Fabricate doors to comply with applicable provisions in ICC A117.1 and the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines for Buildings and Facilities.
2. Single Pass Door: 36 by 84 inches .
3. Pass-Door Hardware: Equip pass door with the following:

a. Door Seals: Sweep floor seals.
b. Panic hardware.
c. Concealed door closer.
d. Door Viewer: Installed with view in direction of swing.
e. Exit Sign: Recessed, self-illuminated.
f. Latchset: Passage set.
g. Lock: Key-operated lock with cylinder, keyed to master key system, operable from both sides of door. Include two keys per lock.
h. Lock: Deadlock to receive cylinder, operable from both sides of door. See Section 08710 "Door Hardware" for lock cylinder and keying requirements.

B. Storage Pocket Door: Full height at end of partition runs to conceal stacked partition; of same materials, finish, construction, thickness, and acoustical qualities as panels; complete with operating hardware and acoustical seals at soffit, floor, and jambs. Hinges in finish to match other exposed hardware.

1. Manufacturer's standard method to secure storage pocket door in closed position.
2. Rim Lock: Key-operated lock cylinder, keyed to master key system**,** to secure storage pocket door in closed position. Include two keys per lock.
3. Rim Lock: Deadlock to receive cylinder, to secure storage pocket door in closed position. See Section 08710 "Door Hardware" for lock cylinder and keying requirements.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine flooring, structural support, and opening, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of operable panel partitions.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. General: Comply with ASTM E 557 except as otherwise required by operable panel partition manufacturer's written installation instructions.

B. Install operable panel partitions and accessories after other finishing operations, including painting, have been completed in area of partition installation.

C. Install panels from marked packages in numbered sequence indicated on Shop Drawings.

D. Broken, cracked, chipped, deformed, or unmatched panels are not acceptable.

E. Broken, cracked, deformed, or unmatched gasketing or gasketing with gaps at butted ends is not acceptable.

F. Light-Leakage Test: Illuminate one side of partition installation and observe vertical joints and top and bottom seals for voids. Adjust partitions for alignment and full closure of vertical joints and full closure along top and bottom seals. Perform test and make adjustments before NIC testing.]

3.3 FIELD QUALITY CONTROL

A. NIC Testing: Engage a qualified testing agency to perform tests and inspections.

1. Testing Extent: Testing agency shall randomly select two operable panel partition installation(s) for testing.
2. Testing Methodology: Perform testing of installed operable panel partition for noise isolation according to ASTM E 336, determined by ASTM E 413, and rated for not less than NIC indicated. Adjust and fit partitions to comply with NIC test method requirements.

B. An operable panel partition installation will be considered defective if it does not pass tests and inspections.

C. Prepare test and inspection reports.

3.4 ADJUSTING

A. Adjust operable panel partitions, hardware, and other moving parts to function smoothly, and lubricate as recommended by manufacturer.

B. Adjust pass doors and storage pocket doors to operate smoothly and easily, without binding or warping.

C. Verify that safety devices are properly functioning.

3.5 MAINTENANCE SERVICE

A. Maintenance Service: Beginning at Substantial Completion, maintenance service shall include 12 months' full maintenance by manufacturer's authorized service representative. Include quarterly preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper operable-partition operation. Parts and supplies shall be manufacturer's authorized replacement parts and supplies.

3.6 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain operable panel partitions.

END OF SECTION 10631

SECTION 10670 - STORAGE SHELVING

PART 1 - GENERAL

1.1 SELECTION INCLUDES

A. Vinyl-coated ventilated shelving.

B. Adjustable shelf systems.

C. Storage accessories.

1.2 RELATED SECTIONS

A. Section 06105 – Miscellaneous Carpentry

B. Section 09111 – Non-load bearing steel framing

C. Section 09260 – Gypsum Board Assemblies.

1.3 SUBMITTALS

A. Submit under provisions of Section 01330.

B. Product Data: Manufacturer’s catalog data, details sheets, and specifications.

C. Shop Drawings: Prepared specifically for this project; show dimensions of shelving and interface with other products.

D. Selection Samples: For each finish product specified, two complete sets of color chips representing manufacturer’s full range of available color and patterns.

E. Verification Samples: For each finish product specified, two samples, minimum size 6 inches (150 mm) square representing actual product, color, and patterns.

1.4 QUALITY ASSURANCE

A. Manufacturer Qualifications: All primary products specified in this section will be supplied by a single manufacturer with a minimum of ten years experience.

B. Installer Qualifications: All products listed in this section are to be installed by a single installer with a minimum of five years demonstrated experience in installing products of the same type and scope as specified.

C. Mock-Up: Provide a mock-up for evaluation of surface preparation techniques and application workmanship.

1. Finish areas designated by Architect.

2. Do not proceed with remaining work until workmanship, color, and sheen are approved by Architect.

3. Refinish mock-up area as required to produce acceptable work.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturer’s unopened packaging until ready for installation.

1.6 PROJECT CONDITIONS

A. Maintain environmental conditions (temperature, humidity, and verification) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

1.7 WARRANTY

A. At project closeout, provide Owner or Owner's representative an executed copy of the manufacturer's standard limited warranty against manufacturing defect, outlining its terms, conditions, and exclusions from coverage.

PART 2 - PRODUCTS

2.1 MANUFACTURERS PRODUCTS: Subject to compliance with requirements, available products that may be incorporated into the work include, but not limited to, the following:

A. ClosetMaid Corp., www.closetmaid.com

B. Knape and Vogt Manufacturing Company; https://www.knapeandvogt.com/

C. Rubbermaid ; https://www.rubbermaid.com

D. Provide all storage shelving from a single manufacturer.

2.2 MATERIALS

A. Steel Wire: Basic cold drawn, Grade C-1006; average tensile strength over 100,00 psi (690 MPa); coated.

B. Wire Coatings: Proprietary heavy-duty polyvinyl chloride (PVC) formula resin, plasticizers, stabilizers, pigments, and other additives.

1. Thickness: 7 to 17 mil (0.178 to 0.432 mm).

2. Classification: No ingredients listed as hazardous per OSHA 29CFR1910.0017.

2.3 MANUFACTURED UNITS

A. Coated Wire Shelving:

1. Linen: 1 inch (25 mm) spacing.

a. Color: White Wire.

b. Color: Satin Chrome.

c. Pre-loaded Side Wall Bracket: Part # 979.

2. Close Mesh: 5/8 inch (16 mm) spacing.

a. Color: White Wire.

b. Color: Satin Chrome.

B. Accessories: As required and as manufactured by single source manufacturer.

1. Wall clips.

2. End brackets.
3. Support brackets.
4. Standards.
5. Shelf brackets.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verification of Conditions:

1. Prepared spaces are sized and located in accordance with shop drawings.
2. Framing, reinforcements, and anchoring devices are correct type and are located in accordance with shop drawings.

B. Installer’s Examination:

1. Examine conditions under which installation is preformed; submit written notification if such conditions are unacceptable.
2. Installation activities started before unacceptable conditions have been corrected is prohibited.
3. Installation indicates installer’s acceptance of conditions.

3.2 INSTALLATION

A. Cut shelves ½ inch to 1-3/8 inches (12.7 to 35 mm) shorter than actual wall measurements; cap all exposed ends.

B. Install shelving plumb and level at heights indicated in accordance with shop drawings and manufacturer’s printed installation instructions.

C. Place wall clip every 10 to 12 (254 to 305 mm) on level line.

D. Install end brackets on same level line as wall clips, centered on the front rods of shelves. Support shelves 36 inches (914 mm) maximum with end brackets, support brackets, or poles.

E. Drill holes where required using sharp bit; do not punch.

F. Drywall: Drill ¼ inch (6 mm) hole, insert No. 910 or 911 wall clip. Use No. 658 # 8 x 1 inch (25 mm) pin to expand anchor if unloaded.

G. Wood: Drill ¼ inch (6 mm) hole into wood, secure wall clip with No. 8 x 1 inch (25 mm) screw or secure pole clip No. 978 directly to wood with No. 8 x 1-1/4 inch (31 mm) screws.

H. Concrete: Drill ¼ inch (6 mm) hole with masonry bit, insert wall clip with No. 911 or 978 with 250 anchor, secure with No. 8 x 1 inch (25 mm) screws.

I. Standards and Brackets: Install per manufacturer’s written instructions.

J. Shelf support: Install per manufacturer’s written instructions.

3.3 CLEANING

A. As work proceeds, maintain premises free of unnecessary accumulation of tools, equipment, surplus materials, and debris related to work.

B. Upon completion of installation, clean all surfaces that have become soiled during installation.

SECTION 10801 - TOILET AND BATH ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Washroom and shower room accessories.
2. Childcare accessoriesUnderlavatory guards.
3. Custodial accessories.

1.2 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Product Schedule: Indicating types, quantities, sizes, and installation locations by room of each accessory required.

1. Identify locations using room designations indicated.
2. Identify products using designations indicated.

C. Maintenance data.

D. Warranty: Sample of special warranty.

1.3 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

1.4 WARRANTY

A. Special Mirror Warranty: Manufacturer's standard form in which manufacturer agrees to replace mirrors that develop visible silver spoilage defects and that fail in materials or workmanship within specified warranty period.

1. Warranty Period: 15 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 ACCESSORIES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following :
1. American Specialties, Inc.
2. Bobrick Washroom Equipment, Inc.
3. Bradley Corporation.
4. GAMCO Specialty Accessories; a division of Bobrick Washroom Equipment, Inc.

B. Toilet Tissue (Roll) Dispenser :

1. Basis-of-Design Product: Bobrick ClassicSeries Surface-mounted multi-roll toilet tissue dispenser #B-2888.

C. Paper Towel (Folded) Dispenser :

1. Basis-of-Design Product: Bobrick ClassicSeries Surface Mounted Paper Towel Dispenser #B-262.

D. Liquid-Soap Dispenser :

1. Basis-of-Design Product: Bobrick ClassicSeries Surface Mount Soap Dispenser - B-2111.

E. Grab Bar :

1. Basis-of-Design Product: Bobrick Concealed Mounting with Snap Flange.
2. Material: Stainless steel, 0.05 inch thick.

a. Finish: Smooth, No. 4 finish (satin) on ends and slip-resistant texture in grip area.

3. Outside Diameter: 1-1/2 inches.
4. Configuration and Length: As indicated on Drawings .

F. Mirror Unit :

1. Basis-of-Design Product: Bobrick frameless mirrors – B-1556.

2. Size: As indicated on Drawings .

G. ADA Mirror Unit :

1. Basis-of-Design Product: Bobrick fixed position tilt-mirror - B-293.

2. Size: As indicated on Drawings .

H. Shower Curtain Rod :

1. Basis-of-Design Product: Bobrick Shower Curtain Rod with Concealed Mounting - B-207.
2. Finish: No. 4 (satin)
3. Size: As indicated on drawings.

I. Shower Curtain :

1. Basis-of-Design Product: Bobrick Vinyl Shower Curtain - 204-2 with (7) Shower Curtain Hooks - 204-1.

J. Folding Shower Seat :

1. Basis-of-Design Product: Bobrick Reversible Folding Shower Seat - B-5181.

K. Recessed Soap Dish :

1. Basis-of-Design Product: Bobrick Recessed Heavy-Duty Soap Dish and Bar - B-4390.

L. Wall Mount Soap Dish:

1. Basis-of-Design Product: Bobrick ClassicSeries Surface-Mounted Soap Dish – B-76807.

M. Coat Hook:

1. Basis-of-Design Product: Bobrick Utility Hook – B-6707.

N. Towel Bar:

1. Basis-of-Design Product: Bobrick ClassicSeries Surface-Mounted Towel Shelf with Towel Bar 0 b-76767.

O. Diaper Changing Station:

1. Basis-of-Design Product: Koala Kare Products; a division of Bobrick Washroom Equipment
2. Horizontal Recessed Mounted: KB110-SSRE
3. Surface Mounted: KB110-SSWM

2.2 UNDERLAVATORY GUARDS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Plumberex Specialty Products, Inc.

2. Truebro by IPS Corporation.

B. Underlavatory Guard:
1. Description: Insulating pipe covering for supply and drain piping assemblies that prevent direct contact with and burns from piping; allow service access without removing coverings.
2. Material and Finish: Antimicrobial, molded plastic, white.

2.3 CUSTODIAL ACCESSORIES

A. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
1. American Specialties, Inc.
2. Bobrick Washroom Equipment, Inc.
3. Bradley Corporation.
4. GAMCO Specialty Accessories; a division of Bobrick Washroom Equipment, Inc.

B. Mop and Broom Holder with Utility Shelf:

1. Basis-of-Design Product: Bobrick Shelf with mop and broom holders and hooks – B-239.

2.4 FABRICATION

A. Keys: Provide universal keys for internal access to accessories for servicing and resupplying. Provide minimum of six keys to Owner's representative.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install accessories according to manufacturers' written instructions, using fasteners appropriate to substrate indicated and recommended by unit manufacturer. Install units level, plumb, and firmly anchored in locations and at heights indicated.

B. Grab Bars: Install to withstand a downward load of at least 250 lbf, when tested according to ASTM F 446.

3.2 ACCESSORY SCHEDULE

A. Kitchen 110
1. (2) Paper Towel (Folded) Dispenser
2. (2) Liquid-Soap Dispenser

B. Sick Room 124
   1. (1) Toilet Tissue (Roll) Dispenser
   2. (1) Paper Towel (Folded) Dispenser
   3. (1) Liquid-Soap Dispenser
   4. (2) Grab Bar
   5. (1) ADA Mirror Unit
   6. (1) Under lavatory guard
   7. (1) Shower Curtain Rod
   8. (2) Shower Curtain
   9. (1) Soap Dish
   10. (1) towel bar
   11. (2) grab bar
   12. (1) Folding Shower seat
   13. (1) fold down diaper station (recessed)

C. Infants 128
   1. (2) Paper Towel (Folded) Dispenser
   2. (2) Liquid-Soap Dispenser

D. Toddlers 130 & 135
   1. (1) Paper Towel (Folded) Dispenser
   2. (1) Liquid-Soap Dispenser

E. Preschool 136 & 140 Each
   1. (1) Paper Towel (Folded) Dispenser
   2. (1) Liquid-Antibacterial Dispenser

F. Utility 132
   1. (1) Paper Towel (Folded) Dispenser
   2. (1) Liquid-Soap Dispenser

G. Restroom 133
   1. (2) Toilet Tissue (Roll) Dispenser
   2. (1) Paper Towel (Folded) Dispenser
   3. (2) Liquid-Soap Dispenser
   4. (2) Mirror Unit
   5. (1) Shower Curtain Rod
   6. (1) Shower Curtain
   7. (1) Soap Dish
   8. (2) grab bar

H. Room 117,118,217 Janitor’s Closet Each
   1. (2) Mop and Broom Holder with Utility Shelf

I. Restroom 139
   1. (4) Toilet Tissue (Roll) Dispenser
   2. (1) Paper Towel (Folded) Dispenser
   3. (1) Liquid-Soap Dispenser
   4. (2) Mirror Unit
   5. (4) grab bars

J. Restroom 122
   1. (1) Toilet Tissue (Roll) Dispenser
   2. (1) Paper Towel (Folded) Dispenser
   3. (1) Liquid-Soap Dispenser
   4. (1) Mirror Unit
   5. (1) grab bars
   6. (1) fold down diaper station (recessed)
   7. (3) Robe Hook

K. Restroom 121
   1. (3) Toilet Tissue (Roll) Dispenser
   2. (1) Paper Towel (Folded) Dispenser
   3. (1) Liquid-Soap Dispenser
   4. (2) Mirror Unit
   5. (1) grab bars
   6. (1) fold down diaper station (recessed)

L. Restroom 218
   1. (3) Toilet Tissue (Roll) Dispenser
   2. (1) Paper Towel (Folded) Dispenser
   3. (1) Liquid-Soap Dispenser
   4. (2) Mirror Unit
   5. (1) grab bars
   6. (1) fold down diaper station (surface mounted)

M. Restroom 219
   1. (3) Toilet Tissue (Roll) Dispenser
   2. (1) Paper Towel (Folded) Dispenser
   3. (1) Liquid-Soap Dispenser
   4. (2) Mirror Unit
   5. (1) grab bars
   6. (1) fold down diaper station (recessed)
   7. (2) Coat Hook

END OF SECTION 10801

DIVISION 11

SECTION 11400 - FOODSERVICE EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes equipment for foodservice facilities.

1. Stainless-steel countertops, including integral sinks.
2. Stainless-steel base cabinets
3. Stainless-steel shelving
4. Food Equipment

B. See Division 15 Sections for supply and exhaust fans; exhaust ductwork; service roughing-ins; drain traps; atmospheric vents; valves, pipes, and fittings; fire-extinguishing systems; and other materials required to complete foodservice equipment installation.

C. See Division 15 Section "Commercial Kitchen Hoods" for ventilation hoods.

D. See Division 16 Sections for connections to fire-alarm systems, wiring, disconnect switches, and other electrical materials required to complete foodservice equipment installation.

1.2 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: For fabricated equipment. Include plans, elevations, sections, roughing-in dimensions, fabrication details, utility service requirements, and attachments to other work.

C. Samples: For each exposed product and for each color and texture specified.

D. Coordination Drawings: For foodservice facilities.

1. Indicate locations of foodservice equipment and connections to utilities.
2. Key equipment using same designations as indicated on Drawings.
3. Include plans and elevations; clearance requirements for equipment access and maintenance; details of equipment supports; and utility service characteristics.

E. Operation and maintenance data.

F. Sample warranties.

1.3 QUALITY ASSURANCE

A. NSF Standards: Provide equipment that bears NSF Certification Mark or UL Classification Mark certifying compliance with applicable NSF standards.

B. BISSC Standards: Provide bakery equipment that complies with BISSC/Z50.2.

1. Provide BISSC-certified equipment, with certification verified by a third-party agency.

C. UL Certification: Provide electric and fuel-burning equipment and components that are evaluated by UL for fire, electric shock, and casualty hazards according to applicable safety standards, and that are UL certified for compliance and labeled for intended use.

D. Steam Equipment: Provide steam-generating and direct-steam heating equipment that is fabricated and labeled to comply with ASME Boiler and Pressure Vessel Code.

E. Regulatory Requirements: Install equipment to comply with the following:

1. ASHRAE 15, "Safety Code for Mechanical Refrigeration."
2. NFPA 54, "National Fuel Gas Code."
3. NFPA 70, "National Electrical Code."
4. NFPA 96, "Ventilation Control and Fire Protection of Commercial Cooking Operations."

F. Seismic Restraints: Comply with SMACNA's "Kitchen Ventilation Systems and Food Service Equipment Fabrication and Installation Guidelines," Appendix A, "Seismic Restraint Details," unless otherwise indicated.

G. Preinstallation Conference: Conduct conference at Project site .

1.4 WARRANTY

A. Refrigeration Compressor Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace compressors that fail in materials or workmanship within specified warranty period.

1. Failure includes, but is not limited to, inability to maintain set temperature.
2. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 FABRICATED EQUIPMENT

A. Integral Stainless-Steel Sinks: .

a. SEE SHEET FS-1 FOR EQUIPMENT SCHEDULE

2. Stainless- Steel Tables, Carts, Wall Mount Shelving & Base Cabinets:

   The following manufacturers and models are the basis of design but available manufacturers offering project comparable may be submitted:

   a. Item 1C: 1 ea. Metro Model No. NK3 Packed
   b. Item 14: Metro Model No. MW103 Packed/MW Standard Duty Utility Cart, MW100 series (2) solid shelves, open base, shelf size 24" x 18"D, tubular stainless steel frame with (2) push handles, with (4) swivel/resilient tread casters, NSF
   c. Item 15: (2) ea Overshelf, Eagle Group Model SWS1560-16/4 Packed ea
      Wall shelf snap-n-slide, 1 ½" rolled front edge, 15: x 60, 16 gauge type 430 stainless steel, 1 ½" upturn on rear and ends, stainless steel wall brackets mount to wall studs, no wall backing required. 225 lb weight capacity, NSF

   d. Item 17: (2) ea Overshelf, Eagle Group Model No. SWS1536-16/4 X packed: ea. Wal shelf, snap-n-slide, 1 ½" rolled front edge, 15" x 36", 16 gauge type 430 stainless steel, 1 ½" upturn on rear and ends, stainless steel wall brackets mount to wall studs, no wall backing required, 135 lb weight capacity, NSF

   e. Item 22 :(2) Overshelf, Eagle Group No SWS1536-16/4-X Packed ea, Wall Shelf, Snap-n-slide, 1 ½" rolled front edge, 15" x 36", 16 gauge type 430 stainless steel, 1 ½" upturn on rear and ends, stainless steel wall brackets mount to wall studs, no wall backing required, 135lb. weight capacity, NSF.

   f. Item 23: (1) ea Dry Storage Shelving, Metro, (5) ea. A2448NK3 Super Adjustable Super Erecta Shelf, wire, 48"w 24" D, Metroseal 3(corrosion-resistant) finish, corner release system, with Microban antimicrobial protection, NSF. (5) ea. A2460NK3 Super Adjustable Super Erecta Shelf, wire, 60"w 24" D, Metroseal 3(corrosion-resistant) finish, corner release system, with Microban antimicrobial protection, NSF. (8) EA 74PK3 Super Electa SiteSelect Post, 74- 5/8" H, adjustable leveling bolt, posts are grooved at 1" increments & numbers at 2" increments, double grooved every 8", Metroseal 3 epoxy coated corrosion-resistant finish with Micoban antimicrobial protection

   g. Item 24: (1) ea Can Rack Eagle Group Model No OCR-10-4AP-X Packed: ea Panco Can Rack, half size, mobile design, self feeding gravity fed shelves, designed for (72) #10 or (96) #5 cans, aluminum welded frame with poly top, 4" swivel plate casters, NSF (Flyer)

   h. Item 25: (1) ea Hot Food Serving Counter, Duke Manufacturing Model No. E302 Packed: ea Aerohot Steamtable Hot Food Unit, 30-3/8 L, electric (2) 12" x 20" hot food wells with exposed elements, infinite controls, stainless steel top with ½" thick x 7" wide poly carving board, stainless steel open base with undershelf, legs & fee (1) ea 120v/60/1-ph, 1000 watts, 8.3 amps, NEMA 5-15

i. Item 26: (1) ea Work Table Eagle Group Model No. T24120SEB-BS Packed ea Deluxe Work table, 120' x 24" d, 16/304 Stainless steel top with 4 ½" backsplash, rolled front edge, square turndown ends, Uni-Lok gusset system, heavy gauges/s undershelf, (6) 1 5/8" diameter heavy guage s/s legs with 1" adjustable s/s/fee, NSF

j. Item 28: (2) ea Overshelf, Eagle Group Model No. SWS1548-16/4-X Packed: ea. Wall shelf, snap-n-slide, 1 ½" rolled front edge, 15" x 48", 16 gauge type 430 stainless steel, 1 ½" upturn on rear and ends, stainless steel wall brackets mount to wall studs, no wall backing required, 180lb weight capacity, NSF

(1) Ea SW1560-16/4-X Wall Shelf, snap-n-slide, 1 ½" rolled front edge, 15" x 60", 16- gauge type stainless steel, 1 ½" upturn on rear and ends, stainless steel wall brackets mount to wall studs, no wall backing required, 225 lb weight capacity, NSF

2.2 FOODSERVICE EQUIPMENT

a. SEE SHEET FS-1 FOR EQUIPMENT SCHEDULE

2.3 MISCELLANEOUS MATERIALS

A. Installation Accessories, General: NSF certified for end-use application indicated.

B. Elastomeric Joint Sealant: ASTM C 920; silicone . Type S (single component), Grade NS (nonsag), Class 25, Use NT (nontraffic) related to exposure, and Use M, G, A, or O as applicable to joint substrates indicated.

1. Public Health and Safety Requirements:

a. Sealant is certified for compliance with NSF standards for end-use application indicated.
b. Washed and cured sealant complies with the FDA's regulations for use in areas that come in contact with food.

2. Cylindrical Sealant Backing: ASTM C 1330, Type C, closed-cell polyethylene, in diameter greater than joint width.

2.4 FINISHES

A. Stainless-Steel Finishes:

1. Surface Preparation: Remove tool and die marks and stretch lines, or blend into finish.
2. Polished Finishes: Grind and polish surfaces to produce uniform finish, free of cross scratches.

a. Run grain of directional finishes with long dimension of each piece.

b. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install foodservice equipment level and plumb, according to manufacturer's written instructions.

1. Connect equipment to utilities.
2. Provide cutouts in equipment, neatly formed, where required to run service lines through equipment to make final connections.

B. Complete equipment assembly where field assembly is required.

1. Provide closed butt and contact joints that do not require a filler.
2. Grind field welds on stainless-steel equipment until smooth and polish to match adjacent finish.

C. Install equipment with access and maintenance clearances that comply with manufacturer's written installation instructions and with requirements of authorities having jurisdiction.

D. Install cabinets and similar equipment on bases in a bed of sealant.

E. Install closure-trim strips and similar items requiring fasteners in a bed of sealant.

F. Install joint sealant in joints between equipment and abutting surfaces with continuous joint backing unless otherwise indicated. Produce airtight, watertight, vermin-proof, sanitary joints.

3.2 CLEANING AND PROTECTING

A. After completing installation of equipment, repair damaged finishes.

B. Clean and adjust equipment as required to produce ready-for-use condition.

C. Protect equipment from damage during remainder of the construction period.

3.3 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain foodservice equipment.

END OF SECTION 11400

SECTION 11451 - CLEANING APPLIANCES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. Cleaning appliances.

1.2 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Samples: For each exposed product and for each color and texture.

C. Product certificates.

D. Field quality-control reports.

E. Operation and maintenance data.

F. Warranties: Sample of special warranties.

1.3 QUALITY ASSURANCE

A. Installer Qualifications: An employer of workers trained and approved by manufacturer for installation and maintenance of units required for this Project.

1.4 WARRANTY

A. Special Warranties: Manufacturer's standard form in which manufacturer agrees to repair or replace residential appliances or components that fail in materials or workmanship within specified warranty period.

1. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 CLOTHES WASHERS AND DRYERS (STACKABLE UNITS)

A. Clothes Washer : Complying with ASSE 1007.

1. Basis-of-Design Product: Whirlpool CE model– 3.1 cu.ft. Capacity washer.

B. Clothes Dryer : Complying with AHAM HLD-1.

1. Basis-of-Design Product: Whirlpool CE model – 6.7 cu. ft.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Freestanding Equipment: Place units in final locations after finishes have been completed in each area. Verify that clearances are adequate to properly operate equipment.

B. Utilities: See Divisions 15 and 16 for plumbing and electrical requirements.

3.2 FIELD QUALITY CONTROL

A. Perform tests and inspections.

1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.

B. Tests and Inspections:

1. Perform visual, mechanical, and electrical inspection and testing for each appliance according to manufacturers' written recommendations. Certify compliance with each manufacturer's appliance-performance parameters.
2. Leak Test: After installation, test for leaks. Repair leaks and retest until no leaks exist.
3. Operational Test: After installation, start units to confirm proper operation.
4. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and components.

C. Prepare test and inspection reports.

END OF SECTION 11451

DIVISION 12

SECTION 12366 - SOLID SURFACING COUNTERTOPS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Solid surface material countertops.
2. Solid surface material windowsills.
3. Countertop support brackets.

1.2 ACTION SUBMITTALS

A. Product Data: For countertop and windowsill materials.

B. Samples for Verification: For the following products:

1. Countertop and Windowsill material, 6 inches square.

1.3 CLOSEOUT SUBMITTALS

A. Maintenance Data: For solid surface material to include in maintenance manuals. Include Product Data for care products used or recommended by Installer and names, addresses, and telephone numbers of local sources for products.

1.4 QUALITY ASSURANCE

A. Fabricator Qualifications: Shop that employs skilled workers who custom-fabricate countertops similar to that required for this Project, and whose products have a record of successful in-service performance.

B. Installer Qualifications: Fabricator of countertops.

1.5 FIELD CONDITIONS

A. Field Measurements: Verify dimensions of countertops and windowsills by field measurements before windowsill fabrication is complete.

1.6 COORDINATION

A. Coordinate locations of utilities that will penetrate countertops and windowsills or backsplashes.

PART 2 - PRODUCTS

2.1 SOLID SURFACE COUNTERTOP MATERIALS

A. Solid Surface Material: Homogeneous-filled plastic resin complying with ICPA SS-1.

1. Subject to compliance with requirements, provide product indicated on Finish Schedule or comparable product by one of the following:

a. DuPont de Nemours, Inc.; Corian.

b. Formica;

c. Hanwha Surfaces.

d. Transolid;

e. Wilsonart;

2. Type: Provide Standard type unless Special Purpose type is indicated.
3. Colors and Patterns: As indicated by manufacturer's designations.

B. Plywood: Exterior softwood plywood complying with DOC PS 1, Grade C-C Plugged, touch sanded.

2.2 COUNTERTOP FABRICATION

A. Fabricate countertops according to solid surface material manufacturer's written instructions and to the AWI/AWMAC/WI's "Architectural Woodwork Standards."

1. Grade: Premium.

B. Configuration:

1. Front: Straight, slightly eased at top, with 1-inch nosing.
2. Backsplash: Straight, slightly eased at corner.
3. End Splash: Matching backsplash.

C. Countertops: 3/4-inch-thick, solid surface material with front edge built up with same material.

D. Backsplashes: 1/2-inch-thick, 4-inch-high solid surface material.

E. Fabricate tops with shop-applied edges unless otherwise indicated. Comply with solid surface material manufacturer's written instructions for adhesives, sealers, fabrication, and finishing.

1. Fabricate with loose backsplashes for field assembly.

F. Joints: Fabricate straight countertops eight feet or less in length without joints. Where size and configuration of countertops exceed dimensions of solid surface slab, fabricate countertops in sections for joining in field, with joints at locations indicated on approved Shop Drawings.

G. Cutouts and Holes:

1. Counter-Mounted Plumbing Fixtures: Prepare countertops in shop for field cutting openings for counter-mounted fixtures. Mark tops for cutouts and drill holes at corners of cutout locations. Make corner holes of largest radius practical.
2. Fittings: Drill countertops in shop for plumbing fittings, undercounter soap dispensers, and similar items.

2.3 WINDOWSILL FABRICATION

A. Fabricate windowsills according to solid surface material manufacturer's written instructions and to the AWI/AWMAC/WI's "Architectural Woodwork Standards."

1. Grade: Premium.

B. Sills: Not less than 1/2-inch-thick, solid surface material, and as indicated on Drawings.

C. Configuration: As indicated on Drawings.

D. Joints: Fabricate windowsills without joints, except where width of opening exceeds length of available materials.

E. Subsills: Plywood, exterior grade, 3/4-inch thickness, unless otherwise indicated on Drawings.

2.4 COUNTERTOP SUPPORT BRACKETS.

A. Rakks Model EH Inside Wall mount.

1. Size: Depending on the size of the countertops they are supporting.
2. Finish: As selected by Architect from Manufactures full range.
3. Color: As selected by Architect from Manufactures full range.

2.5 INSTALLATION MATERIALS

A. Adhesive: Product recommended by solid surface material manufacturer.

1. Adhesives shall have a VOC content of 70 g/L or less.

B. Sealant for Windowsills: Comply with applicable requirements in Section 079200 "Joint Sealants."

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates to receive solid surface material windowsills and conditions under which windowsills will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of windowsills.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Fasten plywood sub-tops to cabinets by screwing through sub-tops into corner blocks of base cabinets. Shim as needed to align subtops in a level plane.

B. Secure countertops to subtops with adhesive according to solid surface material manufacturer's written instructions. Align adjacent surfaces and, using adhesive in color to match countertop, form seams to comply with manufacturer's written instructions. Carefully dress joints smooth, remove surface scratches, and clean entire surface.

C. Install subsills as indicated on Drawings.

D. Secure windowsills to subsills with adhesive according to solid surface material manufacturer's written instructions. Align adjacent surfaces and, using adhesive in color to match windowsill, form seams to comply with manufacturer's written instructions. Carefully dress joints smooth, remove surface scratches, and clean entire surface.

1. Install windowsills level to a tolerance of 1/8 inch in 8 feet, 1/4 inch maximum. Do not exceed 1/64-inch difference between planes of adjacent units.

E. Bond joints with adhesive and draw tight as windowsills are set. Mask areas of windowsills adjacent to joints to prevent adhesive smears.

1. Install metal splines in kerfs in windowsill edges at joints. Fill kerfs with adhesive before inserting splines and remove excess immediately after adjoining units are drawn into position.

F. Apply sealant to gaps at walls; comply with Section 079200 "Joint Sealants."

END OF SECTION

SECTION 12484 - FLOOR MATS AND FRAMES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Recessed frames and floor grids at main entrance door.

1.2 ACTION SUBMITTALS

A. Product Data: Product data for each type of floor grid and frame specified, including manufacturer's specifications and installation instructions

B. Shop Drawings:

   1. Items penetrating floor mats and frames, including door control device.
   2. Divisions between mat sections.
   3. Detail showing layout of grid and frame specified indicating construction relative to materials, direction of traffic, spline locations, profiles, anchors and accessories.

C. Samples: Submit as assembled section of floor grid and frame members with selected tread insert showing each type of color for exposed floor grid, frame and accessories required.

1.3 PERMORMANCE REQUIREMENTS

A. Slip Resistance in accordance with ASTM D-2047-96, coefficient of Friction, minimum 0.60 for accessible routes. Provide certification from manufacturer meeting minimum coefficient of friction when tested in wet conditions

B. Standard Rolling load performance is 500lb/wheel (load applied to a solid 5" x 2" wide polyurethane wheel, 1000 passes without damage).

1.4 QUALITY ASSURANCE

A. Single Source Responsibility: Obtain floor grids and frames from one source of a single manufacturer.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance data in the form of manufacturer's printed instructions for cleaning and maintaining floor grids.

PART 2 - PRODUCTS

2.1 ENTRANCE FLOOR MATS AND FRAMES, GENERAL

A. Regulatory Requirements: Comply with applicable provisions in [**the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines for Buildings and Facilities**] [**and**] [**ICC A117.1**] <**Insert regulation**>.

2.2 STAINLESS STEEL GRIDS

A. Basis-of-Design Product: Subject to compliance with requirements, provide construction specialities gridline G6 or a comparable product by one of the following:
1. American Mat & Rubber Company.
2. Babcock-Davis
3. Balco, Inc.
4. Pawling Corporation; Architectural Products Division.

B. Materials: Stainless Steel – Type 304 Stainless Steel for surface wires and support bars..

C. Floor Grids: 5/8” maximum depths, wire to be .090 x .150” electronically welded and spaced .145 apart.

2.3 FRAMES

A. Recessed Frames: ASTM B 221 (ASTM B 221M). Manufacturer's standard extrusion.

1. Color: As selected by Architect from full range of industry colors and color densities.

2. Stainless Steel angle frame with drain pan shall be Type 304 stainless steel with 1/8” exposed surface at grid perimeter. Support structure to be comprised of adjustable height – aluminum support feet and legs no more than 24” o.c. Maximum overall depth of grid and framing system to be no more than 7” deep.

2.4 FABRICATION

A. Floor Mats: Shop fabricate units to greatest extent possible in sizes indicated. Unless otherwise indicated, provide single unit for each mat installation; do not exceed manufacturer's recommended maximum sizes for units that are removed for maintenance and cleaning. Where joints in mats are necessary, space symmetrically and away from normal traffic lanes. Miter corner joints in framing elements with hairline joints or provide prefabricated corner units without joints.

B. Field Measurements: Check actual openings for grids by accurate field measurements before fabrication. Record actual measurements on final shop drawings. Coordinate fabrication schedule with construction progress to avoid delay in work.

C. Coordinate frame installation with concrete construction to ensure recess and frame anchorage are accurate and that the base is level and flat. Defer frame installation until building enclosure is complete and related interior finish work is in progress.

D. Coat concealed surfaces of aluminum frames that contact cementitious material with manufacturer's standard protective coating.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install recessed mat frames to comply with manufacturer's written instructions. Set mat tops at height recommended by manufacturer for most effective cleaning action; coordinate tops of mat surfaces with bottoms of doors that swing across mats to provide clearance between door and mat.

B. Install surface-type units to comply with manufacturer's written instructions at locations indicated; coordinate with entrance locations and traffic patterns.

3.2 PROTECTION

A. After completing frame installation and concrete work, provide temporary filler of plywood or fiberboard in recesses and cover frames with plywood protective flooring. Maintain protection until construction traffic has ended and Project is near Substantial Completion.

END OF SECTION 12484

SECTION 12931 - BIKE RACKS

PART I - GENERAL

1.1 Summary

A. This section includes:

1. Bicycle Rack

1.2 Quality Assurance

A. Installer Qualifications: An experienced installer who has completed installation of bicycle racks similar in material, design, and extent to that indicated for this project and whose work has resulted in construction with a record of successful in-service performance.
B. Manufacturer Qualifications: A firm experienced in manufacturing bicycle racks similar to those required for this project and with a record of successful in-service performance.
C. Source Limitations: Obtain each color, finish, shape and type of bicycle rack from a single source with resources to provide components of consistent quality in appearance and physical properties.
D. Product Options: Drawings indicate size, shape and dimensional requirements of bicycle racks and are based on the specific system indicated.

1.3 Submittals

A. Product Data: Include physical characteristics such as shape, dimensions, bicycle parking capacity and finish for each bicycle rack.
B. Shop Drawings: Show installation details for each bicycle rack.
C. Samples: Submit manufacturer's samples of materials, finishes, and colors.
D. Maintenance Data: For each bicycle rack.
E. Warranty: Manufacturer's standard warranty.

1.4 Delivery, Storage and Handling

A. Upon delivery, before signing for shipment, inspect for any damages and notate on the B.O.L.
B. Store bicycle racks in original undamaged packages and containers until ready for installation
C. Handle bicycle racks with sufficient care to prevent any scratches or damage to the finish.

PART 2 - PRODUCTS

2.1 Manufacturers

A. Acceptable Manufacturers: Bike Hitch by DERO BIKE RACK CO, 42 Northern Stacks Drive, Minneapolis, MN 55421, 1-888-337-6729. Fax: 612-331-2731. Website: www.dero.com
B. Acceptable Manufacturers: Ring Bike Rack by LandscapeForms, 7800 E Michigan Ave, Kalamazoo, MI 49048, 800-430-6209. Website: www.landscapeforms.com
C. Or approved equal.

2.2 Materials

A. 1.5" OD 11 gauge tube.
B. Fabrication: Shop assembled bicycle rack.

2.3 Finishes

A. A 304 grade stainless steel finish, high luster electropolish finish.

2.4 Bike Rack

A. Setbacks

1. Parallel Wall Setback: A minimum of 30" should be left between the wall and the rack. 36" is the recommended setback.
2. Distance Between Racks: 24" is the minimum distance between racks. 36" is recommended.
3. Street Setback: 24" is the minimum distance between the street and the rack. 36" is recommended.
4. 3/8" anchors.
5. Capacity: 2 bicycles.

PART 3 - EXECUTION

3.1 Installation

A. Installation Method: In-ground mount is embedded into concrete base.
B. Install in accordance with manufacturer's instructions at locations indicated on the Drawings.
C. Install level.
D. Anchor securely in place.
E. It is the responsibility of the installer to ensure that all base materials into which the rack will be installed can support the rack and will not be damaged by any required installation procedures.

3.2 Cleaning

A. Clean rack promptly after installation in accordance with manufacturer's instructions.
B. Do not use harsh cleaning materials or methods that could damage finish.

3.3 Protection

A. Protect installed racks to ensure that, except for normal weathering, racks will be without damage or deterioration at time of Substantial Completion.

END OF SECTION 12931

DIVISION 13

SECTION 13085 – SOUND ISOLATION

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Sound isolation clips installed with drywall furring channels for support of gypsum board for noise control (de-coupling) in walls and ceilings.

1.2 RELATED SECTIONS

A. Section 05400 – Cold-Formed Metal Framing

B. Section 07210 – Building Insulation

C. Section 07920 – Joint Sealants

D. Section 09111 – Non-Load-Bearing Wall Framing

E. Section 09250 – Gypsum Board

F. Section 09260 – Gypsum Board Assemblies

1.3 REFERENCES

A. AISI Specifications for Design of Cold-Formed Steel Structural Members

B. ASTM B 633 – Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel

C. ASTM C 645 – Standard Specification for Nonstructural Steel Framing Members

D. ASTM C 754 – Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products

E. ASTM C 840 – Standard Specification for Application and Finishing of Gypsum Board

F. ASTM C 1002 – Standard Specification for Steel-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs

G. ASTM D 412 – Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers – Tension

H. ASTM D 573 – Standard Test Method for Rubber-Deterioration in an Air Oven

I. ASTM D 2000 – Standard Classification System for Rubber Products in Automotive Applications

J. ASTM D 2240 – Standard Test Method for Rubber Property – Durometer Hardness

K. UL Fire Resistance Directory

1.4 DESIGN REQUIREMENTS

A. Dead or Shear Load: Maximum design load of 36 pounds per each resilient sound isolation clip

B. Conform to UL Fire Resistance Directory design assemblies, where required

1.5 SUBMITTALS

A. Comply with Section 01330 – Submittal Procedures

B. Product Data: Submit manufacturer's product data and installation instructions
   1. Sound isolation clips
   2. Drywall furring channels

C. Samples: Submit manufacturer's samples
   1. Sound isolation clips
   2. Drywall furring channels

D. Warranty: Submit manufacturer's standard warranty for resilient sound isolation clips

1.6 DELIVERY, STORAGE AND HANDLING

A. Delivery: Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly identifying product name and manufacturer

B. Storage: Store materials in clean, dry area indoors in accordance with manufacturer's instructions

C. Handling: Protect materials during handling and installation to prevent damage

PART 2 - PRODUCTS

2.1 SOUND ISOLATION

A. Sound Isolation Clips Basis of Design: Sound Isolation Clip (ARSIC-1)
   1. Acoustical Solutions, Inc
   2. Rubber Isolator:
      a. Natural organic rubber compound, blended with fire-inhibiting compounds
      b. Molded to isolate ferrule from clip
      c. Minimum of 12 micro-vibration controlling pedestals at point of contact with framing member
      d. Manufactured to ASTM D 2000, M2 AA 510 A13, which includes:
         1) Hardness, ASTM D 2240, Shore A: 47
         2) Modulus 300 Percent, ASTM D 412, Die C: 5.3 MPa
         3) Tensile Strength, ASTM D 412, Die C : 11.2 MPa
         4) Elongation at Break, ASTM D 573: 454 percent
   3. Clip: Galvanized or aluminum-zinc coated steel, 16 gauge
   4. Ferrule: Zinc-electroplated steel

5. Projection: 1-5/8 inches from supporting structure, when 7/8-inch drywall furring channels are used

B. Drywall Furring Channels (Hat Track):
   1. Material: Cold-formed galvanized steel
   2. Conformance:
      a. AISI Specifications for Design of Cold-Formed Steel Structural Members
      b. ASTM C 645
      c. ASTM C 754
   3. Designation: Steel Stud Manufacturers Association (SSMA) Code 087F125-18 (22 gauge)
      a. Size: 0.0179 inch (0.53mm) thick, 7/8 inch (22.2 mm) height, 2-11/16 inches (68 mm) width
      b. Hemmed edge detail
   4. Designation: Steel Stud Manufacturers Association (SSMA) Code 087F125-27 (22 gauge)
      a. Size: 0.0269 inch (0.68 mm) thick, 7/8 inch (22.2 mm) height, 2-11/16 inches (68 mm) width
      b. Hemmed edge detail

C. Mechanical Fasteners:
   1. Type: Self-drilling, self-tapping screws. Steel, ASTM C 1002. Galvanized coating, plated, or oil-phosphate coated, ASTM B 633, as needed for required corrosion resistance
   2. Sound Isolation Clip Connections:
      a. To Wood Framing Members: Screws 2-1/2 inches (63mm) minimum length, #8 minimum shank, Type W (course thread), bugle-or hex-head screws of equal or greater size.
         1) Minimum Pullout and Shear: 108 pounds
      b. To Steel Framing Members (Less than Gauge): Screws 1-1/2 inches (38 mm) minimum length; #8 minimum shank; Type S (fine thread); bugle-, wafer-, or hex head screws of equal or greater size
         1) Minimum Pullout and Shear: 108 pounds
      c. To Steel Framing Members (20 Gauge through 12 Gauge): Screws 1-1/2 inches (38 mm) minimum length; #8 minimum shank; Type S (fine thread); self-drilling tip; bugle-, wafer-, or hex-head screws or equal or greater size
         1) Minimum Pullout and Shear: 108 pounds
      d. To Concrete: Anchors 1-3/4 inches (44mm) minimum length, 3/16-inch to ¼-inch diameter. Mushroom head or screw-in type anchor in accordance with fastener manufacturer's instructions. Powers Fasteners or approved equal
         1) Minimum Pullout and Shear: 108 pounds
      e. To Concrete Masonry Units: Anchors 2-1/4 inches (57 mm) minimum length, ¼ inch diameter. Designed for use in concrete masonry units in accordance with fastener manufacturer's instructions. Power Fasteners or approved equal
         1) Minimum Pullout and Shear: 108 pounds
   3. Drywall Furring Channel Lap Joint Connection, Steel to Steel: Framing screws, button head, 7/16 inch (11 mm) minimum length, #6 minimum shank, needle point, Phillips drive or greater, or double-wire tie with 18 gauge tie wire.

D. Tie Wire: 18 gauge, annealed, galvanized steel

E. Acoustical Sealant: Sound Sealant a flexible, non-hardening caulk

F. Fire/Smoke Sealant: Flexible, non-hardening. Classified as an acoustical sealant. As specified in Section 07920

G. Putty Pad Sealant: Control noise transmission and fire resistance at electrical boxes and other penetrations

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas to receive materials. Notify Architect if areas are not acceptable. Do not begin installation until unacceptable conditions have been corrected.

3.2 INSTALLATION – GENERAL

A. Install sound isolation clips and drywall furring channels in accordance with manufacturer's instructions

B. Mechanically fasten resilient sound isolation clips to structure with screws, bolts, or expansion anchors, dependent upon structure

C. Fire-Resistive Design Assemblies:
1. Install as specified in UL Fire Resistance Directory, where required
2. Do not arbitrarily add resilient sound isolation clips to fire-rated assemblies

D. Space sound isolation clips at maximum of 24 inches (600 mm) by 48 inches (1,200 mm) or center for walls and ceilings

E. Do not exceed design load (pull and shear) of 36 pounds per isolation clip

F. Stagger isolation clip installation, so dead load is supported by all support members

G. Splicing Drywall Furring Channels:
1. Splice drywall-furring channels with minimum of 6-inch (150-mm) laps
2. Secure laps with 2 framing screws or 18-gauge tie wire double wrapped
3. Locate splices between resilient sound isolation clips
4. Do not locate splices on resilient sound isolation clips

H. Install sound isolation clips on 1 side of wall assembly, unless otherwise indicated on the drawings.

I. Flanking Noise:
1. Review installation details to prevent structure-borne flanking noise
2. Do not allow drywall furring channels or gypsum board to contact foreign materials, including floors, ceilings, or wall framing members

J. Ensure metal ferrule of resilient sound isolation clips is in firm contact with structural member

K. Gypsum Board:
1. Install gypsum board in vertical or horizontal position with 1/8-inch (3-mm) to ¼-inch (6-mm) gap around perimeter for acoustical sealant application
2. Install gypsum board in accordance with ASTM C 840 as specified in Section 09250

L. Acoustical Sealant:

1. Seal potential air leaks with Sound Sealant acoustical caulk to achieve best Field Sound Transmission Class (FSTC)
2. Seal electrical outlets and penetrations with Sound Sealant acoustical caulk
3. Apply fire-rated acoustical sealant at locations where fire-rated assembly is required

M. Putty Pad Sealant: Acoustically seal with putty pads, electrical boxes in walls and ceilings in which resilient sound isolation clips are used

3.3 INSTALLATION – WALLS

A. Install drywall-furring channels perpendicular to framing members

B. Space drywall furring channels maximum of 24 inches (600mm) on center

C. Locate first drywall furring channel parallel to floor and maximum of 3 inches (75 mm) above floor and 1 drywall furring channel maximum of 6 inches (150 mm) from ceiling

3.4 INSTALLATION – CEILINGS

A. Install drywall-furring channels perpendicular, parallel, or angular to framing members

B. Space drywall furring channels:
   1. Maximum of 24 inches (600mm) on center with:
      a. Single layer of 5/8-inch (16-mm) gypsum board
      b. Double layer of 5/8-inch (16-mm) gypsum board, weighing less than 2.25 pounds per square foot per layer
      c. Single layer of ½-inch (12-mm) high-strength gypsum board
      d. Double layer of ½-inch (12-mm) high-strength gypsum board
   2. Maximum of 16 inches (400 mm) on center with:
      a. Double layer of 5/8-inch (16 mm) gypsum board
      b. Single layer of ½-inch (12-mm) regular-strength gypsum board
      c. Double layer of ½-inch (12-mm) regular-strength gypsum board
   3. Reduce spacing of drywall furring channels to prevent potential for sagging of gypsum board or when additional loads are supported by sound isolation clips

C. Locate sound isolation clips maximum of 8 inches (200mm) from ends of drywall furring channels

D. Locate drywall furring channels maximum of 3 inches (75 mm) from parallel wall assemblies

END OF SECTION 13085

DIVISION 14

SECTION 14210 - ELECTRIC TRACTION ELEVATORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes electric traction passenger elevator located at 1st floor entrance and 2nd floor corridor.

1.3 DEFINITIONS

A. Definitions in ASME A17.1 apply to work of this Section.

B. Defective Elevator Work: Operation or control system failure, including excessive malfunctions; performances below specified ratings; excessive wear; unusual deterioration or aging of materials or finishes; unsafe conditions; need for excessive maintenance; abnormal noise or vibration; and similar unusual, unexpected, and unsatisfactory conditions.

1.4 ACTION SUBMITTALS

A. Product Data: Include capacities, sizes, performances, operations, safety features, finishes, and similar information. Include product data for the following:

1. Car enclosures and hoistway entrances.

2. Operation, control, and signal systems.

B. Shop Drawings: Show plans, elevations, sections, and large-scale details indicating service at each landing, machine room layout, coordination with building structure, relationships with other construction, and locations of equipment and signals. Include large-scale layout of car control station and standby power operation control panel. Indicate variations from specified requirements,maximum dynamic and static loads imposed on building structure at points of support, and maximum and average power demands.

1.5 INFORMATIONAL SUBMITTALS

A. Manufacturer Certificates: Signed by elevator manufacturer certifying that hoistway, pit, and machine room layout and dimensions, as shown on Drawings, and electrical service, as shown aAnd specified, are adequate for elevator system being provided.

B. Coordination Drawings: For traction elevators.

1. Indicate modifications to structural and architectural drawings necessitated by use of manufacturer model other than basis of design model specified.

2. Indicate locations of elevator equipment and connections to utilities and building structure.

3. Include plans and elevations; clearance requirements for equipment access and maintenance; details of equipment supports; and utility service characteristics.

4. Show location of elevator pit components, including pit lights, ladders, power locations, sump pumps, sump and grate.

5. Show location of shaft components, including elevator-related miscellaneous steel components, sprinkler heads, smoke and heat detectors, and fastening to other construction.

6. Show location of elevator machine room components, including elevator equipment, smoke and heat detectors, sprinkler heads, lights, power locations, clearances, door and door swing, louvers, and HVAC diffusers.

C. Qualification Data: For Installer.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For elevators to include in emergency, operation, and maintenance manuals.

1. In addition to items specified in Division 01 Section "Operation and Maintenance Data," include diagnostic and repair information available to manufacturer's and Installer's maintenance personnel.

B. Inspection and Acceptance Certificates and Operating Permits: As required by authorities having jurisdiction for normal, unrestricted elevator use.

1.7 QUALITY ASSURANCE

A. Installer Qualifications: Elevator manufacturer or manufacturer's authorized representative who is trained and approved for installation of units required for this Project.

B. Source Limitations: Obtain elevators through one source from a single manufacturer.

1. Provide major elevator components, including pump-and-tank units, plunger-cylinder assemblies, controllers, signal fixtures, door operators, car frames, cabs, and entrances, manufactured by single manufacturer responsible for providing warranty.

C. Regulatory Requirements: Comply with ASME A17.1 and elevator design requirements for earthquake loads in ASCE 7.

D. Accessibility Requirements: Comply with Section 4.10 in the U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA), Accessibility Guidelines for Buildings and Facilities (ADAAG)," and NCSBC.

E. Fire-Rated Hoistway Entrance Assemblies: Door and frame assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated, based on testing at as close to neutral pressure as possible according to UL 10B.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle materials, components and equipment in manufacturer's protective packaging.

B. Store materials, components, and equipment off of ground, under cover, and in a dry location. Handle according to manufacturer's written recommendations to prevent damage, deterioration, or soiling.

C. If the construction site is not prepared to receive the elevator equipment at the agreed ship date, the General Contractor shall be responsible to provide a safe, dry, and easily accessible storage area on or off the premises. Additional labor costs for double handling will be the responsibility of the general contractor.

1.9 COORDINATION

A. Coordinate installation of sleeves, block outs, and items that are embedded in concrete or masonry for elevator equipment. Furnish templates and installation instructions and deliver to Project site in time for installation.

B. Coordinate sequence of elevator installation with other work to avoid delaying the Work.

C. Coordinate locations and dimensions of other work relating to hydraulic elevators including pit ladders, sumps, and floor drains in pits; entrance subsills; and electrical service, electrical outlets, lights, and switches in pits and machine rooms.

1.10 MAINTENANCE SERVICE

A. Initial Maintenance Service: Beginning at Substantial Completion, provide one year's full maintenance service by skilled employees of elevator Installer. Include monthly preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper elevator operation at rated speed and capacity. Provide parts and supplies same as those used in the manufacture and installation of original equipment.

1. Perform maintenance, including emergency callback service, during normal working hours.

1.11 WARRANTY

A. Manufacturer's Special Warranty: Manufacturer agrees to repair, restore, or replace elevator work that fails in materials or workmanship within specified warranty period.

1. Warranty Period: One year from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide KONE MonoSpace 300 gearless traction elevator 3500 lbs./150 fpm speed, stretcher accommodation, elevator, sized as indicated, or a comparable product of one of the following:

1. Otis.

2. Thyssen Krup.

3. Schindler.

B. Project design is based upon basis of design unit. Modifications to design required by use of other than basis of design shall be prepared by Contractor and submitted to Architect for review.

2.02 EQUIPMENT: CONTROL COMPONENTS AND CONTROL SPACE

A. Controller: Provide microcomputer based control system to perform all of the functions.
1. All high voltage (110V or above) contact points inside the controller cabinet shall be protected from accidental contact in a situation where the controller doors are open.
2. Controller shall be separated into two distinct halves; Motor Drive side and Control side. High voltage motor power conductors shall be routed and physically segregated from the rest of the controller.
3. Provide a serial cardrack and main CPU board containing a non-erasable EPROM and operating system firmware.
4. Variable field parameters and adjustments shall be contained in a non-volatile memory module.

B. Drive: Provide Variable Voltage Variable Frequency AC drive system to develop high starting torque with low starting current.

C. Controller Location: Locate controller{s} in remote closet to the entrance frame at the top landing of the elevator.

2.03 EQUIPMENT: HOISTWAY COMPONENTS

A. Machine: AC gearless machine, with permanent magnet synchronous motor, direct current electro-mechanical disc brakes and integral traction drive sheave, mounted to the car guide rail at the top of the hoistway.

B. Governor: Friction type over-speed governor rated for the duty of the elevator specified.

C. Buffers, Car and Counterweight: Polyurethane buffer.

D. Hoistway Operating Devices:
1. Emergency stop switch in the pit
2. Terminal stopping switches.
3. Emergency stop switch on the machine

E. Positioning System: System consisting of magnets and proximity switches.

F. Guide Rails and Attachments: Steel rails with brackets and fasteners.

2.04 EQUIPMENT: HOISTWAY ENTRANCES

A. Hoistway Entrances
1. Sills: extruded.
2. Doors: Hollow metal construction with vertical internal channel reinforcements.
3. Fire Rating: Entrance and doors shall be UL fire-rated for 1-1/2 hour.
4. Entrance Finish: Brushed Stainless Steel.
5. Entrance Markings Jamb Plates: Provide standard entrance jamb tactile markings on both jambs, at all floors. Plate Mounting: Refer to manufacturer drawings.

2.05 EQUIPMENT: CAR COMPONENTS

A. Car Frame: Provide car frame with adequate bracing to support the platform and car enclosure.

B. Platform: Platform shall be all steel construction.

C. Car Guides: Provide guide-shoes mounted to top and bottom of both car and counterweight frame. Each guide-shoe assembly shall be arranged to maintain constant contact on the rail surfaces. Provide retainers in areas with Seismic design requirements.

D. Steel Cab
   1. Car Wall Finish: Brushed stainless steel.
   2. Car Front Finish: Brushed stainless steel.
   3. Car Door Finish: Brushed stainless steel.
   4. Ceiling:
      a. Rectangular, LED Spot Lights (CL94) Brushed Stainless Steel and Brushed Aluminum frame.
   5. Handrail:
      a. Round, Straight ends tube brushed aluminum - 1.5 in.. Rails to be located on Back Wall of car enclosure.

   6. Flooring: By others. (Not to exceed 2sqft & 1/2" finished depth.)
   7. Threshold: Aluminum

E. Emergency Car Signals
   1. Emergency Siren: Siren mounted on top of cab that is activated when the alarm button in the car operating panel is engaged. Siren shall have rated sound pressure level of 80 dB(A) at a distance of three feet from device. Siren shall respond with a delay of not more than one second after activation of alarm button.
   2. Emergency Car Lighting: Provide emergency power unit employing a 12-volt sealed rechargeable battery and totally static circuits shall illuminate the elevator car and provide current to the alarm bell in the event of building power failure.
   3. Emergency Exit Contact: An electrical contact shall be provided on the car-top exit.

F. Ventilation: No fan.

2.06 EQUIPMENT: SIGNAL DEVICES AND FIXTURES

A. Car Operating Panel: Provide car operating panel with all push buttons, key switches, and message indicators for elevator operation.
   1. Full height car operating panel shall contain a bank of round, mechanical, illuminated buttons marked to correspond to landings served, emergency call button, door open button, door close button, and key switches for lights, inspection, and exhaust fan. Buttons have amber illumination (halo). All buttons to have raised text and Braille marking on left hand side. The car operating display panel shall be amber 7 Segment. All texts, when illuminated, shall be amber. The full height car operating panel shall have a polycarbonate face plate that is shatterproof and impact resistant in a color and pattern per manufacturers standard selection.
   2. Additional features of car operating panel shall include:
      a. Car Position Indicator within operating panel (amber).
      b. Elevator Data Plate marked with elevator capacity and car number on car top.
      c. Help buttons with raised markings.
      d. In car stop switch per local code.
      e. Firefighter's hat.

f. Firefighter's Phase II Key-switch.
g. Call Cancel Button.
h. Pre-programmed integrated ADA phone (complete description of krms features included as standard)
i. Help Button/Communicator. Activation of help button will initiate two-way communication between car and a location inside the building, switching over to alternate location if call is unanswered, where personnel are available to take the appropriate action. Visual indicators are provided for call initiation and call acknowledgement.
j. Firefighter's Phase II emergency in-car operating instructions.

B. Hall Fixtures: Wall mounted hall fixtures shall be provided with necessary push buttons and key switches for elevator operation. Wall mounted hall fixtures shall have a polycarbonate face plate that is shatterproof and impact resistant in a color per manufacturers standard selection.
1. Hall fixtures shall feature round, mechanical, illuminated buttons in raised fixture housings. Hall fixtures shall correspond to options available from that landing. Buttons shall be flat flush in vertically mounted fixture. Hall fixtures should not be jamb-mounted. Hall lanterns shall feature amber illumination.

C. Car Lantern and Chime: A directional lantern visible from the corridor shall be provided in the car entrance. When the car stops and the doors are opening, the lantern shall indicate the direction in which the car is to travel and a chime will sound. The chime will sound once for up and twice for down.

2.07 EQUIPMENT: ELEVATOR OPERATION AND CONTROLLER

A. Elevator Operation
1. Simplex Collective Operation: Using a microprocessor-based controller, operation shall be automatic by means of the car and hall buttons. If all calls in the system have been answered, the car shall park at the last landing served.
2. Zoned Car Parking.
3. Relative System Response Dispatching.

B. Standard Operating Features to include:
1. Full Collective Operation
2. Fan and Light Control.
3. Load Weighing Bypass.
4. Ascending Car Uncontrolled Movement Protection
5. Top of Car Inspection Station.

C. Additional Operating Features to include:

D. Elevator Control System for Inspections and Emergency
1. Provide devices within controller to run the elevator in inspection operation.
2. Provide devices on car top to run the elevator in inspection operation.
3. Provide within controller an emergency stop switch to disconnect power from the brake and prevents motor from running.
4. Provide the means from the controller to mechanically lift and control the elevator brake to safely bring car to nearest available landing when power is interrupted.
5. Provide the means from the controller to reset the governor over speed switch and also trip the governor.
6. Provide the means from the controller to reset the emergency brake when set because of an unintended car movement or ascending car over speed.
7. Provide the means for the control to reset elevator earthquake operation.

2.08 EQUIPMENT: DOOR OPERATOR AND CONTROL

A. Door Operator: A closed loop permanent magnet VVVF high-performance door operator shall be provided to open and close the car and hoistway doors simultaneously. Door movement shall be cushioned at both limits of travel. Electro-mechanical interlock shall be provided at each hoistway entrance to prevent operation of the elevator unless all doors are closed and locked. An electric contact shall be provided on the car at each car entrance to prevent the operation of the elevator unless the car door is closed.

B. The door operator shall be arranged so that, in case of interruption or failure of electric power, the doors can be readily opened by hand from within the car, in accordance with applicable code. Emergency devices and keys for opening doors from the landing shall be provided as required by local code.

C. Doors shall open automatically when the car has arrived at or is leveling at the respective landings. Doors shall close after a predetermined time interval or immediately upon pressing of a car button. A door open button shall be provided in the car. Momentary pressing of this button shall reopen the doors and reset the time interval.

D. Door hangers and tracks shall be provided for each car and hoistway door. Tracks shall be contoured to match the hanger sheaves. The hangers shall be designed for power operation with provisions for vertical and lateral adjustment. Hanger sheaves shall have polyurethane tires and pre-lubricated sealed-for-life bearings.

E. Electronic Door Safety Device. The elevator car shall be equipped with an electronic protective device extending the full height of the car. When activated, this sensor shall prevent the doors from closing or cause them to stop and reopen if they are in the process of closing. The doors shall remain open as long as the flow of traffic continues and shall close shortly after the last person passes through the door opening.

PART 3 EXECUTION

3.01 EXAMINATION

A. Field measure and examine substrates, supports, and other conditions under which elevator work is to be performed.

B. Do not proceed with work until unsatisfactory conditions are corrected.

C. Prior to start of Work, verify hoistway is in accordance with shop drawings. Dimensional tolerance of hoistway from shop drawings: -0 inches +2 inches. Do not begin work of this section until dimensions are within tolerances.

D. Prior to start of Work, verify projections greater then 2 inches (4 inches if ASME A17.1/CSA B44 2000 applies) must be beveled not less then 75 degrees from horizontal.

E. Prior to start of Work, verify landings have been prepared for entrance sill installation. Traditional sill angle or concrete sill support shall not be required.

F. Prior to start of Work, verify elevator pit has been constructed in accordance with requirements, is dry and reinforced to sustain vertical forces, as indicated in approved submittal. Verify that sumps or sump pumps located within pit will not interfere with installed elevator equipment.

G. Prior to start of Work, verify control space has been constructed in accordance with requirements, with access coordinated with elevator shop drawings, including Sleeves and penetrations.

H. Verify installation of GFCI protected 20-amp in pit and adjacent to each signal control cabinet in control space.

3.02 PREPARATION

A. Coordinate installation of anchors, bearing plates, brackets and other related accessories.

3.03 INSTALLATION

A. Install equipment, guides, controls, car and accessories in accordance with manufacturer installation methods and recommended practices.

B. Properly locate guide rails and related supports at locations in accordance with manufacturer's recommendations and approved shop drawings. Anchor to building structure using isolation system to minimize transmission of vibration to structure.

C. All hoistway frames shall be securely fastened to fixing angles mounted in the hoistway. Coordinate installation of sills and frames with other trades.

D. Lubricate operating system components in accordance with manufacturer recommendations.

E. Perform final adjustments, and necessary service prior to substantial completion.

3.04 CONSTRUCTION

A. Interface with Other Work:
   1. Guide rail brackets attached to steel shall be installed prior to application of fireproofing.
   2. Coordinate construction of entrance walls with installation of door frames and sills. Maintain front wall opening until elevator equipment has been installed.
      a. Ensure adequate support for entrance attachment points at all landings.
      b. Coordinate wall openings for hall push buttons, signal fixtures and sleeves. Each elevator requires sleeves within the hoistway wall.
      c. Coordinate emergency power transfer switch and power change pending signals as required for termination at the primary elevator signal control cabinet in each group.
      d. Coordinate interface of elevators and fire alarm system.
      e. Coordinate interface of dedicated telephone line.

3.05 TESTING AND INSPECTIONS

A. Perform recommended and required testing in accordance with authority having jurisdiction.

B. Obtain required permits and provide originals to Owner's Representative.

3.06 DEMONSTRATION

A. Prior to substantial completion, instruct Owner's Representative on the proper function and required daily maintenance of elevators. Instruct personnel on emergency procedures.

END OF SECTION

DIVISION 15

SECTION 15000 - GENERAL MECHANICAL REQUIREMENTS

PART 1 - GENERAL

1.1 SCOPE

A. This section as well as the Drawing and General Provisions of the Contract, including General and Supplementary Conditions and Division 1 – General Sections included in Division 15 Specifications are for mechanical and related work particular to Young Women's Christian Association (YWCA) Facility at 601-605 South Jefferson Davis Parkway New Orleans, Louisiana. Coordinate with plans and other specifications sections.

1.2 RELATED DOCUMENTS

A. SECTION 15000 - MECHANICAL GENERAL REQUIREMENTS
SECTION 15050 – MECHANICAL BASIC MATERIALS AND METHODS
SECTION 15055 – MOTORS
SECTION 15057 – ENCLOSED CONTROLLERS
SECTION 15060 - HANGERS AND SUPPORTS FOR MECHANICAL EQUIPMENT AND PIPING
SECTION 15071 - MECHANICAL VIBRATIONS AND SEISMIC CONTROLS
SECTION 15075 – MECHANICAL IDENTIFICATION
SECTION 15083 – MECHANICAL PIPE INSULATION
SECTION 15091 – SLEEVES AND SLEEVE SEALS FOR HVAC PIPING
SECTION 15122 – METERS AND GAUGES FOR HVAC PIPING
SECTION 15183 - REFRIGERANT PIPING
SECTION 15732 – ROOFTOP AIR CONDITIONERS
SECTION 15738 - SPLIT SYSTEM AIR CONDITIONING UNITS
SECTION 15740 – 100% OUTSIDE AIR PACKAGED ROOFTOP UNITS
SECTION 15800 – HVAC FUNCTIONAL CHECK OUT
SECTION 15815 - METAL DUCT
SECTION 15829 - DUCT ACCESSORIES
SECTION 15830- DUCT INSULATION
SECTION 15855 - DIFFUSERS, REGISTERS AND GRILLES
SECTION 15870 – COMMERCIAL KITCHEN HOODS
SECTION 15923 – DIRECT DIGITAL CONTROLS
SECTION 15990 – TESTING, ADJUSTING AND BALANCING

1.3 WORK INCLUDED

A. The work covered by this Division of the Specifications consists of furnishing all plant, labor, equipment, supervision, appliances, and materials, and in performing all operations in connection with the plumbing, fire protection, air conditioning, heating and ventilating systems complete and in strict accordance with this Division of the Specifications and the applicable drawings.

1.4 COORDINATION OF WORK

A. General: Refer to the Division 1 sections for general coordination requirements applicable to the entire work. It is recognized that the contract documents are diagrammatic in showing certain physical relationships which must be established within the mechanical work, and in its interface with other work, including electrical work, and that such establishment is the exclusive responsibility of the Contractor.

B. Advise other trades of openings required in their work for the subsequent move-in of large equipment.

C. Submit coordination drawings prior to purchase-fabrication-installation of any of the elements involved in the coordination.

D. Verify final locations for rough-ins with field measurements and with the requirements of the actual equipment to be connected.

E. Verify all dimensions by field measurements.

F. Arrange for chases, slots, and openings in other building components to allow for installation.

G. Coordinate the installation of required supporting devices and sleeves to be set in poured-in-place concrete and other structural components, as they are constructed.

H. Sequence, coordinate, and integrate installations of materials and equipment for efficient flow of the work. Give particular attention to large equipment requiring positioning prior to closing-in the installation areas.

I. Coordinate the cutting and patching of building components to accommodate the installation of equipment and materials. Comply with Division I.

J. Install equipment to facilitate maintenance and repair or replacement of equipment components. As much as practical, connect equipment for ease of disconnecting, with minimum of interference with other installations.

K. Coordinate the installation of materials and equipment above ceilings with suspension system, mechanical equipment and systems, and structural components.

L. Contractor shall visit the site before bidding to familiarize himself with conditions under which he will have to perform his Contract.

1.5 EXISTING CONDITIONS

A. The utilities and information shown on the drawings are based on information provided to the designers by the architect or utility company. Contractor shall field verify existing conditions and notify architect in writing of any discrepancies prior to commencing with new work.

B. All existing piping and materials not to be reused and becoming surplus or abandoned shall be removed from the premises and shall be property of the Contractor, unless otherwise noted

1.6 INTERRUPTION OF SERVICES

A. All work shall be accomplished at a time most convenient to the owner and so that the interruption of service (water, gas, heating, and air conditioning) shall be minimum and only for changeover.

B. No service shall be interrupted or changeover begun until the time and duration of service interruption have been agreed to, in writing, signed by the Owner's Representative, the Architect, and the Contractor.

C. Temporary connections, or temporary rerouting to serve existing facilities will be required as the work progresses. Make due allowances in bid.

D. The contractor is responsible for re-connecting all existing mechanical and plumbing systems or items to remain such that they are in the same operable condition as prior to construction. It is the contractor's sole responsibility to trace the existing systems prior to demolition to ensure that all existing systems to remain will remain operable. At no additional cost to the owner, the contractor shall extend existing or new systems to serve those components should any portion of those systems be removed.

1.7 CODES AND STANDARDS

A. Workmanship, material and equipment shall be in accordance with Specifications and Drawings, and in some instances the requirements exceed those required by codes and standards. Where not exceeded, the codes and standards shall be considered as absolute minimum requirements.

1.8 ELECTRICAL WORK

A. Refer to Division 16 for all electrical work as it pertains to work specified in this section.

1.9 WORKMANSHIP

A. Install all materials and components of the work in accordance with instructions of manufacturer following the best modern construction practices and conforming with the Contract Documents. Workmanship shall be first class, in both function and appearance, whether finally concealed or exposed and shall be performed by experienced workmen skilled in the type of work. As practicable, the lines of all exposed components of the system shall be perpendicular or parallel to the lines of the building.

1.10 DRAWINGS

A. Contract Drawings and details are shown to limit and explain structural conditions, requirements, and manner of erecting work. Drawings are intended to convey the scope of work and indicate general arrangements of equipment, ducts and piping and approximate sizes and locations of equipment and outlets. Trades shall follow these drawings in laying out their work, check general construction drawings to familiarize themselves with all conditions affecting their work, and shall verify spaces in which their work will be installed.

B. It may be necessary to shift pipes and/or ducts and this is permissible, and may be required under the general contract, but all such changes must be referred to the Architect for approval. Where rearrangement of piping or equipment is required, contractor shall prepare and submit approval drawings of the proposed arrangement.

C. Where the Contractor is not certain about the method of installation, he shall ask for details. Lack of details, not requested, will not be an excuse for improper installation, and any such work must be corrected.

1.11 SHOP DRAWINGS AND DATA TO BE SUBMITTED

A. Submit adequate engineering data on each piece of equipment to allow a careful check of compliance with the technical requirements of the Contract documents. Clearly indicate on submitted data the manufacturer's name, piece number, equipment capacity, and other applicable technical data. Refer to individual sections for specific requirements.

B. Corrections or comments made on shop drawings during the review do not relieve the Contractor from compliance with requirements of the Contract Documents, Plans and Specifications. Shop Drawings will be checked for general conformance with the design concept of the project and general compliance with information given in the contract documents. Review of Shop Drawings shall not relieve the Contractor from responsibility for confirming and correlating all quantities and dimensions, coordinating work with that of all other trades, and performing work in a safe and satisfactory manner. Review of shop drawings shall not permit any deviation from Plans and Specifications. Shop Drawings must be accompanied by signed statement from contractor, stating that he has reviewed the submittal and checked it for compliance.

C. Shop Drawings: Submit 1/4 inch minimum scale coordinated shop drawings relating to the duct systems, showing clearances and relationship to structural members, piping, lights and ceilings. Shop drawings for all ductwork must be submitted and reviewed before any ductwork is constructed or installed.

D. Submit a 1/4" scale layout of each mechanical room showing the location, arrangement, etc. of all such equipment to be installed in this room.

E. Contractor shall provide products as specified if submittals for review of materials are not received within thirty (30) days after award of the Contract.

F. Any item not specified herein but submitted as a substitute for the specified item shall be accompanied by manufacturer’s documentation starting/illustrating the following

applicable information in addition to the specific information requested in other sections.

1. Dimensions/weight.
2. Electrical ratings-voltage, amperage, short circuit capability, etc.
3. Construction - gauge of steel/aluminum, paint finish/application method, color, NEMA type, etc.
4. Warranty.

1.12 INSTRUCTIONS

A. Contractor shall provide formal training sessions for all mechanical systems. Training shall be provided by competent instructors who will give full instruction to designated personnel in the adjustment, operation, and maintenance, including pertinent safety requirements of the equipment or system specified. Instruction shall be given during the first regular work week after the equipment or system has been accepted and turned over to the Owner for regular operation. The length of training session(s) shall be as long as required to review the mechanical systems to the owner's satisfaction with the exception of systems with specified training requirements. There is no limit to the number of attendees on behalf of the owner.

B. Training sessions shall be coordinated to provide the owner with sequential training of all mechanical systems and equipment. Impromptu training without proper documentation is not acceptable as formal training.

C. The contractor is solely responsible for initiating, coordinating, and documenting owner training sessions. The contractor shall:
   1. Schedule the training session with the owner's representative in writing, allowing sufficient time for the owner to notify the necessary attendees.
   2. Provide a written agenda outlining the systems to be addressed in a given session.
   3. Provide a sign in sheet and minutes of the training session.
   4. Distribute the above documentation to the owner and architect as proof of completing formal training.

1.13 OPERATING AND MAINTENANCE MANUALS

A. Bind in loose-leaf binders with the words, "Operating and Maintenance Manual" and the project identification imprinted on the cover. Prepare three complete sets of records for the Owner, with table of contents, index, and tabbed section dividers.

B. During the construction period, accumulate the following for inclusion in the Operating and Maintenance Manuals:

C. Copies of warranties and guarantees on each piece of equipment installed.
   1. Wiring and control diagrams.
   2. Shop Drawings.
   3. Operating instructions for:
      a. HVAC Systems
      b. Recommended maintenance procedures.

D. Submit the manuals for approval at approximately 75 percent job completion. Each manual shall consist of:
   1. Complete description of each item of equipment and apparatus furnished and installed - including ratings, capacities, and characteristics.
   2. Fully detailed parts list, including all numbered parts of each item of equipment and apparatus furnished and installed.
   3. Manufacturer's printed instructions describing operation, servicing, maintenance and repair of each item of equipment and apparatus.
   4. Provide serial and model numbers for all equipment.

1.14 DELIVERY, STORAGE AND HANDLING

A. Deliver products to project properly identified with names, model numbers, types, grades, compliance labels, and similar information needed for distinct identifications, adequately packaged and protected to prevent damage during shipment, storage, and handling.

B. Store equipment and materials at the site, unless off-site storage is authorized in writing. Protect stored equipment and materials from damage.

C. Coordinate deliveries of materials and equipment to minimize construction site congestion.

1.15 GUARANTEES

A. Contractor shall guarantee all materials, workmanship, and equipment furnished under Division 15 for a period of one (1) year after the date of final acceptance or beneficial use by the Owner, whichever date is the earliest.

PART 2 - PRODUCTS

2.1 AVAILABLE MANUFACTURERS

A. Manufacturer's names and catalog numbers are scheduled or specified for the purpose of establishing standard of design, quality, appearance, performance and serviceability, and not to limit competition. Scheduled products (as may be modified by detailed Specifications) are those selected as the basis for system design with respect to physical size and space arrangements, required capacity and performance characteristics, and the product quality intended.

B. The Drawings indicate specified products physically arranged in the spaces, as catalogued by Specific manufacturers, generally as listed in the equipment schedules.

C. Listed "Acceptable Manufacturers" are those considered capable of manufacturing products conforming to detailed Specifications, and as such, are invited to compete on an equal basis provided the offering is comparable in every respect to scheduled or specified products and actually conforms to the detailed Specifications and schedule

requirements. Listing herein as "acceptable manufacturers" does not imply "accepted," "approved," "prior approval," or any other such connotation.

2.2 DUCT MOUNTED SMOKE DETECTORS

A. Duct detectors shall be provided and installed as required by NFPA 90A and Standard Mechanical Code and in other locations indicated on the plans.

B. Smoke detectors shall be the ionization type provided, installed and commissioned by Division 15 unless specified under Division 15 “Fire Alarm”, in which case the duct detector shall be provided by Division 16 and mounted by Division 15.

C. General: Include the following features:
   1. Operating Voltage: 24-V dc, nominal. Provide transformer if required.
   2. Self-Restoring: Detectors do not require resetting or readjustment after actuation to restore them to normal operation.
   3. Plug-in Arrangement: Detector and associated electronic components are mounted in a module that connects in a tamper-resistant manner to a fixed base with a twist-locking plug connection. Terminals in the fixed base accept building wiring.
   4. Integral Visual-Indicating Light: LED type. Indicates detector has operated.
   5. Sensitivity: Can be tested and adjusted in-place after installation. Relay Fan Shutdown: Rated to interrupt fan motor-control circuit.

2.3 FLAME-SPREAD AND SMOKE DEVELOPED PROPERTIES OF MATERIALS

A. Materials and adhesives used throughout the mechanical and electrical systems for insulation, acoustical lining, filters, ducts, flexible connections, and jackets or coverings regardless of kind, or for piping or conduit system components, shall have a flame-spread rating not over 25 without evidence of continued combustion and with a smoke developed rating not higher than 50. If such materials are to be applied with adhesives, they shall be tested as applied with such adhesives, or the adhesives used shall have a flame-spread rating not over 25 and a smoke developed rating not higher than 50.

B. "Flame-Spread Rating" and "Smoke Developed Rating" shall be as determined by the "Method of Test of Surface Burning Characteristics of Building Materials, NFPA No. 225, ASTM E84, Underwriter's Laboratories, Inc., Standard." Such materials are listed in the Underwriter's Laboratories, Inc. "Building Materials List" under the heading "Hazard Classification (Fire)."

2.4 AUXILIARY STRUCTURAL SUPPORTS

A. Provide auxiliary structural supports as necessary to support mechanical systems from the building structure. Supporting members shall be metal strut framing or standard structural shapes, designed to support imposed loads with a working stress no greater than 25 percent of ultimate stress values of the members, and articulation with the

building structure without exceeding structural limitations at the point of attachment to the building structure.

2.5 SPECIAL TOOLS

A. Furnish a set of special tools and devices required for the proper maintenance of the major pieces of equipment and install on adequate tool board. This shall include only tools which cannot normally be purchased "over-the-counter" at hardware stores.

2.6 EQUIPMENT GUARDS

A. Provide equipment with exposed moving parts with belt guards, coupling guards, fan guards or other enclosures as necessary for personnel safety.

2.7 ACCESS DOORS

A. Furnish, for installation under appropriate section of the work, access doors at each point required to provide access to concealed valves, dampers, damper operators, and other devices requiring operation, adjustment, or maintenance.

B. Shall be 16 gauge steel, with mounting straps, concealed hangers, and screwdriver locks, designed for the doors to open 180 degrees, minimum.

C. Access doors installed in fire walls or partitions shall be U.L. labeled to maintain the fire rating of the wall or partition.

D. Provide prime coat finish for installation in ceilings or painted or unfinished surfaces.

E. Provide polished chrome plate finish for installation in unpainted finished walls.

F. Milcor Style M for masonry and surfaces not specified otherwise.

G. Milcor Style K for plastered surfaces.

H. Milcor Style DW for drywall surfaces.

I. Milcor Style AT-FRSC "Special" for drywall ceilings. (Designated "fire resistive suspended ceiling door" by manufacturer).

J. Milcor Style AT for acoustical tile ceilings.

K. Milcor Style AP for acoustical plaster ceilings.

L. Acceptable Manufacturers: Baldwin, Hannon, Josam, Miami, Carey, Milcor, Titus, Wade, Walsh, Zurn.

PART 3 - EXECUTION

3.1 HAZARDOUS LOCATIONS

A. Air-Moving equipment installed within, or handling air from hazardous locations shall be provided with non-ferrous fan wheels, non-sparking inlet rings, and with explosion proof motors and electrical devices.

B. "Hazardous Locations" shall be as defined in the National Electrical Code.

3.2 PROTECTION OF EQUIPMENT AND MATERIALS

A. Protect equipment and materials from physical damage, water damage and deterioration after it is delivered to the project, and during the installation.

B. The equipment shall be kept clean. Motors and electrical devices shall be covered with suitable materials to prevent dirt or dust accumulation within equipment. Machinery and devices shall be properly oiled and maintained to prevent rusting and deterioration.

C. Repair scratches, mars, or paint deterioration.

3.3 MATERIAL DAMAGE

A. The contractor shall immediately report in writing to the owner and design professional any incident involving equipment or material damage including rain water damage, pipe leaks, physical damage, etc.

B. At a minimum the report shall include the areas and extent of damage and proposed resolution.

C. Water damaged materials shall be replaced with new materials without exception.

3.4 EXCAVATION AND BACKFILL

A. Perform excavation and backfill required for the installation of underground pipe, ducts, equipment, and devices in accordance with other divisions of this Specification relating to such work. Carefully check for existing underground services before using power equipment for excavation.

B. Trenches shall be wide enough for proper installation of the pipe. Grade the ditch bottom for proper slope and provide bell holes to allow the full bearing of the pipe barrel. Comply with all health and safety regulations relating to ditching.

C. De-water to extent necessary to keep trenches dry and to provide proper compaction under all pipes. Continue de-watering operation until system has been tested, approved, backfilled and compacted.

D. Excavate 6" below the pipe and fill with sand to pipe grade.

E. No excavation shall be under or near footings without approval of the Architect.

F. Backfill trenches with clean dirt or sand. Take care not to disturb the pipe grade or alignment. Compact around and under the pipe carefully. The fill shall be compacted in 6" layers with a power tamper to achieve 95% compaction. Clean up around the ditch area to remove trash and any excess dirt.

3.5 EQUIPMENT AND PIPE SPACE

A. The Drawings indicate specified products physically arranged in the spaces, as catalogued by specific manufacturers, generally as listed in the equipment schedules.

B. Drawings show pipe and ductwork diagrammatically.

C. Adhere to Drawings as closely as possible in layout of work.

D. Vary run of piping, run and shape of ductwork and make offsets during progress of work as required to meet structural and other interferences per reviewed shop drawings.

E. Install piping and ductwork in furred spaces wherever possible. Run exposed piping and ductwork parallel to or at right angles to building walls.

F. Keep horizontal lines as high as practicable.

G. Conform to ceiling heights established on the Drawings with adequate clearance for light fixtures.

3.6 PAINTING AND FINISHING AND CLEANING

A. Finish painting (other than factory applied) of mechanical and electrical equipment, and its associated piping, ductwork, and devices is specified in other sections. Provide touch-up painting of pre-finished mechanical products.

B. Surfaces shall be left clean, debris shall be removed, and equipment shall be furnished in prime coat finish unless otherwise specified.

C. Piping, ductwork and equipment: Clean exterior of piping, ductwork and equipment, removing rust, plaster and dirt by wire brushing. Remove grease, oil, and similar materials by wiping with clean rags and suitable solvents.

D. Supports and anchors: Exterior supports and anchors shall be hot dipped galvanized steel with cold galvanized welds.

E. Motors, pumps and other items with factory finish. Remove grease and oil and leave surfaces clean and polished.

F. Plumbing Fixtures: Clean and polish fixtures immediately prior to final inspection.

G. Cleaning operations are supplemented by detailed instructions for specific systems.

END OF SECTION 15000

SECTION 15001 – PLUMBING GENERAL REQUIREMENTS

PART 1 - GENERAL

1.1 SCOPE

A. This section, as well as the Drawings and General Provisions of the Contract, including General and Supplementary Conditions and Division 1 - General Sections included in Division 15 Specifications are for mechanical and related work particular to Young Women's Christian Association (YWCA) Facility at 601-605 South Jefferson Davis Parkway New Orleans, Louisiana. Coordinate with plans and other specifications sections.

1.2 RELATED DOCUMENTS

SECTION 15001 - PLUMBING GENERAL REQUIREMENTS
SECTION 15051 – PLUMBING BASIC MATERIALS AND METHODS
SECTION 15061 - HANGERS AND SUPPORTS FOR PLUMBING PIPING AND EQUIPMENT
SECTION 15072 - VIBRATION AND SEISMIC CONTROLS FOR PLUMBING PIPING AND EQUIPMENT
SECTION 15076 - IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT
SECTION 15084 - PLUMBING PIPING INSULATION
SECTION 15092 - SLEEVES AND SLEEVE SEALS FOR PLUMBING PIPING
SECTION 15110 - VALVES FOR PLUMBING PIPING
SECTION 15123 - METERS AND GAUGES FOR PLUMBING PIPING
SECTION 15140 - DOMESTIC WATER PIPING
SECTION 15150 - SANITARY WASTE AND VENT PIPING
SECTION 15160 - STORM DRAINAGE PIPING
SECTION 15194 – FUEL GAS PIPING
SECTION 15410 - PLUMBING FIXTURES
SECTION 15430 - PLUMBING SPECIALTIES
SECTION 15485 – ELECTRIC DOMESTIC WATER HEATERS
SECTION 15486 - GAS-FIRED DOMESTIC WATER HEATERS
SECTION 15489 - SUMP PUMPS

1.3 WORK INCLUDED

A. The work covered by this Division of the Specifications consists of furnishing all plant, labor, equipment, supervision, appliances, and materials, and in performing all operations in connection with the plumbing and fire protection systems complete and in strict accordance with this Division of the Specifications and the applicable drawings.

1.4 COORDINATION OF WORK

A. General: Refer to the Division 1 sections for general coordination requirements applicable to the entire work. It is recognized that the contract documents are diagrammatic in showing certain physical relationships which must be established within the mechanical work, and in its interface with other work, including electrical work, and that such establishment is the exclusive responsibility of the Contractor.

B. Advise other trades of openings required in their work for the subsequent move-in of large equipment.

C. Submit coordination drawings prior to purchase-fabrication-installation of any of the elements involved in the coordination.

D. Verify final locations for rough-ins with field measurements and with the requirements of the actual equipment to be connected.

E. Verify all dimensions by field measurements.

F. Arrange for chases, slots, and openings in other building components to allow for installation.

G. Coordinate the installation of required supporting devices and sleeves to be set in poured-in-place concrete and other structural components, as they are constructed.

H. Sequence, coordinate, and integrate installations of materials and equipment for efficient flow of the work. Give particular attention to large equipment requiring positioning prior to closing-in the installation areas.

I. Coordinate the cutting and patching of building components to accommodate the installation of equipment and materials. Comply with Division 1.

J. Install equipment to facilitate maintenance and repair or replacement of equipment components. As much as practical, connect equipment for ease of disconnecting, with minimum of interference with other installations.

K. Coordinate the installation of materials and equipment above ceilings with suspension system, mechanical equipment and systems, and structural components.

L. Contractor shall visit the site before bidding to familiarize himself with conditions under which he will have to perform his Contract.

1.5 CODES AND STANDARDS

A. Workmanship, material and equipment shall be in accordance with Specifications and Drawings, and in some instances the requirements exceed those required by codes and standards. Where not exceeded, the codes and standards shall be considered as absolute minimum requirements.

1.6 ELECTRICAL WORK

A. Refer to Division 16 for all electrical work as it pertains to work specified in this section.

1.7 WORKMANSHIP

A. Install all materials and components of the work in accordance with instructions of manufacturer, following the best modern construction practices and conforming with the Contract Documents. Workmanship shall be first class, in both function and appearance, whether finally concealed or exposed and shall be performed by experienced workmen skilled in the type of work. As practicable, the lines of all exposed components of the system shall be perpendicular or parallel to the lines of the building.

1.8 DRAWINGS

A. Contract Drawings and details are shown to limit and explain structural conditions, requirements, and manner of erecting work. Drawings are intended to convey the scope of work and indicate general arrangements of equipment and piping and approximate sizes and locations of equipment and outlets. Trades shall follow these drawings in laying out their work, check general construction drawings to familiarize themselves with all conditions affecting their work, and shall verify spaces in which their work will be installed.

B. It may be necessary to shift pipes or equipment and this is permissible, and may be required under the general contract, but all such changes must be referred to the Architect for approval. Where rearrangement of piping or equipment is required, Contractor shall prepare and submit approval drawings of the proposed arrangement. Revised routing and required offsets shall be provided at no additional expense to the owner.

C. Where the Contractor is not certain about the method of installation, he shall ask for details. Lack of details, not requested, will not be an excuse for improper installation, and any such work must be corrected.

1.9 SHOP DRAWINGS AND DATA TO BE SUBMITTED

A. Submit adequate engineering data on each piece of equipment to allow a careful check of compliance with the technical requirements of the Contract documents. Clearly indicate on submitted data the manufacturer's name, piece number, equipment capacity, and other applicable technical data. Refer to individual sections for specific requirements.

B. Corrections or comments made on shop drawings during the review do not relieve the Contractor from compliance with requirements of the Contract Documents, Plans and Specifications. Shop Drawings will be checked for general conformance with the design concept of the project and general compliance with information given in the contract documents. Review of Shop Drawings shall not relieve the Contractor from responsibility for confirming and correlating all

quantities and dimensions, coordinating work with that of all other trades, and performing work in a safe and satisfactory manner. Review of shop drawings shall not permit any deviation from Plans and Specifications. Shop Drawings must be accompanied by signed statement from contractor, stating that he has reviewed the submittal and checked it for compliance.

C. Any item not specified herein but submitted as a substitute for the specified item shall be accompanied by manufacturer's documentation starting/illustrating the following applicable information in addition to the specific information requested in other sections.

1. Dimensions/weight.
2. Electrical ratings-voltage, amperage, short circuit capability, etc.
3. Construction - gauge of steel/aluminum, paint finish/application method, color, NEMA type, etc.
4. Warranty.

D. Submit manufacturer's documentation on the following:

1. Valves
2. Pipe Insulation.
3. Hangers and Supports.
4. Plumbing Fixtures.
5. Plumbing Specialties.
6. Water Heaters

1.10 INSTRUCTIONS

A. Contractor shall provide formal training sessions for all mechanical systems. Training shall be provided by competent instructors who will give full instruction to designated personnel in the adjustment, operation, and maintenance, including pertinent safety requirements of the equipment or system specified. Instruction shall be given during the first regular work week after the equipment or system has been accepted and turned over to the Owner for regular operation. The length of training session(s) shall be as long as required to review the mechanical systems to the Owner's satisfaction with the exception of systems with specified training requirements. There is no limit to the number of attendees on behalf of the owner.

B. Training sessions shall be coordinated to provide the owner with sequential training of all mechanical systems and equipment. Impromptu training without proper documentation is not acceptable as formal training.

C. The contractor is solely responsible for initiating, coordinating, and documenting owner training sessions. The contractor shall:
1. Schedule the training session with the owner's representative in writing, allowing sufficient time for the owner to notify the necessary attendees.
2. Provide a written agenda outlining the systems to be addressed in a given session.
3. Provide a sign in sheet and minutes of the training session.
4. Distribute the above documentation to the owner and architect as proof of completing formal training.

1.11 OPERATING AND MAINTENANCE MANUALS

A. Bind in loose-leaf binders with the words, "Operating and Maintenance Manual" and the project identification imprinted on the cover. Prepare three complete sets of records for the Owner, with table of contents, index, and tabbed section dividers.

B. During the construction period, accumulate the following for inclusion in the Operating and Maintenance Manuals:

C. Copies of warranties and guarantees on each piece of equipment installed.

1. Plumbing.
2. Wiring and control diagrams.
3. Shop Drawings.
4. Operating instructions for:
   a.Fire Protection Systems.
   b.Plumbing Systems.

5. Recommended maintenance procedures.

D. Submit the manuals for approval at approximately 75 percent job completion. Each manual shall consist of:

1. Complete description of each item of equipment and apparatus furnished and installed - including ratings, capacities, and characteristics.
2. Fully detailed parts list, including all numbered parts of each item of equipment and apparatus furnished and installed.
3. Manufacturer's printed instructions describing operation, servicing, maintenance and repair of each item of equipment and apparatus.

1.12 COMMISSIONING

A. The contractor shall provide commissioning support as outlined in SECTION 018000 “Commissioning Process” and referenced sections therein.

1.13 DELIVERY, STORAGE AND HANDLING

A. Deliver products to project properly identified with names, model numbers, types, grades, compliance labels, and similar information needed for distinct identifications, adequately packaged and protected to prevent damage during shipment, storage, and handling.

B. Store equipment and materials at the site, unless off-site storage is authorized in writing. Protect stored equipment and materials from damage.

C. Coordinate deliveries of materials and equipment to minimize construction site congestion.

1.14 GUARANTEES

A. Contractor shall guarantee all materials, workmanship, and equipment furnished under Division 22 for a period of five (5) year after the date of final acceptance or beneficial use by the Owner, whichever date is the earliest. This warranty shall supersede other warranties defined elsewhere in the project manual and shall remain in effect.

PART 2 - PRODUCTS

2.1 AVAILABLE MANUFACTURERS

A. Manufacturer's names and catalog numbers are scheduled or specified for the purpose of establishing standard of design, quality, appearance, performance and serviceability, and not to limit competition. Scheduled products (as may be modified by detailed Specifications) are those selected as the basis for system design with respect to physical size and space arrangements, required capacity and performance characteristics, and the product quality intended.

B. The Drawings indicate specified products physically arranged in the spaces, as catalogued by Specific manufacturers, generally as listed in the equipment schedules.

C. Listed "Acceptable Manufacturers" are those considered capable of manufacturing products conforming to detailed Specifications, and as such, are invited to compete on an equal basis provided the offering is comparable in every respect to scheduled or specified products and actually conforms to the detailed Specifications and schedule requirements. Listing herein as "acceptable manufacturers" does not imply "accepted," "approved," "prior approval," or any other such connotation.

2.2 FLAME-SPREAD AND SMOKE DEVELOPED PROPERTIES OF MATERIALS

A. Materials and adhesives used throughout the mechanical and electrical systems for insulation, acoustical lining, filters, ducts, flexible connections, and jackets or coverings regardless of kind, or for piping or conduit system components, shall have a flame-spread rating not over 25 without evidence of continued combustion and with a smoke developed rating not higher than 50. If such materials are to be applied with adhesives, they shall be tested as applied with such adhesives, or the adhesives used shall have a flame-spread rating not over 25 and a smoke developed rating not higher than 50.

B. "Flame-Spread Rating" and "Smoke Developed Rating" shall be as determined by the "Method of Test of Surface Burning Characteristics of Building Materials, NFPA No. 225, ASTM E84, Underwriter's Laboratories, Inc., Standard." Such materials are listed in the Underwriter's Laboratories, Inc. "Building Materials List" under the heading "Hazard Classification (Fire)."

2.3 AUXILIARY STRUCTURAL SUPPORTS

A. Provide auxiliary structural supports as necessary to support mechanical systems from the building structure. Supporting members shall be metal strut framing or standard structural shapes, designed to support imposed loads with a working stress no greater than 25 percent of ultimate stress values of the members, and articulation with the building structure without exceeding structural limitations at the point of attachment to the building structure.

2.4 SPECIAL TOOLS

A. Furnish a set of special tools and devices required for the proper maintenance of the major pieces of equipment and install on adequate tool board. This shall include only tools which cannot normally be purchased "over-the-counter" at hardware stores.

2.5 EQUIPMENT GUARDS

A. Provide equipment with exposed moving parts with belt guards, coupling guards, fan guards or other enclosures as necessary for personnel safety.

2.6 ACCESS DOORS

A. Furnish, for installation under appropriate section of the work, access doors at each point required to provide access to concealed valves, dampers, damper operators, and other devices requiring operation, adjustment, or maintenance. Access doors shall be located in inconspicuous locations and in unoccupied areas wherever possible. Access door locations shall be shown on shop drawings for architect approval.

B. Shall be 16 gauge steel, with mounting straps, concealed hangers, and screwdriver locks, designed for the doors to open 180 degrees, minimum.

C. Access doors installed in fire walls or partitions shall be U.L. labeled to maintain the fire rating of the wall or partition.

D. Provide prime coat finish for installation in ceilings or painted or unfinished surfaces.

E. Provide primed finish for installation in unpainted finished walls.

F. Milcor Style M for masonry and surfaces not specified otherwise.

G. Milcor Style DW for drywall surfaces.

H. Milcor Style AT-FRSC "Special" for drywall ceilings. (Designated "fire resistive suspended ceiling door" by manufacturer).

I. Milcor Style AP for acoustical plaster ceilings.

J. Acceptable Manufacturers: Josam, Miami, Milcor, Wade and Zurn.

PART 3 - EXECUTION

3.1 PROTECTION OF EQUIPMENT AND MATERIALS

A. Protect equipment and materials from physical damage, water damage and deterioration after it is delivered to the project, and during the installation.

B. The equipment shall be kept clean. Motors and electrical devices shall be covered with suitable materials to prevent dirt or dust accumulation within equipment. Machinery and devices shall be properly oiled and maintained to prevent rusting and deterioration.

C. Repair scratches, mars, or paint deterioration.

3.2 MATERIAL DAMAGE

A. The Contractor shall immediately report in writing to the Owner and design professional any incident involving equipment or material damage including rain water damage, pipe leaks, physical damage, etc.

B. At a minimum the report shall include the areas and extent of damage and proposed resolution.

C. Water damaged materials shall be replaced with new materials without exception.

3.3 EXCAVATION AND BACKFILL

A. Perform excavation and backfill required for the installation of underground pipe, equipment, and devices in accordance with other divisions of this Specification relating to such work. Carefully check for existing underground services before using power equipment for excavation.

B. Trenches shall be wide enough for proper installation of the pipe. Grade the ditch bottom for proper slope and provide bell holes to allow the full bearing of the pipe barrel. Comply with all health and safety regulations relating to ditching.

C. De-water to extent necessary to keep trenches dry and to provide proper compaction under all pipes. Continue de-watering operation until system has been tested, approved, backfilled and compacted.

D. Excavate 6" below the pipe and fill with sand to pipe grade.

E. No excavation shall be under or near footings without approval of the Architect.

F. Backfill trenches with clean dirt or sand. Take care not to disturb the pipe grade or alignment. Compact around and under the pipe carefully. The fill shall be compacted in 6" layers with a power tamper to achieve 95% compaction. Clean up around the ditch area to remove trash and any excess dirt.

3.4 EQUIPMENT AND PIPE SPACE

A. The Drawings indicate specified products physically arranged in the spaces, as cataloged by specific manufacturers, generally as listed in the equipment schedules.

B. Drawings show pipe diagrammatically.

C. Adhere to Drawings as closely as possible in layout of work.

D. Vary run of piping and make offsets during progress of work as required to meet structural and other interferences per reviewed shop drawings.

E. Install piping in furred spaces and above ceilings wherever possible. Run exposed piping parallel to or at right angles to building walls.

F. Keep horizontal lines as high as practicable.

G. Conform to ceiling heights established on the Drawings with adequate clearance for light fixtures and to allow for ceiling tile removal/installation.

3.5 PAINTING AND CLEANING

A. Finish painting (other than factory applied) of mechanical equipment, and its associated piping, and devices is specified in other sections. Provide touch-up painting of pre-finished mechanical products.

B. Surfaces shall be left clean, debris shall be removed, and equipment shall be furnished in prime coat finish unless otherwise specified.

C. Paint all piping that is exposed to public view. Clean exterior of piping, removing rust, plaster and dirt by wire brushing. Remove grease, oil, and similar materials by wiping with clean rags and suitable solvents. Refer to Division 9 for painting requirements.

D. Exterior supports and anchors shall be hot dipped galvanized steel with cold galvanized welds.

E. Motors, pumps and other items with factory finish: Remove grease and oil and leave surfaces clean and polished.

F. Plumbing Fixtures: Clean and polish fixtures immediately prior to final inspection.

G. Cleaning operations are supplemented by detailed instructions for specific systems.

END OF SECTION 15001

SECTION 15051 – PLUMBING BASIC MECHANICAL MATERIALS AND METHODS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Piping materials and installation instructions common to plumbing and fire protection piping systems.
2. Dielectric fittings.
3. Sleeves.
4. Escutcheons.
5. Grout.
6. Equipment installation requirements.
7. Concrete bases.

1.2 SUBMITTALS

A. Product Data: For the following

1. Escutcheons
2. Dielectric fittings

B. Welding certificates.

1.3 QUALITY ASSURANCE

A. Steel Support Welding: Qualify processes and operators according to AWS D1.1, "Structural Welding Code--Steel."

B. Steel Pipe Welding: Qualify processes and operators according to ASME Boiler and Pressure Vessel Code: Section IX, "Welding and Brazing Qualifications."

1. Comply with provisions in ASME B31 Series, "Code for Pressure Piping."
2. Certify that each welder has passed AWS qualification tests for welding processes involved and that certification is current.

C. Electrical Characteristics for Mechanical Equipment: Equipment of higher electrical characteristics may be furnished provided such proposed equipment is approved in writing and connecting electrical services, circuit breakers, and conduit sizes are appropriately modified. If minimum energy ratings or efficiencies are specified, equipment shall comply with requirements.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Deliver pipes and tubes with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe end damage and to prevent entrance of dirt, debris, and moisture.

B. Protect steel pipe from weather during storage to prevent corrosion and scale build-up.

C. Store plastic pipes such that they are protected from direct sunlight. Support to prevent sagging and bending.

1.5 COORDINATION

A. Arrange for pipe spaces, chases, slots, core drilling and openings in building structure during progress of construction, to allow for mechanical installations. Contractor is responsible for providing required penetrations in structure to accommodate piping.

B. Coordinate installation of required supporting devices and set sleeves in poured-in-place concrete and other structural components as they are constructed.

PART 2 - PRODUCTS

2.1 PIPE, TUBE, AND FITTINGS

A. Refer to individual Division 15 piping Sections for pipe, tube, and fitting materials and joining methods.

B. Pipe Threads: ASME B1.20.1 for factory-threaded pipe and pipe fittings.

2.2 JOINING MATERIALS

A. Refer to individual Division 22 piping Sections for special joining materials not listed below.

B. Pipe-Flange Gasket Materials: ASME B16.21, nonmetallic, flat, asbestos-free, 1/8-inch maximum thickness unless thickness or specific material is indicated. Full-Face type for flat-face, Class 125, flanges and narrow-face type for raised face, Class 250, flanges.

C. Solder Filler Metals: ASTM B 32, lead-free alloys. Include water-flushable flux according to ASTM B 813.

D. Brazing Filler Metals: AWS A5.8, BCuP Series or BAg1, unless otherwise indicated.

E. Welding Filler Metals: Comply with AWS D10.12.

F. Solvent Cements for Joining Plastic Piping:

1. PVC Piping: ASTM D 2564. Include primer according to ASTM F 656.
2. PVC to ABS Piping Transition: ASTM D 3138.

2.3 TRANSITION FITTINGS

A. AWWA Transition Couplings: Same size as, and with pressure rating at least equal to and with ends compatible with, piping to be joined.

2.4 DIELECTRIC FITTINGS

A. Description: Combination fitting of copper alloy and ferrous materials with threaded, solder-joint, plain, or weld-neck end connections that match piping system materials.

B. Insulating Material: Suitable for system fluid, pressure, and temperature.

C. Dielectric Unions: Factory-fabricated, union assembly, for 250-psig minimum working pressure at 180 degrees F.

D. Dielectric Flanges: Factory-fabricated, companion-flange assembly, for 150- or 300-psig minimum working pressure as required to suit system pressures.

E. Dielectric Couplings: Galvanized-steel coupling with inert and noncorrosive, thermoplastic lining; threaded ends; and 300-psig minimum working pressure at 225 degrees F.

F. Dielectric Nipples: Electroplated steel nipple with inert and noncorrosive, thermoplastic lining; plain, threaded, or grooved ends; and 300-psig minimum working pressure at 225 degrees F.

2.5 SLEEVES

A. Steel Pipe: ASTM A 53, Type E, Grade B, Schedule 40, galvanized, plain ends.

2.6 ESCUTCHEONS

A. Description: Manufactured wall and ceiling escutcheons and floor plates, with an ID to closely fit around pipe, tube, and insulation of insulated piping and an OD that completely covers opening.

B. One-Piece, Cast-Brass Type: With set screw.

1. Finish: Polished chrome-plated.

2.7 GROUT

A. Description: ASTM C 1107, Grade B, non-shrink and nonmetallic, dry hydraulic-cement grout.

1. Characteristics: Post-hardening, volume-adjusting, non-staining, noncorrosive, nongaseous, and recommended for interior and exterior applications.
2. Design Mix: 3000-psi, 28-day compressive strength.
3. Packaging: Premixed and factory packaged.

PART 3 - EXECUTION

3.1 PIPING SYSTEMS - COMMON REQUIREMENTS

A. Install piping according to the following requirements and Division 15 Sections specifying piping systems.

B. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.

C. Install piping in concealed locations, unless otherwise indicated and except in equipment rooms and service areas.

D. Install at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

E. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.

F. Install piping to permit valve servicing.

G. Install piping at required slopes.

H. Install piping free of sags and bends.

I. Install fittings for changes in direction and branch connections.

J. Install piping to allow application of insulation.

K. Select system components with pressure rating equal to or greater than system operating pressure.

L. Install escutcheons for penetrations of walls, ceilings, and floors in exposed areas.

M. Install sleeves for pipes passing through concrete and masonry walls. Cut sleeves to length for mounting flush with both surfaces.

N. Aboveground, Exterior-Wall Pipe Penetrations: Seal penetrations using non-shrink grout between the wall and the sleeve. Seal the annular space between the pipe and the sleeve using non-shrink grout or flexible silicon sealants. Select sleeve size to allow for 1-inch annular clear space between pipe and sleeve for installing grout or silicone sealant.

1. Install steel pipe for sleeves smaller than 10 inches in diameter.

O. Fire-Barrier Penetrations: Seal all piping penetrations to maintain indicated fire rating of walls, partitions, ceilings, and floors at mechanical penetrations. Refer to architectural fire proofing requirements.

P. Verify final equipment locations prior to roughing-in.

Q. Refer to equipment specifications in other Sections of these Specifications for roughing-in requirements.

R. Expansion and Contraction of Piping:

1. Allowance shall be made throughout for expansion and contraction of pipe. Horizontal runs of pipe with expansion loops or joints shall be anchored to the wall or the supporting construction to force expansion toward the expansion joints or loops. Horizontal runs of piping without expansion joints or loops, over 50 feet in length, shall be anchored in the middle of the run to force the expansion evenly toward the ends.

2. All piping shall be so installed that it may contract or expand freely without damage to any other work or injury to itself. Any swing joints, expansion joints, or bends necessary shall be installed whether shown or not.

3.2 PIPING JOINT CONSTRUCTION

A. Join pipe and fittings according to the following requirements and Division 22 Sections specifying piping systems.

B. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.

C. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.

D. Soldered Joints: Apply ASTM B 813, water-flushable flux, unless otherwise indicated, to tube end. Construct joints according to ASTM B 828 or CDA's "Copper Tube Handbook," using lead-free solder alloy complying with ASTM B 32.

E. Brazed Joints: Construct joints according to AWS's "Brazing Handbook," "Pipe and Tube" Chapter, using copper-phosphorus brazing filler metal complying with AWS A5.8.

F. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:

1. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.
2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.

G. Welded Joints: Construct joints according to AWS D10.12, using qualified processes and welding operators according to Part 1 "Quality Assurance" Article.

H. Flanged Joints: Select appropriate gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Use suitable lubricants on bolt threads.

I. Plastic Piping Solvent-Cement Joints: Clean and dry joining surfaces. Join pipe and fittings according to the following:

1. Comply with ASTM F 402, for safe-handling practice of cleaners, primers, and solvent cements.
2. PVC Non-pressure Piping: Join according to ASTM D 2855.
3. PVC to ABS Non-pressure Transition Fittings: Join according to ASTM D 3138 Appendix.

3.3 PIPING CONNECTIONS

A. Make connections according to the following, unless otherwise indicated:

1. Install unions, in piping NPS 2 and smaller, adjacent to each valve and at final connection to each piece of equipment.
2. Install flanges, in piping NPS 2-1/2 and larger, adjacent to flanged valves and at final connection to each piece of equipment.
3. Dry Piping Systems: Install dielectric unions and flanges to connect piping materials of dissimilar metals.
4. Wet Piping Systems: Install dielectric coupling and nipple fittings to connect piping materials of dissimilar metals.

3.4 EQUIPMENT INSTALLATION - COMMON REQUIREMENTS

A. Install equipment to allow maximum possible headroom unless specific mounting heights are indicated.

B. Install equipment level and plumb, parallel and perpendicular to other building systems and components in exposed interior spaces, unless otherwise indicated.

C. Install mechanical equipment to facilitate service, maintenance, and repair or replacement of components. Connect equipment for ease of disconnecting, with minimum interference to other installations. Extend grease fittings to accessible locations.

D. Install equipment to allow right of way for piping installed at required slope.

3.5 PAINTING

A. Painting of mechanical systems, equipment, and components is specified in Division 9 Section.

B. Damage and Touchup: Repair marred and damaged factory-painted finishes with materials and procedures to match original factory finish.

C. Paint all pining that is exposed to public view. Clean exterior of piping, removing rust, plaster and dirt by wire brushing. Remove grease, oil, and similar materials by wiping with clean rags and suitable solvents. Refer to Division 9 for painting requirements.

3.6 CONCRETE BASES

A. Concrete Bases: Anchor equipment to concrete base according to equipment manufacturer's written instructions.

1. Construct concrete bases of dimensions indicated, but not less than 4 inches larger in both directions than supported unit.
2. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch centers around the full perimeter of the base.
3. Install epoxy-coated anchor bolts for supported equipment that extend through concrete base, and anchor into structural concrete floor.
4. Place and secure anchorage devices. Use supported equipment manufacturer's setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
5. Install anchor bolts to elevations required for proper attachment to supported equipment.
6. Install anchor bolts according to anchor-bolt manufacturer's written instructions.
7. Use 3,000 psi concrete and reinforcement.

3.7 GROUTING

A. Mix and install grout for mechanical equipment base bearing surfaces, pump and other equipment base plates, and anchors.

B. Clean surfaces that will come into contact with grout.

C. Provide forms as required for placement of grout.

D. Avoid air entrapment during placement of grout.

E. Place grout, completely filling equipment bases.

F. Place grout on concrete bases and provide smooth bearing surface for equipment.

G. Place grout around anchors.

H. Cure placed grout.

END OF SECTION 15051

SECTION 15055 - MOTORS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes basic requirements for motors.

B. See individual Sections for application of motors and reference to specific motor requirements for motor-driven equipment.

C. See Division 15 Section "Mechanical Vibration and Seismic Controls" for mounting motors and vibration isolation and seismic-control devices.

1.2 DEFINITIONS

A. Factory-Installed Motor: A motor installed by motorized-equipment manufacturer as a component of equipment.

B. Field-Installed Motor: A motor installed at Project site and not factory installed as an integral component of motorized equipment.

1.3 SUBMITTALS

A. Product Data for Field-Installed Motors: For each type and size of motor indicated, provide nameplate data and ratings; mounting arrangements; size, type, and location of winding terminations; conduit entry and ground lug locations; and information on coatings or finishes.

B. Shop Drawings for Field-Installed Motors: Dimensioned plans, elevations, sections, and details, including required clearances and service space around equipment. Include the following:
   1. Each installed unit's type and details.
   2. Nameplate legends.
   3. Diagrams of power and control wiring. Provide schematic wiring diagram for each type of motor and for each control scheme.

C. Qualification Data: For testing agency.

D. Field quality-control test reports.

E. Operation and maintenance data.

1.4 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

B. Comply with NFPA 70.

1.5 COORDINATION

A. Coordinate features of motors, installed units, and accessory devices. Provide motors that are:
   1. Compatible with the following:
      a. Magnetic controllers.
      b. Multispeed controllers.
      c. Reduced-voltage controllers.
   2. Designed and labeled for use with variable frequency drives, and suitable for use throughout speed range without overheating.
   3. Matched to torque and horsepower requirements of the load.
   4. Matched to ratings and characteristics of supply circuit and required control sequence.

B. Coordinate motor support with requirements for driven load; access for maintenance and motor replacement; installation of accessories, belts, belt guards; and adjustment of sliding rails for belt tensioning.

C. Coordinate size and location of concrete bases. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified in Division 3 Section.

PART 2 - PRODUCTS

2.1 MOTOR REQUIREMENTS

A. Motor requirements apply to factory-installed and field-installed motors, except as follows:
   1. Different ratings, performance, or characteristics for a motor are specified in another Section.
   2. Manufacturer for a factory-installed motor requires ratings, performance, or characteristics, other than those specified in this Section, to meet performance specified.

2.2 MOTOR CHARACTERISTICS

A. Motors 3/4 HP and Larger: Three phase, unless noted otherwise.

B. Motors Smaller than 3/4 HP: Single phase, unless noted otherwise.

C. Frequency Rating: 60 Hz.

D. Voltage Rating: NEMA standard voltage selected to operate on nominal circuit voltage to which motor is connected.

E. Service Factor: 1.15

F. Duty: Continuous duty at ambient temperature of 105 deg F (40 deg C) and at altitude of 3300 ft (1005 m) above sea level.

G. Capacity and Torque Characteristics: Sufficient to start, accelerate, and operate connected loads at designated speeds, at installed altitude and environment, with indicated operating sequence, and without exceeding nameplate ratings or considering service factor.

H. Enclosure: Provide Open Drip Proof motors for motors located indoors in dry locations, and Totally Enclosed Fan Cooled motors in wet locations or outdoors.

I. Speed: Unless noted otherwise motors shall operate at 1750 RPM or less.

2.3 POLYPHASE MOTORS

A. Description: NEMA MG 1, Design B, medium induction motor.

B. Efficiency: Minimum efficiencies shall be as follows:

Motor HP	Minimum Efficiency
1-3	81%
5-15	86%
20-50	90%
60 and above	93%

C. Stator: Copper windings, unless otherwise indicated.
1. Multispeed motors shall have separate winding for each speed.

D. Rotor: Squirrel cage, unless otherwise indicated.

E. Bearings: Double-shielded, prelubricated ball bearings suitable for radial and thrust loading.

F. Temperature Rise: Match insulation rating, unless otherwise indicated.

G. Insulation: Class F evaluated in accordance with IEEE 117 classification tests, unless otherwise indicated.

H. Code Letter Designation:
1. Motors 15HP and Larger: NEMA starting Code F or G.
2. Motors smaller than 15HP: Manufacturer's standard starting characteristic.

I. Enclosure: Cast iron for motors 7.5 hp and larger; rolled steel for motors smaller than 7.5 hp. All motors installed in wet locations or outdoors shall be cast iron.
1. Finish: Gray enamel.

2.4 POLYPHASE MOTORS WITH ADDITIONAL REQUIREMENTS

A. Motors Used with Variable Frequency Controllers: Ratings, characteristics, and features coordinated with and approved by controller manufacturer.
   1. Designed with critical vibration frequencies outside operating range of controller output.
   2. Temperature Rise: Matched to rating for Class B insulation.
   3. Insulation: Class H.
   4. Thermal Protection: Comply with NEMA MG 1, Part 31 requirements for thermally protected motors.

B. Rugged-Duty Motors: Totally enclosed, with 1.25 minimum service factor, greased bearings, integral condensate drains, and capped relief vents. Windings insulated with nonhygroscopic material.
   1. Finish: Chemical-resistant paint over corrosion-resistant primer.

C. Source Quality Control: Perform the following tests on each motor according to NEMA MG 1:
   1. Measure winding resistance.
   2. Read no-load current and speed at rated voltage and frequency.
   3. Measure locked rotor current at rated frequency.
   4. Perform high-potential test.

2.5 SINGLE-PHASE MOTORS

A. Type: One of the following, to suit starting torque and requirements of specific motor application:
   1. Split-phase start, capacitor run.
   2. Capacitor start, capacitor run.
   3. Permanent-split capacitor.

B. Shaded-Pole Motors: For motors 1/20 hp and smaller only.

C. Thermal Protection: Internal protection to automatically open power supply circuit to motor when winding temperature exceeds a safe value calibrated to temperature rating of motor insulation. Thermal-protection device shall automatically reset when motor temperature returns to normal range.

D. Bearings: Ball type for belt-connected motors and other motors with high radial forces on motor shaft; sealed, prelubricated-sleeve type for other single-phase motors.

E. Source Quality Control: Perform the following tests on each motor according to NEMA MG 1:
   1. Measure winding resistance.
   2. Read no-load current and speed at rated voltage and frequency.
   3. Measure locked rotor current at rated frequency.
   4. Perform high-potential test.

PART 3 - EXECUTION

3.1 MOTOR INSTALLATION

A. Anchor each motor assembly to base, adjustable rails, or other support, arranged and sized according to manufacturer's written instructions. Attach by bolting. Level and align with load transfer link.

B. Install motors on concrete bases complying with Division 3.

C. Comply with mounting and anchoring requirements specified in Division 15 Section "Mechanical Vibration and Seismic Controls."

3.2 FIELD QUALITY CONTROL

A. Prepare for acceptance tests as follows:
   1. Run each motor with its controller. Demonstrate correct rotation, alignment, and speed at motor design load.
   2. Test interlocks and control features for proper operation.
   3. Verify that current in each phase is within nameplate rating.

B. Testing: Perform the following field quality-control testing:
   1. Perform each electrical test and visual and mechanical inspection stated in NETA ATS, Section 7.15.1.
      a. Certify compliance with test parameters.
   2. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.

3.3 ADJUSTING

A. Align motors, bases, shafts, pulleys and belts. Tension belts according to manufacturer's written instructions.

END OF SECTION 15055

SECTION 15057 - ENCLOSED CONTROLLERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes ac general-purpose controllers rated 600 V and less that are supplied as enclosed units.

B. All magnetic starters will be furnished in this Division for installation in Division-26, except starters furnished as part of a motor control center.

1.3 SUBMITTALS

A. Product Data: For each type of enclosed controller. Include dimensions and manufacturer's technical data on features, performance, electrical characteristics, ratings, and finishes.

B. Shop Drawings: For each enclosed controller.
   1. Dimensioned plans, elevations, sections, and details, including required clearances and service space around equipment. Show tabulations of installed devices, equipment features, and ratings. Include the following:
      a. Enclosure types and details.
      b. Nameplate legends.
      c. Short-circuit current rating of integrated unit.
      d. UL listing for series rating of overcurrent protective devices in combination controllers.
      e. Features, characteristics, ratings, and factory settings of individual overcurrent protective devices in combination controllers.
   2. Wiring Diagrams: Power, signal, and control wiring. Differentiate between manufacturer-installed and field-installed wiring.

C. Maintenance Data: For enclosed controllers and components to include in maintenance manuals specified in Division 1. In addition to requirements specified in Division 1 Section "Closeout Procedures," include the following:
   1. Routine maintenance requirements for enclosed controllers and all installed components.
   2. Manufacturer's written instructions for testing and adjusting overcurrent protective devices.

D. Load-Current and Overload-Relay Heater List: Compile after motors have been installed and arrange to demonstrate that selection of heaters suits actual motor nameplate full-load currents.

1.4 QUALITY ASSURANCE

A. Manufacturer Qualifications: Maintain, within 100 miles of Project site, a service center capable of providing training, parts, and emergency maintenance and repairs.

B. Source Limitations: Obtain enclosed controllers of a single type through one source from a single manufacturer.

C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

D. Comply with NFPA 70.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Store enclosed controllers indoors in clean, dry space with uniform temperature to prevent condensation. Protect enclosed controllers from exposure to dirt, fumes, water, corrosive substances, and physical damage.

1.6 COORDINATION

A. Coordinate layout and installation of enclosed controllers with other construction including conduit, piping, equipment, and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.

B. Coordinate features of enclosed controllers and accessory devices with pilot devices and control circuits to which they connect.

C. Coordinate features, accessories, and functions of each enclosed controller with ratings and characteristics of supply circuit, motor, required control sequence, and duty cycle of motor and load.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Manual and Magnetic Enclosed Controllers:
      a. Danfoss
      b. Eaton Corp.; Cutler-Hammer Products.
      c. General Electrical Distribution & Control.
      d. Rockwell Automation Allen-Bradley Co.; Industrial Control Group.
      e. Square D Co.

2.2 MANUAL ENCLOSED CONTROLLERS

A. Fractional Horsepower Single Phase Manual Starters: Fractional horsepower manual starters shall consist of a manually operated toggle switch equipped with meting alloy type thermal overload relay. Thermal unit shall be of one-piece construction and interchangeable. Starter shall be inoperative if thermal unit is removed. Contacts shall be double break, silver alloy, visible from both sides of starter.

B. Manual Starters Three Phase: Manual starters shall be constructed and tested in accordance with the latest published NEMA Standards. The manual starters shall consist of a manually operated switch equipped with melting alloy type thermal overload relays. The overload relays shall be trip-free, and the starter shall be inoperative if any thermal units are removed. Thermal units must be of one-piece construction. The starters will be furnished in a NEMA 1 general purpose enclosure unless otherwise indicated on the plans.

2.3 MAGNETIC ENCLOSED CONTROLLERS

A. Description: NEMA ICS 2, Class A, full voltage, nonreversing, across the line, unless otherwise indicated. Across-the-line magnetic starters through NEMA. size seven shall be equipped with double break silver alloy contacts. All contacts shall be replaceable without removing power wiring or removing starter from panel.

B. Control Circuit: Control voltage at 120 V shall be obtained from integral control power transformer of sufficient capacity to operate connected pilot, indicating and control devices, plus 100 percent spare capacity.

C. Overload Relay: Ambient-compensated type with inverse-time-current characteristic and NEMA ICS 2, Class 10 tripping characteristic. Provide with heaters or sensors in each phase matched to nameplate full-load current of specific motor to which they connect and with appropriate adjustment for duty cycle.

2.4 ENCLOSURES

A. Description: Flush- or surface-mounted cabinets as indicated. NEMA 250, Type 1, unless otherwise indicated to comply with environmental conditions at installed location.
   1. Outdoor Locations: NEMA 250, Type 3R.
   2. Kitchen Areas: NEMA 250, Type 4X, stainless steel.

3. Other Wet or Damp Indoor Locations: NEMA 250, Type 4.

2.5 ACCESSORIES

A. Devices shall be factory installed in controller enclosure, unless otherwise indicated.

B. Provide HOA Switch, and Auxiliary contacts as required by the control sequence (coordinate with the control sequence specifications): NEMA ICS 2, heavy-duty type.

2.6 FACTORY FINISHES

A. Manufacturer's standard prime-coat finish ready for field painting.

B. Finish: Manufacturer's standard paint applied to factory-assembled and -tested enclosed controllers before shipping.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas to receive enclosed controllers for compliance with requirements, installation tolerances, and other conditions affecting performance.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 APPLICATIONS

A. Select features of each enclosed controller to coordinate with ratings and characteristics of supply circuit and motor; required control sequence; duty cycle of motor, drive, and load; and configuration of pilot device and control circuit affecting controller functions.

B. Select horsepower rating of controllers to suit motor controlled.

3.3 INSTALLATION

A. See Division 16 Section "Basic Electrical Materials and Methods" for general installation requirements.

B. For control equipment at walls, bolt units to wall or mount on lightweight structural-steel channels bolted to wall. For controllers not at walls, provide freestanding racks.

C. Install freestanding equipment on concrete bases complying with Division 3 Section "Cast-in-Place Concrete."

D. Enclosed Controller Fuses: Install fuses in each fusible switch. Comply with requirements in Division 16 Section "Fuses."

3.4 IDENTIFICATION

A. Identify enclosed controller components and control wiring according to Division 26.

3.5 CONTROL WIRING INSTALLATION

A. Install wiring between enclosed controllers according to Division 16 Section "Conductors and Cables."

B. Bundle, train, and support wiring in enclosures.

C. Connect hand-off-automatic switch and other automatic-control devices where applicable.
   1. Connect selector switches to bypass only manual- and automatic-control devices that have no safety functions when switch is in hand position.

3.6 CONNECTIONS

A. Conduit installation requirements are specified in other Division 26 Sections. Drawings indicate general arrangement of conduit, fittings, and specialties.

B. Ground equipment.

C. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

3.7 ADJUSTING

A. Set field-adjustable switches and circuit-breaker trip ranges.

3.8 CLEANING

A. Clean enclosed controllers internally, on completion of installation, according to manufacturer's written instructions. Vacuum dirt and debris; do not use compressed air to assist in cleaning.

3.9 STARTUP SERVICE

A. Engage a factory-authorized service representative to perform startup service.

B. Verify that enclosed controllers are installed and connected according to the Contract Documents.

C. Verify that electrical wiring installation complies with manufacturer's submittal and installation requirements in Division 16 Sections.

D. Complete installation and startup checks according to manufacturer's written instructions.

3.10 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain enclosed controllers.
   1. Train Owner's maintenance personnel on procedures and schedules for starting and stopping, troubleshooting, servicing, and maintaining equipment and schedules.
   2. Review data in maintenance manuals. Refer to Division 1 Section "Closeout Procedures."
   3. Review data in maintenance manuals. Refer to Division 1 Section "Operation and Maintenance Data."
   4. Schedule training with Owner, through Architect, with at least seven days' advance notice.

END OF SECTION 15057

SECTION 15060 - HANGERS AND SUPPORTS FOR MECHANICAL EQUIPMENT AND PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes hangers and supports for mechanical system piping and equipment.

B. See Division 15 Section "Mechanical Vibration and Seismic Controls" for vibration isolation supports and hangers

C. Design heavy-duty steel trapezes for piping to support multiple pipes capable of supporting combined weight of supported systems, system contents, and test water.

1.2 SUBMITTALS

A. Product Data: For each type of pipe hanger, channel support system component, and thermal-hanger shield insert indicated.

1.3 QUALITY ASSURANCE

A. Welding: Qualify procedures and personnel according to AWS D1.1, "Structural Welding Code--Steel."

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where subparagraph titles below introduce lists, the following requirements apply for product selection:
   1. Manufacturers: Subject to compliance with requirements, provide products by the manufacturers specified.

2.2 MANUFACTURED UNITS

A. Pipe Hangers, Supports, and Components: MSS SP-58, factory-fabricated components.
   1. Manufacturers:
      a. B-Line Systems, Inc.
      b. Grinnell Corp.
      c. Michigan Hanger Co., Inc.

2. Galvanized, Metallic Coatings: For piping and equipment that will not have field-applied finish.
3. Nonmetallic Coatings: On attachments for electrolytic protection where attachments are in direct contact with copper tubing.

B. Channel Support Systems: MFMA-2, factory-fabricated components for field assembly.
1. Manufacturers:
   a. B-Line Systems, Inc.
   b. Grinnell Corp.
   c. Michigan Hanger Co., Inc.
   d. Unistrut Corp.
2. Coatings: Manufacturer's standard galvanized finish
3. Nonmetallic Coatings: On attachments for electrolytic protection where attachments are in direct contact with copper tubing.

C. Thermal-Hanger Shield Inserts: 100-psi (690-kPa) minimum compressive-strength insulation, encased in sheet metal shield.
1. Material for insulated Piping: ASTM C 552, Type I cellular glass water-repellent-treated, ASTM C 533, Type I calcium silicate with vapor barrier.
2. For Trapeze or Clamped System: Insert and shield cover entire circumference of pipe.
3. For Clevis or Band Hanger: Insert and shield cover lower 180 degrees of pipe.
4. Insert Length: Extend 2 inches (50 mm) beyond sheet metal shield for piping operating below ambient air temperature.

2.3 MISCELLANEOUS MATERIALS

A. Mechanical-Anchor Fasteners: Insert-type attachments with pull-out and shear capacities appropriate for supported loads and building materials where used.

B. Structural Steel: ASTM A 36/A 36M, steel plates, shapes, and bars, black and galvanized.

C. Grout: ASTM C 1107, Grade B, factory-mixed and -packaged, nonshrink and nonmetallic, dry, hydraulic-cement grout.
1. Characteristics: Post hardening and volume adjusting; recommended for both interior and exterior applications.
2. Properties: Nonstaining, noncorrosive, and nongaseous.
3. Design Mix: 5000-psi (34.5-MPa), 28-day compressive strength.

PART 3 - EXECUTION

3.1 APPLICATIONS

A. Specific hanger requirements are specified in Sections specifying equipment and systems.

B. Comply with MSS SP-69 for pipe hanger selections and applications that are not specified in piping system Specification Sections.

C. Horizontal-Piping Hangers and Supports: Unless otherwise indicated and except as specified in piping system Specification Sections, install the following types:
   1. Adjustable Steel Clevis Hangers (MSS Type 1): For suspension of noninsulated or insulated stationary pipes, NPS 1/2 to NPS 30 (DN 15 to DN 750).
   2. Pipe Saddle Supports (MSS Type 36): For support of pipes, NPS 4 to NPS 36 (DN 100 to DN 900), with steel pipe base stanchion support and cast-iron floor flange.
   3. Single Pipe Rolls (MSS Type 41): For suspension of pipes, NPS 1 to NPS 30 (DN 25 to DN 750), from 2 rods if longitudinal movement caused by expansion and contraction might occur.
   4. Complete Pipe Rolls (MSS Type 44): For support of pipes, NPS 2 to NPS 42 (DN 50 to DN 1050), if longitudinal movement caused by expansion and contraction might occur but vertical adjustment is not necessary.

D. Vertical-Piping Clamps: Unless otherwise indicated and except as specified in piping system Specification Sections, install the following types:
   1. Extension Pipe or Riser Clamps (MSS Type 8): For support of pipe risers, NPS 3/4 to NPS 20 (DN 20 to DN 500).
   2. Carbon- or Alloy-Steel Riser Clamps (MSS Type 42): For support of pipe risers, NPS 3/4 to NPS 20 (DN 20 to DN 500), if longer ends are required for riser clamps.

E. Hanger-Rod Attachments: Unless otherwise indicated and except as specified in piping system Specification Sections, install the following types:
   1. Steel Turnbuckles (MSS Type 13): For adjustment up to 6 inches (150 mm) for heavy loads.
   2. Steel Clevises (MSS Type 14): For 120 to 450 deg F (49 to 232 deg C) piping installations.

F. Building Attachments: Unless otherwise indicated and except as specified in piping system Specification Sections, install the following types:
   1. Steel or Malleable Concrete Inserts (MSS Type 18): For upper attachment to suspend pipe hangers from concrete ceiling.
   2. Top-Beam C-Clamps (MSS Type 19): For use under roof installations with bar-joist construction to attach to top flange of structural shape.
   3. Side-Beam or Channel Clamps (MSS Type 20): For attaching to bottom flange of beams, channels, or angles.
   4. Center-Beam Clamps (MSS Type 21): For attaching to center of bottom flange of beams.
   5. C-Clamps (MSS Type 23): For structural shapes.
   6. Welded-Steel Brackets: For support of pipes from below or for suspending from above by using clip and rod. Use one of the following for indicated loads:
      a. Light (MSS Type 31): 750 lb (340 kg).
      b. Medium (MSS Type 32): 1500 lb (675 kg).
      c. Heavy (MSS Type 33): 3000 lb (1350 kg).

G. Saddles and Shields: Unless otherwise indicated and except as specified in piping system Specification Sections, install the following types:

1. Protection Shields (MSS Type 40): Of length recommended by manufacturer to prevent crushing insulation.
2. Steel Pipe-Covering Protection Saddles (MSS Type 39): To fill interior voids with insulation that matches adjoining insulation.
3. Thermal-Hanger Shield Inserts: For supporting insulated pipe, 360-deg ree insert of high-density, 100-psi (690-kPa) minimum compressive-strength, water-repellent-treated calcium silicate or cellular-glass pipe insulation, same thickness as adjoining insulation with vapor barrier and encased in 360-deg ree sheet metal shield.

H. Spring Hangers and Supports: Unless otherwise indicated and except as specified in piping system Specification Sections, install the following types:
1. Spring Cushions (MSS Type 48): For light loads if vertical movement does not exceed 1-1/4 inches (32 mm).
2. Spring-Cushion Roll Hangers (MSS Type 49): For equipping Type 41 roll hanger with springs.
3. Variable-Spring Base Supports (MSS Type 52): Preset to indicated load and limit variability factor to 25 percent to absorb expansion and contraction of piping system from base support.

3.2 INSTALLATION

A. Pipe Hanger and Support Installation: Comply with MSS SP-69 and MSS SP-89. Install hangers, supports, clamps, and attachments as required to properly support piping from building structure.

B. Channel Support System Installation: Arrange for grouping of parallel runs of piping and support together on field-assembled channel systems. Field assemble and install according to manufacturer's written instructions.

C. Heavy-Duty Steel Trapeze Installation: Arrange for grouping of parallel runs of horizontal piping and support together on field-fabricated, heavy-duty trapezes. Support pipes of various sizes together and space trapezes for smallest pipe size or install intermediate supports for smaller diameter pipes as specified above for individual pipe hangers. Field fabricate from ASTM A 36/A 36M, steel shapes selected for loads being supported. Weld steel according to AWS D1.1.

D. Install building attachments within concrete slabs or attach to structural steel. Space attachments within maximum piping span length indicated in MSS SP-69. Install additional attachments at concentrated loads, including valves, flanges, guides, strainers, and expansion joints, and at changes in direction of piping. Install concrete inserts before concrete is placed; fasten inserts to forms and install reinforcing bars through openings at top of inserts.

E. Install mechanical-anchor fasteners in concrete after concrete is placed and completely cured. Install fasteners according to manufacturer's written instructions.

F. Install hangers and supports complete with necessary inserts, bolts, rods, nuts, washers, and other accessories.

G. Install hangers and supports to allow controlled thermal movement of piping systems, to permit freedom of movement between pipe anchors, and to facilitate action of expansion joints, expansion loops, expansion bends, and similar units.

H. Load Distribution: Install hangers and supports so that piping live and dead loads and stresses from movement will not be transmitted to connected equipment.

I. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes and so maximum pipe deflections allowed by ASME B31.9, "Building Services Piping," is not exceeded.

J. Insulated Piping: Comply with the following:
   1. Attach clamps and spacers to piping.
      a. Insulated Piping: Use thermal-hanger shield insert with clamp sized to match OD of insert.
      b. Do not exceed pipe stress limits according to ASME B31.9.
   2. Install MSS SP-58, Type 40 protective shields on cold piping with vapor barrier. Shields shall span arc of 180 deg rees.
   3. Shield Dimensions for Pipe: Not less than the following:
      a. NPS 1/4 to NPS 3-1/2 (DN 8 to DN 90): 12 inches (305 mm) long and 0.048 inch (1.22 mm) thick.
      b. NPS 4 (DN 100): 12 inches (305 mm) long and 0.06 inch (1.52 mm) thick.
      c. NPS 5 and NPS 6 (DN 125 and DN 150): 18 inches (457 mm) long and 0.06 inch (1.52 mm) thick.
      d. NPS 8 to NPS 14 (DN 200 to DN 350): 24 inches (610 mm) long and 0.075 inch (1.91 mm) thick.
      e. NPS 16 to NPS 24 (DN 400 to DN 600): 24 inches (610 mm) long and 0.105 inch (2.67 mm) thick.
   4. Pipes NPS 6 (DN 200) and Larger: Include treated wood inserts.
   5. Insert Material: Length at least as long as protective shield.
   6. Thermal-Hanger Shields: Install with insulation same thickness as piping insulation.

3.3 EQUIPMENT SUPPORTS

A. Fabricate structural-steel stands to suspend equipment from structure above or to support equipment above floor. Place grout under supports for equipment and make smooth bearing surface.

3.4 METAL FABRICATION

A. Cut, drill, and fit miscellaneous metal fabrications for heavy-duty steel trapezes and equipment supports. Fit exposed connections together to form hairline joints. Field-weld connections that cannot be shop-welded because of shipping size limitations. Comply with AWS D1.1 procedures for shielded metal arc welding, appearance and quality of welds, and methods used in correcting welding work, and with the following:
   1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
   2. Obtain fusion without undercut or overlap.

3. Remove welding flux immediately.
4. Finish welds at exposed connections so no roughness shows after finishing and contours of welded surfaces match adjacent contours.

3.5 ADJUSTING

A. Hanger Adjustment: Adjust hangers to distribute loads equally on attachments and to achieve indicated slope of pipe.

3.6 PAINTING

A. Touching Up: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces. Apply paint by brush or spray to provide a minimum dry film thickness of 2.0 mils. See Division 9 Section "Painting" for paint materials and application requirements.

B. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

END OF SECTION 15060

SECTION 15061 - HANGERS AND SUPPORTS FOR PLUMBING AND EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes hangers and supports for fire-suppression and plumbing system piping and equipment.

B. See Division 15 Sections on fire-suppression piping for additional fire-suppression piping hangers and supports requirements.

C. Design heavy-duty steel trapezes for piping to support multiple pipes capable of supporting combined weight of supported systems, system contents, and test water.

1.2 SUBMITTALS

A. Product Data: For each type of pipe hanger, channel support system component, and thermal-hanger shield insert indicated.

1.3 QUALITY ASSURANCE

A. Welding: Qualify procedures and personnel according to AWS D1.1, "Structural Welding Code--Steel."

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where subparagraph titles below introduce lists, the following requirements apply for product selection:
   1. Manufacturers: Subject to compliance with requirements, provide products by the manufacturers specified.

2.2 MANUFACTURED UNITS

A. Pipe Hangers, Supports, and Components: MSS SP-58, factory-fabricated components.
   1. Manufacturers:
      a. B-Line Systems, Inc.
      b. Grinnell Corp.
      c. Michigan Hanger Co., Inc.
   2. Galvanized, Metallic Coatings: For piping and equipment that will not have field-applied finish.

3. Nonmetallic Coatings: On attachments for electrolytic protection where attachments are in direct contact with copper tubing.

B. Channel Support Systems: MFMA-2, factory-fabricated components for field assembly.
1. Manufacturers:
   a. B-Line Systems, Inc.
   b. Grinnell Corp.
   c. Michigan Hanger Co., Inc.
   d. Unistrut Corp.
2. Coatings: Manufacturer's standard galvanized finish.
3. Nonmetallic Coatings: On attachments for electrolytic protection where attachments are in direct contact with copper tubing.

2.3 MISCELLANEOUS MATERIALS

A. Mechanical-Anchor Fasteners: Insert-type attachments with pull-out and shear capacities appropriate for supported loads and building materials where used.

B. Structural Steel: ASTM A 36/A 36M, steel plates, shapes, and bars, black and galvanized.

PART 3 - EXECUTION

3.1 APPLICATIONS

A. Specific hanger requirements are specified in Sections specifying equipment and systems.

B. Comply with MSS SP-69 for pipe hanger selections and applications that are not specified in piping system Specification Sections.

C. Horizontal-Piping Hangers and Supports: Unless otherwise indicated and except as specified in piping system Specification Sections, install the following types:
1. Adjustable Steel Clevis Hangers (MSS Type 1): For suspension of non-insulated or insulated stationary pipes, NPS 1/2 to NPS 10.

D. Vertical-Piping Clamps: Unless otherwise indicated and except as specified in piping system Specification Sections, install the following types:
1. Extension Pipe or Riser Clamps (MSS Type 8 or Type 42): For support of pipe risers, NPS 3/4 to NPS 20.

E. Building Attachments: Unless otherwise indicated and except as specified in piping system Specification Sections, install the following types:
1. Steel or Malleable Concrete Inserts (MSS Type 18): For upper attachment to
2. suspend pipe hangers from concrete ceiling.
3. Top-Beam C-Clamps (MSS Type 19): For use under roof installations with bar-joist construction to attach to top flange of structural shape.

4. Side-Beam or Channel Clamps (MSS Type 20): For attaching to bottom flange of beams, channels, or angles.
5. Center-Beam Clamps (MSS Type 21): For attaching to center of bottom flange of beams.
6. C-Clamps (MSS Type 23): For structural shapes.

F. Saddles and Shields: Unless otherwise indicated and except as specified in piping system Specification Sections, install the following types:
1. Protection Shields (MSS Type 40): Of length recommended by manufacturer to prevent crushing insulation.

G. Refer to drawings for hangers to be used in the crawl space below the Lite-Deck system.

3.2 INSTALLATION

A. Pipe Hanger and Support Installation: Comply with MSS SP-69 and MSS SP-89. Install hangers, supports, clamps, and attachments as required to properly support piping from building structure.

B. Channel Support System Installation: Arrange for grouping of parallel runs of piping and support together on field-assembled channel systems. Field assemble and install according to manufacturer's written instructions.

C. Heavy-Duty Steel Trapeze Installation: Arrange for grouping of parallel runs of horizontal piping and support together on field-fabricated, heavy-duty trapezes. Support pipes of various sizes together and space trapezes for smallest pipe size or install intermediate supports for smaller diameter pipes as specified above for individual pipe hangers. Field fabricate from ASTM A 36/A 36M, steel shapes selected for loads being supported. Weld steel according to AWS D1.1.

D. Install building attachments within concrete slabs or attach to structural steel. Space attachments within maximum piping span length indicated in MSS SP-69. Install additional attachments at concentrated loads, including valves, flanges, guides, strainers, and expansion joints, and at changes in direction of piping. Install concrete inserts before concrete is placed; fasten inserts to forms and install reinforcing bars through openings at top of inserts.

E. Install mechanical-anchor fasteners in concrete after concrete is placed and completely cured. Install fasteners according to manufacturer's written instructions.

F. Install hangers and supports complete with necessary inserts, bolts, rods, nuts, washers, and other accessories.

G. Refer to drawing details of pipe hangers for first floor “Lite Deck” framing system.

H. Install hangers and supports to allow controlled thermal movement of piping systems, to permit freedom of movement between pipe anchors, and to facilitate action of expansion joints, expansion loops, expansion bends, and similar units.

I. Load Distribution: Install hangers and supports so that piping live and dead loads and stresses from movement will not be transmitted to connected equipment.

J. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes and so maximum pipe deflections allowed by ASME B31.9, "Building Services Piping," is not exceeded.

K. Insulated Piping: Comply with the following:
   1. Install MSS SP-58, Type 40 protective shields on cold piping with vapor barrier. Shields shall span arc of 180 degrees.
   2. Shield Dimensions for Pipe: Not less than the following:
      a. NPS 1/4 to NPS 3: 12 inches long and 0.048 inch thick.
      b. NPS 4 to NPS 8: 18 inches long and 0.06 inch thick.

3.3 EQUIPMENT SUPPORTS

A. Fabricate structural-steel stands to suspend equipment from structure above or to support equipment above floor. Place grout under supports for equipment and make smooth bearing surface.

3.4 METAL FABRICATION

A. Cut, drill, and fit miscellaneous metal fabrications for heavy-duty steel trapezes and equipment supports. Fit exposed connections together to form hairline joints. Field-weld connections that cannot be shop-welded because of shipping size limitations. Comply with AWS D1.1 procedures for shielded metal arc welding, appearance and quality of welds, and methods used in correcting welding work, and with the following:
   1. Use materials and methods that minimize distortion and develop strength and
   2. corrosion resistance of base metals.
   3. Obtain fusion without undercut or overlap.
   4. Remove welding flux immediately.
   5. Finish welds at exposed connections so no roughness shows after finishing and contours of welded surfaces match adjacent contours.

3.5 ADJUSTING

A. Hanger Adjustment: Adjust hangers to distribute loads equally on attachments and to achieve indicated slope of pipe.

3.6 PAINTING

A. Touching Up: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces. Apply paint by brush or spray to provide a minimum dry film thickness of 2.0 mils. See Division 09 Section "Painting" for paint materials and application requirements.

B. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A780.

END OF SECTION 15061

SECTION 15071 – MECHANCIAL VIBRATIONS AND SEISMIC CONTROLS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following
   1. Elastomeric isolation pads and mounts.
   2. Restrained elastomeric isolation mounts.
   3. Freestanding and restrained spring isolators.
   4. Housed spring mounts.
   5. Elastomeric hangers.
   6. Spring hangers.
   7. Spring hangers with vertical-limit stops.
   8. Thrust limits.
   9. Pipe riser resilient supports.

1.2 SUBMITTALS

A. Product Data: Include load deflection curves for each vibration isolation device indicated.

1.3 QUALITY ASSURANCE

A. Welding: Qualify procedures and personnel according to AWS D1.1, "Structural Welding Code--Steel."

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where subparagraph titles below introduce lists, the following requirements apply for product selection:
   1. Manufacturers: Subject to compliance with requirements, provide products by the manufacturers specified.

2.2 VIBRATION ISOLATORS

A. Elastomeric Isolator Pads: Oil and water-resistant elastomer or natural rubber, arranged in single or multiple layers, molded with a nonslip pattern and galvanized steel base plates of sufficient stiffness for uniform loading over pad area, and factory cut to sizes that match requirements of supported equipment.
   1. Material: Standard neoprene.

B. Elastomeric Mounts: Double-deflection type, with molded, oil-resistant rubber or neoprene isolator elements with factory-drilled, encapsulated top plate for bolting to equipment and with base plate for bolting to structure. Color-code or otherwise identify to indicate capacity range.

C. Spring Isolators: Freestanding, laterally stable, open-spring isolators.
   1. Outside Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.
   2. Minimum Additional Travel: 50 percent of the required deflection at rated load.
   3. Lateral Stiffness: More than 80 percent of the rated vertical stiffness.
   4. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.
   5. Base plates: Factory drilled for bolting to structure and bonded to 1/4-inch- (6-mm-) thick, rubber isolator pad attached to base plate underside. Base plates shall limit floor load to 100 psig.
   6. Top Plate and Adjustment Bolt: Threaded top plate with adjustment bolt and cap screw to fasten and level equipment.

D. Restrained Spring Isolators: Freestanding, steel, open-spring isolators with seismic restraint.
   1. Housing: Steel with resilient vertical-limit stops to prevent spring extension due to wind loads or if weight is removed; factory-drilled base plate bonded to 1/4-inch- (6-mm-) thick, elastomeric isolator pad attached to base plate underside; and adjustable equipment mounting and leveling bolt that acts as blocking during installation.
   2. Outside Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.
   3. Minimum Additional Travel: 50 percent of the required deflection at rated load.
   4. Lateral Stiffness: More than 80 percent of the rated vertical stiffness.
   5. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.

E. Elastomeric Hangers: Double-deflection type, with molded, oil-resistant rubber or neoprene isolator elements bonded to steel housings with threaded connections for hanger rods. Color-code or otherwise identify to indicate capacity range.

F. Spring Hangers: Combination coil-spring and elastomeric-insert hanger with spring and insert in compression.
   1. Frame: Steel, fabricated for connection to threaded hanger rods and to allow for a maximum of 30 degrees of angular hanger-rod misalignment without binding or reducing isolation efficiency.
   2. Outside Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.
   3. Minimum Additional Travel: 50 percent of the required deflection at rated load.
   4. Lateral Stiffness: More than 80 percent of the rated vertical stiffness.
   5. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.
   6. Elastomeric Element: Molded, oil-resistant rubber or neoprene. Steel-washer-reinforced cup to support spring and bushing projecting through bottom of frame.

G. Spring Hangers with Vertical-Limit Stop: Combination coil-spring and elastomeric-insert hanger with spring and insert in compression and with a vertical-limit stop.
   1. Frame: Steel, fabricated for connection to threaded hanger rods and to allow for a maximum of 30 degrees of angular hanger-rod misalignment without binding or reducing isolation efficiency.
   2. Outside Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.
   3. Minimum Additional Travel: 50 percent of the required deflection at rated load.
   4. Lateral Stiffness: More than 80 percent of the rated vertical stiffness.
   5. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.
   6. Elastomeric Element: Molded, oil-resistant rubber or neoprene.
   7. Adjustable Vertical Stop: Steel washer with neoprene washer "up-stop" on lower threaded rod.

H. Pipe Riser Resilient Support: All-directional, acoustical pipe anchor consisting of 2 steel tubes separated by a minimum of 1/2-inch thick, 60-durometer neoprene. Include steel and neoprene vertical-limit stops arranged to prevent vertical travel in both directions. Design support for a maximum load on the isolation material of 500 psig and for equal resistance in all directions.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install roof curbs, equipment supports, and roof penetrations as specified in "Roof Accessories."

B. Install thrust limits at centerline of thrust, symmetrical on either side of equipment.

3.2 FIELD QUALITY CONTROL

A. Tests and Inspections:
   1. Test isolator deflection.
   2. Inspect minimum snubber clearances.

3.3 ADJUSTING

A. Adjust isolators after piping systems have been filled and equipment is at operating weight.

B. Adjust limit stops on restrained spring isolators to mount equipment at normal operating height. After equipment installation is complete, adjust limit stops so they are out of contact during normal operation.

C. Attach thrust limits at centerline of thrust and adjust to a maximum of 1/4-inch (6-mm) movement during start and stop.

D. Adjust active height of spring isolators.

E. Adjust snubbers according to manufacturer's written recommendations.

END OF SECTION 15071

SECTION 15072 - VIBRATION AND SEISMIC CONTROLS FOR PLUMBING PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Isolation pads.
   2. Isolation mounts.
   3. Restrained elastomeric isolation mounts.
   4. Freestanding and restrained spring isolators.
   5. Housed spring mounts.
   6. Elastomeric hangers.
   7. Spring hangers.
   8. Spring hangers with vertical-limit stops.
   9. Pipe riser resilient supports.
   10. Resilient pipe guides.
   11. Restraining braces and cables.

1.2 SUBMITTALS

A. Product Data: For each product indicated.

B. Delegated-Design Submittal: For vibration isolation and seismic-restraint calculations and details indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

C. Welding certificates.

D. Qualification Data: For professional engineer.

E. Field quality-control test reports.

1.3 QUALITY ASSURANCE

A. Comply with seismic-restraint requirements in the IBC unless requirements in this Section are more stringent.

B. Welding: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

C. Seismic-restraint devices shall have horizontal and vertical load testing and analysis and shall bear anchorage preapproval OPA number from OSHPD, preapproved by ICC-ES, or preapproved by another agency acceptable to authorities having jurisdiction, showing

maximum seismic-restraint ratings. Ratings based on independent testing are preferred to ratings based on calculations. If preapproved ratings are not available, submittals based on independent testing are preferred. Calculations (including combining shear and tensile loads) to support seismic-restraint designs must be signed and sealed by a qualified professional engineer.

PART 2 - PRODUCTS

2.1 VIBRATION ISOLATORS

A. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:
   1. Ace Mountings Co., Inc.
   2. Amber/Booth Company, Inc.
   3. California Dynamics Corporation.
   4. Isolation Technology, Inc.
   5. Kinetics Noise Control.
   6. Mason Industries.
   7. Vibration Eliminator Co., Inc.
   8. Vibration Isolation.
   9. Vibration Mountings & Controls, Inc.
   10. Other prior approved equal.

B. Pads: Arranged in single or multiple layers of sufficient stiffness for uniform loading over pad area, molded with a nonslip pattern and galvanized-steel baseplates, and factory cut to sizes that match requirements of supported equipment.
   1. Resilient Material: Oil- and water-resistant neoprene.

C. Mounts: Double-deflection type, with molded, oil-resistant rubber, hermetically sealed compressed fiberglass, or neoprene isolator elements with factory-drilled, encapsulated top plate for bolting to equipment and with baseplate for bolting to structure. Color-code or otherwise identify to indicate capacity range.
   1. Materials: Cast-ductile-iron or welded steel housing containing two separate and opposing, oil-resistant rubber or neoprene elements that prevent central threaded element and attachment hardware from contacting the housing during normal operation.
   2. Neoprene: Shock-absorbing materials compounded according to the standard for bridge-bearing neoprene as defined by AASHTO.

D. Restrained Mounts: All-directional mountings with seismic restraint.
   1. Materials: Cast-ductile-iron or welded steel housing containing two separate and opposing, oil-resistant rubber or neoprene elements that prevent central threaded element and attachment hardware from contacting the housing during normal operation.
   2. Neoprene: Shock-absorbing materials compounded according to the standard for bridge-bearing neoprene as defined by AASHTO.

E. Spring Isolators: Freestanding, laterally stable, open-spring isolators.

1. Outside Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.
2. Minimum Additional Travel: 50 percent of the required deflection at rated load.
3. Lateral Stiffness: More than 80 percent of rated vertical stiffness.
4. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.
5. Baseplates: Factory drilled for bolting to structure and bonded to **1/4-inch-**thick, rubber isolator pad attached to baseplate underside. Baseplates shall limit floor load to **500 psig**.
6. Top Plate and Adjustment Bolt: Threaded top plate with adjustment bolt and cap screw to fasten and level equipment.

F. Restrained Spring Isolators: Freestanding, steel, open-spring isolators with seismic or limit-stop restraint.
1. Housing: Steel with resilient vertical-limit stops to prevent spring extension due to weight being removed; factory-drilled baseplate bonded to **1/4-inch-**thick, neoprene or rubber isolator pad attached to baseplate underside; and adjustable equipment mounting and leveling bolt that acts as blocking during installation.
2. Restraint: Seismic or limit-stop as required for equipment and authorities having jurisdiction.
3. Outside Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.
4. Minimum Additional Travel: 50 percent of the required deflection at rated load.
5. Lateral Stiffness: More than 80 percent of rated vertical stiffness.
6. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.

G. Housed Spring Mounts: Housed spring isolator with integral seismic snubbers.
1. Housing: Ductile-iron or steel housing to provide all-directional seismic restraint.
2. Base: Factory drilled for bolting to structure.
3. Snubbers: Vertically adjustable to allow a maximum of **1/4-inch** travel up or down before contacting a resilient collar.

H. Elastomeric Hangers: Single or double-deflection type, fitted with molded, oil-resistant elastomeric isolator elements bonded to steel housings with threaded connections for hanger rods. Color-code or otherwise identify to indicate capacity range.

I. Spring Hangers: Combination coil-spring and elastomeric-insert hanger with spring and insert in compression.
1. Frame: Steel, fabricated for connection to threaded hanger rods and to allow for a maximum of 30 degrees of angular hanger-rod misalignment without binding or reducing isolation efficiency.
2. Outside Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.
3. Minimum Additional Travel: 50 percent of the required deflection at rated load.
4. Lateral Stiffness: More than 80 percent of rated vertical stiffness.
5. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.
6. Elastomeric Element: Molded, oil-resistant rubber or neoprene. Steel-washer-reinforced cup to support spring and bushing projecting through bottom of frame.

7. Self-centering hanger rod cap to ensure concentricity between hanger rod and support spring coil.

J. Spring Hangers with Vertical-Limit Stop: Combination coil-spring and elastomeric-insert hanger with spring and insert in compression and with a vertical-limit stop.
   1. Frame: Steel, fabricated for connection to threaded hanger rods and to allow for a maximum of 30 degrees of angular hanger-rod misalignment without binding or reducing isolation efficiency.
   2. Outside Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.
   3. Minimum Additional Travel: 50 percent of the required deflection at rated load.
   4. Lateral Stiffness: More than 80 percent of rated vertical stiffness.
   5. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.
   6. Elastomeric Element: Molded, oil-resistant rubber or neoprene.
   7. Adjustable Vertical Stop: Steel washer with neoprene washer "up-stop" on lower threaded rod.
   8. Self-centering hanger rod cap to ensure concentricity between hanger rod and support spring coil.

K. Pipe Riser Resilient Support: All-directional, acoustical pipe anchor consisting of 2 steel tubes separated by a minimum of **1/2-inch-**thick neoprene. Include steel and neoprene vertical-limit stops arranged to prevent vertical travel in both directions. Design support for a maximum load on the isolation material of **500 psig** and for equal resistance in all directions.

L. Resilient Pipe Guides: Telescopic arrangement of 2 steel tubes or post and sleeve arrangement separated by a minimum of **1/2-inch-**thick neoprene. Where clearances are not readily visible, a factory-set guide height with a shear pin to allow vertical motion due to pipe expansion and contraction shall be fitted. Shear pin shall be removable and re-insertable to allow for selection of pipe movement. Guides shall be capable of motion to meet location requirements.

2.2 SEISMIC-RESTRAINT DEVICES

A. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:
   1. Amber/Booth Company, Inc.
   2. California Dynamics Corporation.
   3. Cooper B-Line, Inc.; a division of Cooper Industries.
   4. Hilti, Inc.
   5. Kinetics Noise Control.
   6. Loos & Co.; Cableware Division.
   7. Mason Industries.
   8. TOLCO Incorporated; a brand of NIBCO INC.
   9. Unistrut; Tyco International, Ltd.
   10. Other prior approved equal

B. General Requirements for Restraint Components: Rated strengths, features, and applications shall be as defined in reports by an evaluation service member of ICC-ES, OSHPD, or an agency acceptable to authorities having jurisdiction.
   1. Structural Safety Factor: Allowable strength in tension, shear, and pullout force of components shall be at least four times the maximum seismic forces to which they will be subjected.

C. Channel Support System: MFMA-3, shop- or field-fabricated support assembly made of slotted steel channels with accessories for attachment to braced component at one end and to building structure at the other end and other matching components and with corrosion-resistant coating; and rated in tension, compression, and torsion forces.

D. Restraint Cables: ASTM A 603 galvanized-steel cables with end connections made of steel assemblies with thimbles, brackets, swivel, and bolts designed for restraining cable service; and with a minimum of two clamping bolts for cable engagement.

E. Hanger Rod Stiffener: Steel tube or steel slotted-support-system sleeve with internally bolted connections to hanger rod.

F. Bushings for Floor-Mounted Equipment Anchor Bolts: Neoprene bushings designed for rigid equipment mountings, and matched to type and size of anchor bolts and studs.

G. Resilient Isolation Washers and Bushings: One-piece, molded, oil- and water-resistant neoprene, with a flat washer face.

H. Mechanical Anchor Bolts: Drilled-in and stud-wedge or female-wedge type in zinc-coated steel for interior applications and stainless steel for exterior applications. Select anchor bolts with strength required for anchor and as tested according to ASTM E 488. Minimum length of eight times diameter.

PART 3 - EXECUTION

3.1 APPLICATIONS

A. Multiple Pipe Supports: Secure pipes to trapeze member with clamps approved for application by an evaluation service member of ICC-ES, OSHPD, or an agency acceptable to authorities having jurisdiction.

B. Hanger Rod Stiffeners: Install hanger rod stiffeners where indicated or scheduled on Drawings to receive them and where required to prevent buckling of hanger rods due to seismic forces.

C. Strength of Support and Seismic-Restraint Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static and seismic loads within specified loading limits.

3.2 VIBRATION-CONTROL AND SEISMIC-RESTRAINT DEVICE INSTALLATION

A. Equipment Restraints:
   1. Install resilient bolt isolation washers on equipment anchor bolts where clearance between anchor and adjacent surface exceeds **0.125 inches**.
   2. Install seismic-restraint devices using methods approved by an evaluation service member of ICC-ES, OSHPD, or an agency acceptable to authorities having jurisdiction providing required submittals for component.

B. Piping Restraints:
   1. Comply with requirements in MSS SP-127.
   2. Space lateral supports a maximum of **40 feet** o.c., and longitudinal supports a maximum of **80 feet** o.c.
   3. Brace a change of direction longer than **12 feet**.

C. Install cables so they do not bend across edges of adjacent equipment or building structure.

D. Install seismic-restraint devices using methods approved by an evaluation service member of ICC-ES, OSHPD, or an agency acceptable to authorities having jurisdiction providing required submittals for component.

E. Install bushing assemblies for anchor bolts for floor-mounted equipment, arranged to provide resilient media between anchor bolt and mounting hole in concrete base.

F. Attachment to Structure: If specific attachment is not indicated, anchor bracing to structure at flanges of beams, at upper truss chords of bar joists, or at concrete members.

G. Drilled-in Anchors:
   1. Identify position of reinforcing steel and other embedded items prior to drilling holes for anchors. Do not damage existing reinforcing or embedded items during coring or drilling. Notify the structural engineer if reinforcing steel or other embedded items are encountered during drilling. Locate and avoid pre-stressed tendons, electrical and telecommunications conduit, and gas lines.
   2. Do not drill holes in concrete or masonry until concrete, mortar, or grout has achieved full design strength.
   3. Wedge Anchors: Protect threads from damage during anchor installation. Heavy-duty sleeve anchors shall be installed with sleeve fully engaged in the structural element to which anchor is to be fastened.
   4. Set anchors to manufacturer's recommended torque, using a torque wrench.
   5. Install zinc-coated steel anchors for interior and stainless steel anchors for exterior applications.

3.3 ACCOMMODATION OF DIFFERENTIAL SEISMIC MOTION

A. Install flexible connections in piping where they cross seismic joints, where adjacent sections or branches are supported by different structural elements, and where the connections terminate with connection to equipment that is anchored to a different structural element from the one supporting the connections as they approach equipment.

Comply with requirements in Division 15 Section "Domestic Water Piping" for piping flexible connections.

3.4 FIELD QUALITY CONTROL

A. Perform tests and inspections.

B. Tests and Inspections:
   1. Provide evidence of recent calibration of test equipment by a testing agency acceptable to authorities having jurisdiction.
   2. Schedule test with Owner, through Architect, before connecting anchorage device to restrained component (unless post-connection testing has been approved), and with at least seven days' advance notice.
   3. Obtain Architect's approval before transmitting test loads to structure. Provide temporary load-spreading members.
   4. Test at least four of each type and size of installed anchors and fasteners selected by Architect.
   5. Test to 90 percent of rated proof load of device.
   6. Measure isolator restraint clearance.
   7. Measure isolator deflection.
   8. If a device fails test, modify all installations of same type and retest until satisfactory results are achieved.

C. Remove and replace malfunctioning units and retest as specified above.

D. Prepare test and inspection reports.

3.5 ADJUSTING

A. Adjust isolators after piping system is at operating weight.

B. Adjust limit stops on restrained spring isolators to mount equipment at normal operating height. After equipment installation is complete, adjust limit stops so they are out of contact during normal operation.

C. Adjust active height of spring isolators.

D. Adjust restraints to permit free movement of equipment within normal mode of operation.

END OF SECTION 15072

SECTION 15075 - MECHANICAL IDENTIFICATION

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following mechanical identification materials and their installation:
   1. Equipment nameplates.
   2. Equipment markers.
   3. Equipment signs.
   4. Access panel and door markers.
   5. Pipe markers.
   6. Duct markers.
   7. Valve tags.

1.2 SUBMITTALS

A. Product Data: For each type of product indicated.

1.3 QUALITY ASSURANCE

A. ASME Compliance: Comply with ASME A13.1, "Scheme for the Identification of Piping Systems," for letter size, length of color field, colors, and viewing angles of identification devices for piping.

PART 2 - PRODUCTS

2.1 EQUIPMENT IDENTIFICATION DEVICES

A. Equipment Nameplates: Metal, with data engraved or stamped, for permanent attachment on equipment.

   1. Data:

      a. Manufacturer, product name, model number, and serial number.
      b. Capacity, operating and power characteristics, and essential data.
      c. Labels of tested compliances.

   2. Location: Accessible and visible.
   3. Fasteners: As required to mount on equipment.

B. Equipment Markers: Engraved, color-coded laminated plastic. Include contact-type, permanent adhesive or affix with stainless steel screws.

   1. Terminology: Match schedules as closely as possible.

2. Data:

    a. Name and plan number.
    b. Equipment service.
    c. Design capacity.
    d. Other design parameters such as pressure drop, entering and leaving conditions, and speed.

3. Size: 2-1/2 by 4 inches for control devices, dampers, and valves; 4-1/2 by 6 inches for equipment.

C. Equipment Signs: ASTM D 709, Type I, phenolic-resin-laminate engraving stock; Grade ES-2, black surface, black phenolic core, with white melamine subcore, unless otherwise indicated. Fabricate in sizes required for message. Provide holes for mechanical fastening.

1. Engraving: Manufacturer's standard letter style, of sizes and with terms to match equipment identification.
2. Thickness: 1/16 inch, unless otherwise indicated.
3. Fasteners: Self-tapping, stainless-steel screws or contact-type, permanent adhesive.

2.2 PIPING IDENTIFICATION DEVICES

A. Manufactured Pipe Markers, General: Preprinted, color-coded, with lettering indicating service, and showing direction of flow.

1. Colors: Comply with ASME A13.1, unless otherwise indicated.
2. Lettering: Use piping system terms indicated and abbreviate only as necessary for each application length.
3. Pipes with OD, Including Insulation, Less Than 6 Inches: Full-band pipe markers extending 360 degrees around pipe at each location.
4. Pipes with OD, Including Insulation, 6 Inches and Larger: Either full-band or strip-type pipe markers at least three times letter height and of length required for label.
5. Arrows: Integral with piping system service lettering to accommodate both directions; or as separate unit on each pipe marker to indicate direction of flow.

B. Pretensioned Pipe Markers: Precoiled semirigid plastic formed to cover full circumference of pipe and to attach to pipe without adhesive.

C. Shaped Pipe Markers: Preformed semirigid plastic formed to partially cover circumference of pipe and to attach to pipe with mechanical fasteners that do not penetrate insulation vapor barrier.

D. Self-Adhesive Pipe Markers: Plastic with pressure-sensitive, permanent-type, self-adhesive back.

2.3 VALVE TAGS

A. Valve Tags: Stamped or engraved with 1/4-inch (6.4-mm) letters for piping system abbreviation and 1/2-inch (13-mm) numbers, with numbering scheme. Provide 5/32-inch (4-mm) hole for fastener.
   1. Material: 0.032-inch- (0.8-mm-) thick brass .
   2. Valve-Tag Fasteners: Brass wire-link or beaded chain; or S-hook.

PART 3 - EXECUTION

3.1 APPLICATIONS, GENERAL

A. Products specified are for applications referenced in other Division 15 Sections. If more than single-type material, device, or label is specified for listed applications, selection is Installer's option.

3.2 EQUIPMENT IDENTIFICATION

A. Install and permanently fasten equipment nameplates on each major item of mechanical equipment that does not have nameplate or has nameplate that is damaged or located where not easily visible. Locate nameplates where accessible and visible. Include nameplates for the following general categories of equipment:
   1. Pumps, compressors, chillers, condensers, and similar motor-driven units.
   2. Heat exchangers, coils, evaporators, cooling towers, heat recovery units, and similar equipment.
   3. Fans, blowers, primary balancing dampers, and mixing boxes.
   4. Packaged HVAC central-station and zone-type units.

B. Install equipment markers with permanent adhesive or stainless steel screws on or near each major item of mechanical equipment. Data required for markers may be included on signs, and markers may be omitted if both are indicated.

   1. Letter Size: Minimum 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.
   2. Data: Distinguish among multiple units, indicate operational requirements, indicate safety and emergency precautions, warn of hazards and improper operations, and identify units.
   3. Locate markers where accessible and visible. Include markers for the following general categories of equipment:

      a. Meters, gages, thermometers, and similar units.
      b. Pumps, compressors, chillers, condensers, and similar motor-driven units.
      c. Heat exchangers, coils, evaporators, cooling towers, heat recovery units, and similar equipment.
      d. Fans, blowers, primary balancing dampers, and mixing boxes.
      e. Packaged HVAC central-station and zone-type units.

C. Install equipment signs with stainless steel screws or permanent adhesive on or near each major item of mechanical equipment. Locate signs where accessible and visible.

1. Identify mechanical equipment with equipment markers in the following color codes:

   a. Green: For cooling equipment and components.
   b. Yellow: For heating equipment and components.
   c. Green and Yellow: For combination cooling and heating equipment and components.
   d. Brown: For energy-reclamation equipment and components.

2. Letter Size: Minimum 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.
3. Data: Distinguish among multiple units, indicate operational requirements, indicate safety and emergency precautions, warn of hazards and improper operations, and identify units.
4. Include signs for the following general categories of equipment:
   a. Main control and operating valves, including safety devices and hazardous units such as gas outlets.
   b. Fuel-burning units, including boilers, furnaces, heaters, stills, and absorption units.
   c. Pumps, compressors, chillers, condensers, and similar motor-driven units.
   d. Heat exchangers, coils, evaporators, cooling towers, heat recovery units, and similar equipment.
   e. Fans, blowers, primary balancing dampers, and mixing boxes.
   f. Packaged HVAC central-station and zone-type units.
   g. Tanks and pressure vessels.
   h. Strainers, filters, humidifiers, water-treatment systems, and similar equipment.

3.3 PIPING IDENTIFICATION

A. Install manufactured pipe markers indicating service on each piping system. Install with flow indication arrows showing direction of flow.
   1. Pipes with OD, Including Insulation, Less Than 6 Inches: Pretensioned pipe markers. Use size to ensure a tight fit.
   2. Pipes with OD, Including Insulation, Less Than 6 Inches: Self-adhesive pipe markers. Use color-coded, self-adhesive plastic tape, at least 1-1/2 inches wide, lapped at least 1-1/2 inches at both ends of pipe marker, and covering full circumference of pipe.

   3. Pipes with OD, Including Insulation, 6 Inches and Larger: Shaped pipe markers. Use size to match pipe and secure with fasteners.
   4. Pipes with OD, Including Insulation, 6 Inches and Larger: Self-adhesive pipe markers. Use color-coded, self-adhesive plastic tape, at least 1-1/2 inches wide, lapped at least 3 inches at both ends of pipe marker, and covering full circumference of pipe.
   5..

B. Locate pipe markers and color bands where piping is exposed in finished spaces; machine rooms; accessible maintenance spaces such as shafts, tunnels, and plenums; and exterior nonconcealed locations as follows:

1. Near each valve and control device.
2. Near each branch connection, excluding short takeoffs for fixtures and terminal units. Where flow pattern is not obvious, mark each pipe at branch.
3. Near penetrations through walls, floors, ceilings, and nonaccessible enclosures.
4. At access doors, manholes, and similar access points that permit view of concealed piping.
5. Near major equipment items and other points of origination and termination.
6. Spaced at maximum intervals of 50 feet along each run. Reduce intervals to 25 feet in areas of congested piping and equipment.
7. On piping above removable acoustical ceilings. Omit intermediately spaced markers.

3.4 VALVE-TAG INSTALLATION

A. Install tags on valves and control devices in piping systems, except check valves; valves within factory-fabricated equipment units; plumbing fixture supply stops; shutoff valves; faucets; convenience and lawn-watering hose connections; and HVAC terminal devices and similar roughing-in connections of end-use fixtures and units. List tagged valves in a valve schedule.

B. Valve-Tag Application Schedule: Tag valves according to size, shape, and color scheme and with captions similar to those indicated in the following:
1. Valve-Tag Size and Shape:

a. 1-1/2 inches (38 mm), round.

2. Valve-Tag Color:

a. Cold Water: Blue.
b. Hot Water: Red.
c. Gas: Yellow .
d. Steam: Red.
e. Condenser Water: Green

3. Letter Color:

a. All Piping: White.

3.5 ADJUSTING AND CLEANING

A. Relocate mechanical identification materials and devices that have become visually blocked by other work.

B. Clean faces of mechanical identification.

END OF SECTION 15075

SECTION 15076 – IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following mechanical identification materials and their installation:

1. Pipe markers.
2. Valve tags.

1.2 SUBMITTALS

A. Product Data: For each type of product indicated.

1.3 QUALITY ASSURANCE

A. ASME Compliance: Comply with ASME A13.1, "Scheme for the Identification of Piping Systems," for letter size, length of color field, colors, and viewing angles of identification devices for piping.

PART 2 - PRODUCTS

2.1 PIPING IDENTIFICATION DEVICES

A. Manufactured Pipe Markers, General: Preprinted, color-coded, with lettering indicating service, and showing direction of flow.

1. Colors: Comply with ASME A13.1, unless otherwise indicated.
2. Lettering: Use piping system terms indicated and abbreviate only as necessary for each application length.
3. Pipes with OD, Including Insulation, Less Than NPS 6: Full-band pipe markers extending 360 degrees around pipe at each location.
4. Pipes with OD, Including Insulation, NPS 6 and Larger: Either full-band or strip-type pipe markers at least three times letter height and of length required for label.
5. Arrows: Integral with piping system service lettering to accommodate both directions; or as separate unit on each pipe marker to indicate direction of flow.

B. Pre-tensioned Pipe Markers: Pre-coiled semi-rigid plastic formed to cover full circumference of pipe and to attach to pipe without adhesive.

C. Shaped Pipe Markers: Preformed semi-rigid plastic formed to partially cover circumference of pipe and to attach to pipe with mechanical fasteners that do not penetrate insulation vapor barrier.

D. Self-Adhesive Pipe Markers: Plastic with pressure-sensitive, permanent-type, self-adhesive back.

2.2 VALVE TAGS

A. Valve Tags: Stamped or engraved with 1/4-inch letters for piping system abbreviation and 1/2-inch numbers, with numbering scheme. Provide 5/32-inch hole for fastener.

1. Material: 0.032-inch- thick brass.
2. Valve-Tag Fasteners: Brass wire-link or beaded chain; or S-hook.

PART 3 - EXECUTION

3.1 APPLICATIONS, GENERAL

A. Products specified are for applications referenced in other Division 22 Sections. If more than single-type material, device, or label is specified for listed applications, selection is Installer's option.

3.2 PIPING IDENTIFICATION

A. Install manufactured pipe markers indicating service on each piping system. Install with flow indication arrows showing direction of flow.

1. Pipes with OD, Including Insulation, Less Than NPS 6: Pre-tensioned pipe markers. Use size to ensure a tight fit.
2. Pipes with OD, Including Insulation, Less Than NPS 6: Self-adhesive pipe markers. Use color-coded, self-adhesive plastic tape, at least 1-1/2 inches wide, lapped at least 1-1/2 inches at both ends of pipe marker, and covering full circumference of pipe.
3. Pipes with OD, Including Insulation, NPS 6 and Larger: Shaped pipe markers. Use size to match pipe and secure with fasteners.
4. Pipes with OD, Including Insulation, NPS 6 and Larger: Self-adhesive pipe markers. Use color-coded, self-adhesive plastic tape, at least 1-1/2 inches wide, lapped at least 3 inches at both ends of pipe marker, and covering full circumference of pipe.

B. Locate pipe markers and color bands where piping is exposed in finished spaces; machine rooms; accessible maintenance spaces such as shafts, tunnels, and plenums; and exterior non-concealed locations as follows:

1. Near each valve and control device.

2. Near each branch connection, excluding short takeoffs for fixtures. Where flow pattern is not obvious, mark each pipe at branch.
3. Near penetrations through walls, floors, ceilings, and non-accessible enclosures.
4. At access doors, manholes, and similar access points that permit view of concealed piping.
5. Near major equipment items and other points of origination and termination.
6. Spaced at maximum intervals of 15 feet along each run. Reduce intervals to 10 feet in areas of congested piping and equipment. Provide a minimum of one marker in each room.

3.3 VALVE-TAG INSTALLATION

A. Install tags on valves and control devices in piping systems, except check valves; valves within factory-fabricated equipment units; plumbing fixture supply stops and similar roughing-in connections of end-use fixtures. List tagged valves in a valve schedule.

B. Valve-Tag Application Schedule: Tag valves according to size, shape, and color scheme and with captions similar to those indicated in the following:

1. Valve-Tag Size and Shape:

    a. 1-1/2 inches, round.

2. Valve-Tag Color:

    a. Cold Water: Blue.
    b. Hot Water: Red.
    c. Gas: Yellow.
    d. Compressed Air: Green.

3. Letter Color:

    a. All Piping: White.

3.5 ADJUSTING AND CLEANING

A. Relocate identification materials and devices that have become visually blocked by other work.

B. Clean faces of mechanical identification.

END OF SECTION 15076

SECTION 15083 – MECHANICAL PIPE INSULATION

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes semirigid and flexible piping insulation, insulating cements, field-applied jackets, accessories and attachments, and sealing compounds.

1.2 SUBMITTALS

A. Product Data: Thermal conductivity, thickness, and jackets (both factory and field applied, if any), for each type of product indicated.

B. Shop Drawings: Shop fabrication and installation details for the following:
   1. Application of protective shields, saddles, and inserts at pipe hangers for each type of insulation and hanger.
   2. Insulation application at pipe expansion joints for each type of insulation.
   3. Insulation application at elbows, fittings, flanges, valves, and specialties for each type of insulation.
   4. Removable insulation at piping specialties and equipment connections.
   5. Application of field-applied jackets.

1.3 QUALITY ASSURANCE

A. Fire-Test-Response Characteristics: Provide products with flame-spread and smoke-developed indices of 25 and 50, respectively, according to ASTM E 84 by a testing agency acceptable to authorities having jurisdiction.

B. Insulation shall be installed by a firm whose principal business is the application and installation of thermal insulating material on piping and duct systems, with a minimum of five years experience in this principal business. Materials shall be installed by skilled mechanics in accordance with manufacturer’s standard published instructions except as otherwise specified.

C. ASBESTOS FREE INSTALLATION: All insulation and insulation materials shall be certified asbestos free. After the installation is complete, all insulation shall be labeled "ASBESTOS FREE INSULATION". The labels shall be positioned so that the labels will not be visible to a person standing on THE floor. The labels shall be fully adhered to the jacket or surface of the insulation so that the labels are not easily removed. The labels shall be located at least 10 foot on center and at each change of direction of the pipe or duct. All equipment that is insulated shall be labeled "ASBESTOS FREE INSULATION" as above. Labels shall be blue with 3/4" high white letters.

D. Provide 20 year manufacturer’s limited warranty on the insulation efficiency, moisture absorption, compressive strength, dimensional stability and combustible properties of

the installed system for indoor chilled water piping. If any of the above listed fails to meet the specified and/or installed value during the warranty period replacement insulation of equal or better quality shall be provided at no cost to the owner. The contractor shall bear the cost of all factory recommended installation procedures and factory inspections required to provide a factory approved installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Mineral-Fiber Insulation:
      a. CertainTeed Manson
      b. Knauf FiberGlass GmbH.
      c. Owens-Corning Fiberglass Corp.
      d. Schuller International, Inc.
   2. Flexible Elastomeric Thermal Insulation:
      a. Armstrong World Industries, Inc.
      b. Rubatex Corp.
   3. Foamglass insulation
      a. Pittsburgh Corning
      b. Cell-U-Foam

2.2 PIPE INSULATION MATERIALS

A. Mineral-Fiber Insulation: Glass fibers bonded with a thermosetting resin complying with the following:
   1. Preformed Pipe Insulation: Comply with ASTM C 547, Type 1, with factory-applied, all-purpose, vapor-retarder jacket.
   2. Blanket Insulation: Comply with ASTM C 553, Type II. 3/4 pcf density, type 75 insulation with ASJ. Secure joints with galvanized staples and 2-1/2" pressure sensitive foil tape.
   3. Preformed pipe insulation with wicking core: Comply with ASTM C 547, Type I, with factory applied jacket with factory cut evaporation holes. Wicking core shall be continuous along all lengths of pipe and across all fittings. Installed system shall be laboratory tested to maintain indefinite insulation dryness without dripping for the service listed under ambient conditions of 90 deg F, 90% relative humidity.
   4. Fire-Resistant Adhesive: Comply with MIL-A-3316C Class 1, Grade A for bonding glass cloth and tape to unfaced glass-fiber insulation, for sealing edges of glass-fiber insulation, and for bonding lagging cloth to unfaced glass-fiber insulation.
   5. Vapor-Retarder Mastics: Fire- and water-resistant, vapor-retarder mastic for indoor applications. Comply with MIL-C-19565C, Type II.
   6. Mineral-Fiber Insulating Cements: Comply with ASTM C 195.
   7. Expanded or Exfoliated Vermiculite Insulating Cements: Comply with ASTM C 196.

8. Mineral-Fiber, Hydraulic-Setting Insulating and Finishing Cement: Comply with ASTM C 449/C 449M.

B. Flexible Elastomeric Thermal Insulation: Closed-cell, sponge- or expanded-rubber materials. Comply with ASTM C 534, Type I for tubular materials and Type II for sheet materials.

C. Cellular Glass Insulation: Closed-cell, 100% rigid cellular glass. Comply with ASTM C 552, Type II, in 18" or 24" sections factory fitted for the vessel size.
1. Joint Sealant: Permanently resilient styrene-butadiene rubber sealant as recommended by manufacturer.

D. Field-Applied Jackets: ASTM C 921, Type 1, unless otherwise indicated.
1. Foil and Paper Jacket: Laminated, glass-fiber-reinforced, flame-retardant kraft paper and aluminum foil.
2. PVC Jacket: High-impact, ultraviolet-resistant PVC; 20 mils thick; roll stock ready for shop or field cutting and forming.
3. Standard PVC Fitting Covers: Factory-fabricated fitting covers manufactured from 20-mil- thick, high-impact, ultraviolet-resistant PVC.
4. Aluminum Jacket: Aluminum jacketing, .016" thickness with bands and seals of same material.

E. Accessories and Attachments:
1. Fiberglass insulation Glass Cloth and Tape: Comply with MIL-C-20079H, Type I for cloth and Type II for tape. Woven glass-fiber fabrics, plain weave, presized a minimum of 8 oz./sq. yd.
2. Bands: 3/4 inch wide, .016 inch thick, aluminum. Tie wire is not acceptable.

PART 3 - EXECUTION

3.1 GENERAL APPLICATION REQUIREMENTS

A. Surface Preparation: Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.

B. Site Preparation: The installation area shall be enclosed and weather proof during and after installation to prevent moisture intrusion. If insulation is water damaged, all affected insulation shall be removed and replaced with new materials. The contractor shall report in writing any incident of water damage to the design professional.

C. Apply insulation materials, accessories, and finishes according to the manufacturer's written instructions; with smooth, straight, and even surfaces; and free of voids throughout the length of pipes and fittings.

D. Use accessories compatible with insulation materials and suitable for the service indicated. Use accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.

E. Seal joints and seams with vapor-retarder mastic on insulation indicated to receive a vapor retarder. Do not use joint sealants to fill voids in excess of 1/8".

F. Apply insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by the insulation material manufacturer. Joint voids shall not exceed 1/8".

G. Apply insulation with the least number of joints practical.

H. Apply insulation over fittings and specialties, with continuous thermal and vapor-retarder integrity, unless otherwise indicated.

I. Hangers and Anchors: Where vapor retarder is indicated, seal penetrations in insulation at hangers, supports, anchors, and other projections with vapor-retarder mastic. Apply insulation continuously through hangers and around anchor attachments. Provide cellular glass blocking and saddles at support points.

J. Insulation Terminations: For insulation application where vapor retarders are indicated, seal ends with a compound recommended by the insulation material manufacturer to maintain vapor retarder.

K. Roof Penetrations: Apply insulation for interior applications to a point even with top of roof flashing.

L. Interior Wall and Partition Penetrations: Apply insulation continuously through walls and partitions except fire-rated walls and partitions. Foamglass insulation shall be continuous through rated walls with a UL listed fire stop assembly.

M. Floor Penetrations: Apply insulation continuously through floors, except rated floor assemblies. Foamglass insulation shall be continuous through rated floors with a UL listed fire stop assembly.

N. Grooved Piping: Insulation applied to grooved piping systems shall be of the material and thickness specified and factory formed to match the fittings. Field cut insulation is not acceptable.

3.2 PIPE INSULATION APPLICATION SCHEDULE

A. Service: Refrigerant suction and hot-gas piping.
   1. Operating Temperature: 35 to 50 deg F.
   2. Insulation Material: Flexible elastomeric.
   3. Insulation Thickness: 1"
   4. Field-Applied Jacket: Provide UV protective finish on all exterior insulation
   5. Vapor Retarder Required: No.

B. Service: Condensate drain piping.
   1. Operating Temperature: 35 to 50 deg F.
   2. Insulation Material: Flexible elastomeric.
   3. Insulation Thickness: 1/2"

END OF SECTION 15083

SECTION 15084 – PLUMBING PIPING INSULATION

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes semi-rigid piping insulation, insulating cements, field-applied jackets, accessories and attachments, and sealing compounds.

1.2 SUBMITTALS

A. Product Data: Thermal conductivity, thickness, and jackets (both factory and field applied, if any), for each type of product indicated.

B. Shop Drawings: Shop fabrication and installation details for the following:

1. Application of protective shields, saddles, and inserts at pipe hangers for each type of insulation and hanger.
2. Insulation application at pipe expansion joints for each type of insulation.
3. Insulation application at elbows, fittings, flanges, valves, and specialties for each type of insulation.
4. Removable insulation at piping specialties and equipment connections.
5. Application of field-applied jackets.

C. LEED Submittals:
1. Product Data for Credit IEQ 4.1: For adhesives and sealants, documentation including printed statement of VOC content and chemical components.
2. Laboratory Test Reports for Credit IEQ 4: For adhesives and sealants, documentation indicating that product complies with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

1.3 QUALITY ASSURANCE

A. Fire-Test-Response Characteristics: Provide products with flame-spread and smoke-developed indices of 25 and 50, respectively, according to ASTM E 84 by a testing agency acceptable to authorities having jurisdiction.

B. Insulation shall be installed by a firm whose principal business is the application and installation of thermal insulating material on piping and duct systems, with a minimum of five years experience in this principal business. Materials shall be installed by skilled mechanics in accordance with manufacturer’s standard published instructions except as otherwise specified.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Mineral-Fiber Insulation:

   a. Johns Manville
   b. Knauf
   c. Owens Corning

2. Flexible Elastomeric Thermal Insulation:

   a. Armstrong World Industries, Inc.
   b. Rubatex Corp.

2.2 PIPE INSULATION MATERIALS

A. Mineral-Fiber Insulation: Glass fibers bonded with a thermosetting resin complying with the following:

1. Preformed Pipe Insulation: Comply with ASTM C 547, Type 1, with factory-applied, all-purpose, vapor-retarder jacket.
2. Blanket Insulation: Comply with ASTM C 553, Type II. 3/4 PCF density, type 75 insulation with ASJ. Secure joints with galvanized staples and 2-1/2" pressure sensitive foil tape.
3. Fire-Resistant Adhesive: Comply with MIL-A-3316C Class 1, Grade A for bonding glass cloth and tape to un-faced glass-fiber insulation, for sealing edges of glass-fiber insulation, and for bonding lagging cloth to un-faced glass-fiber insulation.
4. Vapor-Retarder Mastics: Fire- and water-resistant, vapor-retarder mastic for indoor applications. Comply with MIL-C-19565C, Type II.
5. Mineral-Fiber Insulating Cements: Comply with ASTM C 195.

B. Flexible Elastomeric Thermal Insulation: Closed-cell, sponge- or expanded-rubber materials. Comply with ASTM C 534, Type I for tubular materials and Type II for sheet materials.

C. Field-Applied Jackets: ASTM C 921, Type 1, unless otherwise indicated.

1. Foil and Paper Jacket: Laminated, glass-fiber-reinforced, flame-retardant kraft paper and aluminum foil.
2. PVC Jacket: High-impact, ultraviolet-resistant PVC; 20 mils thick; roll stock ready for shop or field cutting and forming.
3. Standard PVC Fitting Covers: Factory-fabricated fitting covers manufactured from 20 mils thick, high-impact, ultraviolet-resistant PVC.

4. Aluminum Jacket: Aluminum jacketing, .016" thickness with bands and seals of same material.

D. Accessories and Attachments:

1. Fiberglass insulation Glass Cloth and Tape: Comply with MIL-C-20079H, Type I for cloth and Type II for tape. Woven glass-fiber fabrics, plain weave, pre-sized a minimum of 8 oz/sq yd.
2. Bands: 3/4 inch wide, 0.016 inch thick, aluminum. Tie wire is not acceptable.

PART 3 - EXECUTION

3.1 GENERAL APPLICATION REQUIREMENTS

A. Surface Preparation: Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.

B. Site Preparation: The installation area shall be enclosed and weather proof during and after installation to prevent moisture intrusion. If insulation is water damaged, all affected insulation shall be removed and replaced with new materials. The Contractor shall report in writing any incident of water damage to the design professional.

C. Apply insulation materials, accessories, and finishes according to the manufacturer's written instructions; with smooth, straight, and even surfaces; and free of voids throughout the length of pipes and fittings.

D. Use accessories compatible with insulation materials and suitable for the service indicated. Use accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.

E. Seal joints and seams with vapor-retarder mastic on insulation indicated to receive a vapor retarder. Do not use joint sealants to fill voids in excess of 1/8".

F. Apply insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by the insulation material manufacturer. Joint voids shall not exceed 1/8".

G. Apply insulation with the least number of joints practical.

H. Apply insulation over fittings and specialties, with continuous thermal and vapor-retarder integrity, unless otherwise indicated.

I. Hangers and Anchors: Where vapor retarder is indicated, seal penetrations in insulation at hangers, supports, anchors, and other projections with vapor-retarder mastic. Apply insulation continuously through hangers and around anchor attachments. Provide cellular glass blocking and saddles at support points.

J. Insulation Terminations: For insulation application where vapor retarders are indicated, seal ends with a compound recommended by the insulation material manufacturer to maintain vapor retarder.

K. Interior Wall and Partition Penetrations: Apply insulation continuously through walls and partitions, except fire-rated walls and partitions where insulation shall be continuous through rated walls with a UL listed fire stop assembly.

L. Floor Penetrations: Apply insulation continuously through floors, except rated floor assemblies, where insulation shall be continuous through rated floors with a UL listed fire stop assembly.

3.2 PIPE INSULATION APPLICATION SCHEDULE

A. Service: Domestic cold water. Insulate all domestic cold water except piping drops in walls and headers in walls serving fixtures.

1. Operating Temperature: 35 to 80 degrees F.
2. Insulation Material: Mineral-fiber preformed pipe.
3. Insulation Thickness: 1/2"
4. Jacket: All service jacket with self sealing laps on all pipe. Provide preformed PVC jackets for all fittings.
5. Field-Applied Jacket: Aluminum jacket where piping is exposed to view.

B. Service: Domestic hot water. Applies to all piping materials.

1. Operating Temperature: 60 to 140 degrees F.
2. Insulation Material: Mineral fiber.
3. Insulation Thickness: Size according to the following table:

Pipe Size	Insulation thickness
≤ 1-1/4"	1/2"
≥ 1-1/2"	1"

4. Jacket: All service jacket with self sealing laps on all pipe. Provide preformed PVC jackets for all fittings.
5. Field-Applied Jacket: Aluminum jacket where piping is exposed to view.

C. Service: Roof drain bodies, roof drain horizontal piping above ceilings, sanitary sewer horizontal piping carrying cold waste including but not limited to water coolers, ice makers and HVAC condensate, etc. above ceilings:

1. Operating Temperature: 32 to 100 degrees F.
2. Insulation Material: Mineral fiber Blanket.
3. Insulation Thickness: 1-1/2"
4. Jacket: Foil and paper.
5. Vapor Retarder Required: Yes.

END OF SECTION 15084

SECTION 15091 - SLEEVES AND SLEEVE SEALS FOR HVAC PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Sleeves.
2. Grout.

PART 2 - PRODUCTS

2.1 SLEEVES

A. Cast-Iron Wall Pipes: Cast or fabricated of cast or ductile iron and equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop unless otherwise indicated.

B. Galvanized-Steel Wall Pipes: ASTM A 53/A 53M, Schedule 40, with plain ends and welded steel collar; zinc coated.

C. Galvanized-Steel-Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, zinc coated, with plain ends.

D. PVC-Pipe Sleeves: ASTM D 1785, Schedule 40.

E. Galvanized-Steel-Sheet Sleeves: 0.0239-inch minimum thickness; round tube closed with welded longitudinal joint.

2.2 GROUT

A. Standard: ASTM C 1107/C 1107M, Grade B, post-hardening and volume-adjusting, dry, hydraulic-cement grout.

B. Characteristics: Nonshrink; recommended for interior and exterior applications.

C. Design Mix: 5000-psi, 28-day compressive strength.

D. Packaging: Premixed and factory packaged.

PART 3 - EXECUTION

3.1 SLEEVE INSTALLATION

A. Install sleeves for piping passing through penetrations in floors, partitions, roofs, and walls.

1. Sleeves are not required for core-drilled holes.

B. Install sleeves in concrete floors, concrete roof slabs, and concrete walls as new slabs and walls are constructed.

1. Cut sleeves to length for mounting flush with both surfaces.

a. Exception: Extend sleeves installed in floors of mechanical equipment areas or other wet areas 2 inches above finished floor level.

2. Using grout, seal the space outside of sleeves in slabs and walls.

C. Install sleeves for pipes passing through interior partitions.

1. Cut sleeves to length for mounting flush with both surfaces.
2. Install sleeves that are large enough to provide 1/4-inch annular clear space between sleeve and pipe or pipe insulation.
3. Seal annular space between sleeve and piping or piping insulation; use joint sealants appropriate for size, depth, and location of joint. Comply with requirements for sealants specified in Division 07 Section "Joint Sealants."

D. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestop materials. Comply with requirements for firestopping specified in Division 07 Section "Penetration Firestopping."

3.2 SLEEVE SCHEDULE

A. Use sleeves for the following piping-penetration applications:

1. Exterior Concrete Walls above/below Grade: Galvanized-steel wall sleeves.

2. Concrete Slabs above Grade: PVC-pipe sleeves.

a. Piping Smaller Than NPS 6: PVC-pipe sleeves.
b. Piping NPS 6 and Larger: PVC-pipe sleeves.

3. Interior Partitions:

a. Piping Smaller Than NPS 6: PVC-pipe sleeves.
b. Piping NPS 6 and Larger: Galvanized-steel-sheet sleeves.

END OF SECTION 15091

SECTION 15092 - SLEEVES AND SLEEVE SEALS FOR PLUMBING PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Sleeves.
2. Stack-sleeve fittings.
3. Sleeve-seal systems.
4. Sleeve-seal fittings.
5. Grout.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

PART 2 - PRODUCTS

2.1 SLEEVES

A. Cast-Iron Wall Pipes: Cast or fabricated of cast or ductile iron and equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop unless otherwise indicated.

B. Galvanized-Steel Wall Pipes: ASTM A 53/A 53M, Schedule 40, with plain ends and welded steel collar; zinc coated.

C. Galvanized-Steel-Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, zinc coated, with plain ends.

D. PVC-Pipe Sleeves: ASTM D 1785, Schedule 40.

E. Galvanized-Steel-Sheet Sleeves: 0.0239-inch minimum thickness; round tube closed with welded longitudinal joint.

F. Molded-PE or -PP Sleeves: Removable, tapered-cup shaped, and smooth outer surface with nailing flange for attaching to wooden forms.

G. Molded-PVC Sleeves: With nailing flange for attaching to wooden forms.

2.2 STACK-SLEEVE FITTINGS

A. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

1. Smith, Jay R. Mfg. Co.
2. Zurn Specification Drainage Operation; Zurn Plumbing Products Group.
3. Other prior approved equal.

B. Description: Manufactured, cast-iron sleeve with integral clamping flange. Include clamping ring, bolts, and nuts for membrane flashing.

1. Underdeck Clamp: Clamping ring with setscrews.

2.3 SLEEVE-SEAL SYSTEMS

A. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

1. Advance Products & Systems, Inc.
2. CALPICO, Inc.
3. Metraflex Company (The).
4. Pipeline Seal and Insulator, Inc.
5. Proco Products, Inc.
6. Other prior approved equal.

B. Description: Modular sealing-element unit, designed for field assembly, for filling annular space between piping and sleeve.

1. Sealing Elements: EPDM-rubber interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe.
2. Pressure Plates: Carbon steel.
3. Connecting Bolts and Nuts: Carbon steel, with corrosion-resistant coating, of length required to secure pressure plates to sealing elements.

2.4 SLEEVE-SEAL FITTINGS

A. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

1. Presealed Systems.
2. Other prior approved equal.

B. Description: Manufactured plastic, sleeve-type, waterstop assembly made for imbedding in concrete slab or wall. Unit has plastic or rubber waterstop collar with center opening to match piping OD.

2.5 GROUT

A. Standard: ASTM C 1107/C 1107M, Grade B, post-hardening and volume-adjusting, dry, hydraulic-cement grout.

B. Characteristics: Nonshrink; recommended for interior and exterior applications.

C. Design Mix: 5000-psi, 28-day compressive strength.

D. Packaging: Premixed and factory packaged.

PART 3 - EXECUTION

3.1 SLEEVE INSTALLATION

A. Install sleeves for piping passing through penetrations in floors, partitions, roofs, and walls.

B. For sleeves that will have sleeve-seal system installed, select sleeves of size large enough to provide 1-inch annular clear space between piping and concrete slabs and walls.

1. Sleeves are not required for core-drilled holes.

C. Install sleeves in concrete floors, concrete roof slabs, and concrete walls as new slabs and walls are constructed.

1. Permanent sleeves are not required for holes in slabs formed by molded-PE or -PP sleeves.
2. Cut sleeves to length for mounting flush with both surfaces.

a. Exception: Extend sleeves installed in floors of mechanical equipment areas or other wet areas 2 inches above finished floor level.

3. Using grout, seal the space outside of sleeves in slabs and walls without sleeve-seal system.

D. Install sleeves for pipes passing through interior partitions.

1. Cut sleeves to length for mounting flush with both surfaces.
2. Install sleeves that are large enough to provide 1/4-inch annular clear space between sleeve and pipe or pipe insulation.
3. Seal annular space between sleeve and piping or piping insulation; use joint sealants appropriate for size, depth, and location of joint. Comply with requirements for sealants specified in Division 07 Section "Joint Sealants."

E. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestop materials. Comply with requirements for firestopping specified in Division 07 Section "Penetration Firestopping."

3.2 STACK-SLEEVE-FITTING INSTALLATION

A. Install stack-sleeve fittings in new slabs as slabs are constructed.

1. Install fittings that are large enough to provide 1/4-inch annular clear space between sleeve and pipe or pipe insulation.
2. Secure flashing between clamping flanges for pipes penetrating floors with membrane waterproofing. Comply with requirements for flashing specified in Division 07 Section "Sheet Metal Flashing and Trim."
3. Install section of cast-iron soil pipe to extend sleeve to 2 inches above finished floor level.
4. Extend cast-iron sleeve fittings below floor slab as required to secure clamping ring if ring is specified.
5. Using grout, seal the space around outside of stack-sleeve fittings.

B. Fire-Barrier Penetrations: Maintain indicated fire rating of floors at pipe penetrations. Seal pipe penetrations with firestop materials. Comply with requirements for firestopping specified in Division 07 Section "Penetration Firestopping."

3.3 SLEEVE-SEAL-SYSTEM INSTALLATION

A. Install sleeve-seal systems in sleeves in exterior concrete walls and slabs-on-grade at service piping entries into building.

B. Select type, size, and number of sealing elements required for piping material and size and for sleeve ID or hole size. Position piping in center of sleeve. Center piping in penetration, assemble sleeve-seal system components, and install in annular space between piping and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make a watertight seal.

3.4 SLEEVE-SEAL-FITTING INSTALLATION

A. Install sleeve-seal fittings in new walls and slabs as they are constructed.

B. Assemble fitting components of length to be flush with both surfaces of concrete slabs and walls. Position waterstop flange to be centered in concrete slab or wall.

C. Secure nailing flanges to concrete forms.

D. Using grout, seal the space around outside of sleeve-seal fittings.

3.5 SLEEVE AND SLEEVE-SEAL SCHEDULE

A. Use sleeves and sleeve seals for the following piping-penetration applications:

1. Exterior Concrete Walls above Grade:

a. Piping Smaller Than NPS 6: Galvanized-steel wall sleeves or Galvanized-steel-pipe sleeves, Sleeve-seal fittings.
b. Piping NPS 6 and Larger: Galvanized-steel wall sleeves or Galvanized-steel-pipe sleeves.

2. Exterior Concrete Walls below Grade:

a. Piping Smaller Than NPS 6: Galvanized-steel wall sleeves with sleeve-seal system or Galvanized-steel-pipe sleeves with sleeve-seal system, Sleeve-seal fittings.
   1) Select sleeve size to allow for 1-inch annular clear space between piping and sleeve for installing sleeve-seal system.
b. Piping NPS 6 and Larger: Galvanized-steel wall sleeves with sleeve-seal system or Galvanized-steel-pipe sleeves with sleeve-seal system.
   1) Select sleeve size to allow for 1-inch annular clear space between piping and sleeve for installing sleeve-seal system.

3. Concrete Slabs-on-Grade:

a. Piping Smaller Than NPS 6: Galvanized-steel wall sleeves with sleeve-seal system or Galvanized-steel-pipe sleeves with sleeve-seal system, Sleeve-seal fittings.
   1) Select sleeve size to allow for 1-inch annular clear space between piping and sleeve for installing sleeve-seal system.

b. Piping NPS 6 and Larger: Galvanized-steel wall sleeves with sleeve-seal system or Galvanized-steel-pipe sleeves with sleeve-seal system.
   1) Select sleeve size to allow for 1-inch annular clear space between piping and sleeve for installing sleeve-seal system.

4. Concrete Slabs above Grade:

a. Piping Smaller Than NPS 6: Galvanized-steel-pipe sleeves or PVC-pipe sleeves, Stack-sleeve fittings.
b. Piping NPS 6 and Larger: Galvanized-steel-pipe sleeves or PVC-pipe sleeves, Stack-sleeve fittings.

5. Interior Partitions:

a. Piping Smaller Than NPS 6: Galvanized-steel-pipe sleeves or PVC-pipe sleeves.
b. Piping NPS 6 and Larger: Galvanized-steel-sheet sleeves.

END OF SECTION 15092

SECTION 15110 – VALVES FOR PLUMBING PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following general-duty valves:
   1. Copper-alloy ball valves.
   2. Ferrous-alloy butterfly valves.
   3. Bronze check valves.

B. See Division 15 Section "Fire Protection Piping, Valves and Accessories" for fire suppression valves.

C. See Division 15 Section “Plumbing Specialties” for specialty valves.

1.2 SUBMITTALS

A. Product Data: For each type of valve indicated. Include body, seating, and trim materials; valve design; pressure and temperature classifications; end connections; arrangement; dimensions; and required clearances. Include list indicating valve and its application. Include rated capacities; furnished specialties; and accessories.

1.3 QUALITY ASSURANCE

A. ASME Compliance: ASME B31.9 for building services piping valves.

B. ASME Compliance for Ferrous Valves: ASME B16.10 and ASME B16.34 for dimension and design criteria.

C. NSF Compliance: NSF 61 for valve materials for potable-water service.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers are listed below each valve type.

2.2 VALVES, GENERAL

A. Refer to Part 3 "Valve Applications" Article for applications of valves.

B. Bronze Valves: NPS 2 and Smaller: Threaded ends, unless otherwise indicated.

C. Ferrous Valves NPS 2-1/2 and Larger: Flanged ends, unless otherwise indicated.

D. Valve Pressure and Temperature Ratings: Not less than indicated and as required for system pressures and temperatures.

E. Valve Sizes: Same as upstream pipe, unless otherwise indicated.

F. Valve Actuators:

1. Lever Handle: For quarter-turn valves NPS 6 and smaller, except plug valves.

G. Extended Valve Stems: On insulated valves.

H. Valve Flanges: ASME B16.1 for cast-iron valves, ASME B16.5 for steel valves and ASME B16.24 for bronze valves.

I. Valve Grooved Ends: AWWA C606.

J. Solder Joint: With sockets according to ASME B16.18.

1. Caution: Use solder with melting point below 840 degrees F for check valves; below 421 degrees F for all ball valves.

K. Threaded: With threads according to ASME B1.20.1.

L. PEX Connections: Cold expansion type joint according to ASTM F 1960.

M. Valve Bypass and Drain Connections: MSS SP-45.

2.3 CHECK VALVES

A. Check valves, except non-slamming check valves, NPS 2 and smaller shall be Class 125 (125 PSI SWP / 200 PSI WOG) bronze body and trim, threaded ends, and conform to MSS SP-80.

B. Check valves shall be installed where shown on drawings and where required for satisfactory system operation.

2.4 NON-SLAMMING CHECK VALVES

A. Non-slamming or silent check valves shall be of the fully guided conical type, torsion spring actuated, or cone and diaphragm type. Bodies shall be constructed of cast iron, cast steel, stainless steel, or cast bronze in accordance with the following specifications:

Cast Iron: ASTM A-126 Class B or ASTM A-48 Class 35.

Cast Steel: ASTM A-216 Class WCB.

Cast Bronze: ASTM B-61 or ASTM B-584.

B. Seats and discs shall be constructed of bronze complying with ASTM B-62 or ASTM B-584 with torsion springs constructed of 300 series or 18-8 stainless steel. Seats may be of an elastomer suitable for 250 degrees F minimum continuous operating

temperature, or not less than 50 degrees F above the operating temperature of the system, whichever is higher. All mating surfaces of the closure faces shall be of bronze or Type 304, 316, or 17-4PH stainless steel, or elastomer, approved for the particular service, and materials must be compatible to prevent electrolytic action. Pressure loss through the valves, measured in feet of water, shall not exceed six tenths of the water velocity in feet per second.

C. Non-slamming check valves shall provide bubble-tight shutoff when handling water up to 250 degree F, and shall be designed to prevent rubbing of seat material when opening and closing. Poppet type valves shall have conical springs.

2.5 BALL VALVES:

A. All ball valves and their components shall be designed for a minimum working pressure of 600 PSI WOG and conform to MSS-SP-110. All non-metallic components and elastomers shall be suitable for 250 degrees F minimum continuous operating temperature, or not less than 50 degrees F above the operating temperature of the system, whichever is higher. All mating surfaces of closure faces shall be of bronze or Type 300 series or 17-4PH stainless steel, or elastomer, approved for the particular service, and materials must be compatible to prevent poisoning of contact surfaces of different materials (electrolytic action). Each valve shall be provided with a handle or wheel which shall be secured to the stem or chained to the valve body.

B. Ball valves shall be used on lines NPS 2-1/2 and smaller. Valves shall have bronze bodies with chrome-plated balls, threaded ends, and shall conform to MSS SP-110. Valves may be 2-piece or 3-piece bolt-through body. Valves used for balancing shall have balancing/memory stops included with valve. Use stem extensions on all insulated lines.

2.6 BUTTERFLY VALVES

A. Butterfly valves may be used on lines larger than NPS 2-1/2. Valves shall be structurally designed to provide closure against the system operating pressure. Valve shaft shall be of Type 316, 416 or 17-4PH stainless steel. Shaft seals shall be of the "O" ring type. Stems, discs and operators shall be designed for a water velocity of 16 feet per second through the nominal pipe area. Bodies shall be lugged or flanged type. Valves flanges shall be of the same class as required for the lines in which they are installed. Valves 8 inches and larger shall be provided with enclosed worm gear type operators permanently lubricated. Valves which serve to isolate system to permit removal of equipment shall have bodies with integral flanges, or full lugs drilled and tapped, to hold valve in place when piping or equipment is removed, and be capable of dead-end service to 150 PSI without use of the downstream flange. Valves installed with mechanical couplings shall be grooved or shouldered ends suitable for the approved couplings. Valves in insulated lines shall have extended necks to extend a minimum of 1" beyond the insulation and jacket.

2.7 ACCEPTABLE MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Apollo
2. Hammond
3. Milwaukee

PART 3 - EXECUTION

3.1 VALVE APPLICATIONS

A. Refer to piping Sections for specific valve applications. If valve applications are not indicated, use the following:

1. Shutoff Service: Ball or butterfly valves.
2. Throttling Service: Ball and butterfly valves.
3. Pump Discharge: Non-slamming check valves.

B. If valves with specified SWP classes or CWP ratings are not available, the same types of valves with higher SWP class or CWP ratings may be substituted.

C. Valves shall be Class 125 (125 PSI SWP/200 PSI WOG) or 150 percent of the system operating pressure, whichever is the greater.

3.2 VALVE INSTALLATION

A. Piping installation requirements are specified in other Division 15 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Install valves with unions or flanges at each piece of equipment arranged to allow service, maintenance, and equipment removal without system shutdown.

C. Locate valves for easy access.

D. Install valves in horizontal piping with stem at or above center of pipe.

E. Install valves in position to allow full stem movement.

F. Install check valves for proper direction of flow.

3.3 JOINT CONSTRUCTION

A. Refer to Division 15 Section "Basic Materials and Methods" for basic piping joint construction.

B. Grooved Joints: Assemble joints with keyed coupling housing, gasket, lubricant, and bolts according to coupling and fitting manufacturer's written instructions.

C. Soldered Joints: Use ASTM B 813, water-flushable, lead-free flux; ASTM B 32, lead-free-alloy solder; and ASTM B 828 procedure, unless otherwise indicated. Use silver soldered joints for all chilled and hot water piping applications.

3.4 ADJUSTING

A. Adjust or replace valve packing after piping systems have been tested and put into service but before final adjusting and balancing. Replace valves if persistent leaking occurs.

END OF SECTION 15110

SECTION 15122 - METERS AND GAUGES FOR HVAC PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Bimetallic-actuated thermometers.
2. Liquid-in-glass thermometers.
3. Thermowells.
4. Dial-type pressure gauges.
5. Gauge attachments.
6. Pitot-tube flowmeters.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Wiring Diagrams: For power, signal, and control wiring.

1.3 INFORMATIONAL SUBMITTALS

A. Product certificates.

1.4 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

PART 2 - PRODUCTS

2.1 BIMETALLIC-ACTUATED THERMOMETERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

B. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

1. Ashcroft Inc.
2. Ernst Flow Industries.
3. Marsh Bellofram.
4. Miljoco Corporation.
5. Nanmac Corporation.

6. Noshok.
7. Palmer Wahl Instrumentation Group.
8. REOTEMP Instrument Corporation.
9. Tel-Tru Manufacturing Company.
10. Trerice, H. O. Co.
11. Watts Regulator Co.; a div. of Watts Water Technologies, Inc.
12. Weiss Instruments, Inc.
13. WIKA Instrument Corporation - USA.
14. Winters Instruments - U.S.

C. Standard: ASME B40.200.

D. Case: Liquid-filled type(s); stainless steel with 3-inch nominal diameter.

E. Dial: Nonreflective aluminum with permanently etched scale markings and scales in deg F.

F. Connector Type(s): Union joint, adjustable angle, with unified-inch screw threads.

G. Connector Size: 1/2 inch, with ASME B1.1 screw threads.

H. Stem: 0.25 or 0.375 inch in diameter; stainless steel.

I. Window: Plain glass or plastic.

J. Ring: Stainless steel.

K. Element: Bimetal coil.

L. Pointer: Dark-colored metal.

M. Accuracy: Plus or minus 1 percent of scale range.

2.2 LIQUID-IN-GLASS THERMOMETERS

A. Metal-Case, Industrial-Style, Liquid-in-Glass Thermometers:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
2. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

    a. Flo Fab Inc.
    b. Miljoco Corporation.
    c. Palmer Wahl Instrumentation Group.
    d. Tel-Tru Manufacturing Company.
    e. Trerice, H. O. Co.
    f. Weiss Instruments, Inc.
    g. Winters Instruments - U.S.

3. Standard: ASME B40.200.
4. Case: Cast aluminum; 7-inch nominal size unless otherwise indicated.
5. Case Form: Adjustable angle unless otherwise indicated.
6. Tube: Glass with magnifying lens and blue or red organic liquid.
7. Tube Background: Nonreflective aluminum with permanently etched scale markings graduated in deg F.
8. Window: Glass or plastic.
9. Stem: Aluminum and of length to suit installation.

    a. Design for Air-Duct Installation: With ventilated shroud.
    b. Design for Thermowell Installation: Bare stem.

10. Connector: 1-1/4 inches, with ASME B1.1 screw threads.
11. Accuracy: Plus or minus 1 percent of scale range or one scale division, to a maximum of 1.5 percent of scale range.

2.3 DUCT-THERMOMETER MOUNTING BRACKETS

A. Description: Flanged bracket with screw holes, for attachment to air duct and made to hold thermometer stem.

2.4 THERMOWELLS

A. Thermowells:

1. Standard: ASME B40.200.
2. Description: Pressure-tight, socket-type fitting made for insertion into piping tee fitting.
3. Material for Use with Copper Tubing: CNR or CUNI.
4. Material for Use with Steel Piping: CRES.
5. Type: Stepped shank unless straight or tapered shank is indicated.
6. External Threads: NPS 1/2, NPS 3/4, or NPS 1, ASME B1.20.1 pipe threads.
7. Internal Threads: 1/2, 3/4, and 1 inch, with ASME B1.1 screw threads.
8. Bore: Diameter required to match thermometer bulb or stem.
9. Insertion Length: Length required to match thermometer bulb or stem.
10. Lagging Extension: Include on thermowells for insulated piping and tubing.
11. Bushings: For converting size of thermowell's internal screw thread to size of thermometer connection.

B. Heat-Transfer Medium: Mixture of graphite and glycerin.

2.5 PRESSURE GAUGES

A. Direct-Mounted, Metal-Case, Dial-Type Pressure Gauges:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

2. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

    a. AMETEK, Inc.; U.S. Gauge.
    b. Ashcroft Inc.
    c. Ernst Flow Industries.
    d. Flo Fab Inc.
    e. Marsh Bellofram.
    f. Miljoco Corporation.
    g. Noshok.
    h. Palmer Wahl Instrumentation Group.
    i. REOTEMP Instrument Corporation.
    j. Tel-Tru Manufacturing Company.
    k. Trerice, H. O. Co.
    l. Watts Regulator Co.; a div. of Watts Water Technologies, Inc.
    m. Weiss Instruments, Inc.
    n. WIKA Instrument Corporation - USA.
    o. Winters Instruments - U.S.

3. Standard: ASME B40.100.
4. Case: Liquid-filled type(s); cast aluminum or drawn steel; 4-1/2-inch nominal diameter.
5. Pressure-Element Assembly: Bourdon tube unless otherwise indicated.
6. Pressure Connection: Brass, with NPS 1/4 or NPS 1/2, ASME B1.20.1 pipe threads and bottom-outlet type unless back-outlet type is indicated.
7. Movement: Mechanical, with link to pressure element and connection to pointer.
8. Dial: Nonreflective aluminum with permanently etched scale markings graduated in psi.
9. Pointer: Dark-colored metal.
10. Window: Glass or plastic.
11. Ring: Metal.
12. Accuracy: Grade A, plus or minus 1 percent of middle half of scale range.

2.6 GAUGE ATTACHMENTS

A. Snubbers: ASME B40.100, brass; with NPS 1/4 or NPS 1/2, ASME B1.20.1 pipe threads and piston-type surge-dampening device. Include extension for use on insulated piping.

B. Siphons: Loop-shaped section of brass pipe with NPS 1/4 or NPS 1/2 pipe threads.

C. Valves: Brass ball, with NPS 1/4 or NPS 1/2, ASME B1.20.1 pipe threads.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install thermowells with socket extending a minimum of 2 inches into fluid and in vertical position in piping tees.

B. Install thermowells of sizes required to match thermometer connectors. Include bushings if required to match sizes.

C. Install thermowells with extension on insulated piping.

D. Fill thermowells with heat-transfer medium.

E. Install direct-mounted thermometers in thermowells and adjust vertical and tilted positions.

F. Install remote-mounted thermometer bulbs in thermowells and install cases on panels; connect cases with tubing and support tubing to prevent kinks. Use minimum tubing length.

G. Install direct-mounted pressure gauges in piping tees with pressure gauge located on pipe at the most readable position.

H. Install valve and snubber in piping for each pressure gauge for fluids (except steam).

I. Install permanent indicators on walls or brackets in accessible and readable positions.

J. Install connection fittings in accessible locations for attachment to portable indicators.

K. Mount thermal-energy meters on wall if accessible; if not, provide brackets to support meters.

L. Install thermometers in the following locations:

1. Two inlets and two outlets of each chiller.
2. Inlet and outlet of each boiler.
3. Inlet and outlet of each hydronic coil in air-handling units.

M. Install pressure gauges in the following locations:

1. Discharge of each pressure-reducing valve.
2. Inlet and outlet of each chiller chilled-water and condenser-water connection.
3. Suction and discharge of each pump.
4. Inlet and outlet of each boiler.

3.2 CONNECTIONS

A. Install meters and gauges adjacent to machines and equipment to allow service and maintenance of meters, gauges, machines, and equipment.

3.3 ADJUSTING

A. After installation, calibrate meters according to manufacturer's written instructions.

B. Adjust faces of meters and gauges to proper angle for best visibility.

3.4 THERMOMETER SCHEDULE

A. Thermometers at inlets and outlets of each chiller shall be one of the following:
   1. Industrial-style, liquid-in-glass type.

B. Thermometers at inlet and outlet of each hydronic coil in air-handling units and built-up central systems shall be one of the following:
   1. Industrial-style, liquid-in-glass type.

C. Thermometer stems shall be of length to match thermowell insertion length.

3.5 THERMOMETER SCALE-RANGE SCHEDULE

A. Scale Range for Chilled-Water Piping: 0 to 150 deg F.

B. Scale Range for Condenser-Water Piping: 0 to 250 deg F.

C. Scale Range for Heating Hot Water Piping: 0 to 250 deg F.

3.6 PRESSURE-GAUGE SCHEDULE

A. Pressure gauges at inlet and outlet of each chiller chilled-water and condenser-water connection shall be one of the following:

   1. Liquid-filled, direct-mounted, metal case.

B. Pressure gauges at suction and discharge of each pump shall be one of the following:

   1. Liquid-filled, direct-mounted, metal case.

3.7 PRESSURE-GAUGE SCALE-RANGE SCHEDULE

A. Scale Range for Chilled-Water Piping: 0 to 150 psi.

B. Scale Range for Condenser-Water Piping: 0 to 150 psi.

C. Scale Range for Heating Hot-Water Piping: 0 to 150 psi.

END OF SECTION 15122

SECTION 15123 - METERS AND GAUGES FOR PLUMBING PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Thermometers.
   2. Gauges.

1.2 SUBMITTALS

A. Product Data: For each type of product indicated.

PART 2 - PRODUCTS

2.1 METAL-CASE, LIQUID-IN-GLASS THERMOMETERS

A. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
   1. Palmer - Wahl Instruments Inc.
   2. Trerice, H. O. Co.
   3. Weiss Instruments, Inc.
   4. Weksler Instruments Operating Unit; Dresser Industries; Instrument Div.
   5. Other prior approved equal.

B. Case: Die-cast aluminum or brass, minimum 7 inches long.

C. Tube: Red or blue reading, mercury or organic-liquid filled, with magnifying lens.

D. Tube Background: Satin-faced, non-reflective aluminum with permanently etched scale markings.

E. Window: Glass.

F. Connector: Adjustable type, 180 degrees in vertical plane, 360 degrees in horizontal plane, with locking device.

G. Stem: Copper-plated steel, aluminum, or brass for thermowell installation and of length to suit installation.

H. Accuracy: Plus or minus 1 percent of range or plus or minus 1 scale division to maximum of 1.5 percent of range.

2.2 BIMETALLIC-ACTUATED DIAL THERMOMETERS

A. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
   1. Ashcroft Commercial Instrument Operations; Dresser Industries; Instrument Div.
   2. Ernst Gage Co.
   3. Eugene Ernst Products Co.
   4. Marsh Bellofram.
   5. Miljoco Corp.
   6. NANMAC Corporation.
   7. Noshok, Inc.
   8. Palmer - Wahl Instruments Inc.
   9. REO TEMP Instrument Corporation.
   10. Tel-Tru Manufacturing Company.
   11. Trerice, H. O. Co.
   12. Weiss Instruments, Inc.
   13. Weksler Instruments Operating Unit; Dresser Industries; Instrument Div.
   14. WIKA Instrument Corporation.
   15. Winters Instruments.
   16. Other prior approved equal.

B. Description: Direct-mounting, bimetallic-actuated dial thermometers complying with ASME B40.3.

C. Case: Dry type, stainless steel with minimum 3-inch diameter.

D. Element: Bimetal coil.

E. Dial: Satin-faced, nonreflective aluminum with permanently etched scale markings.

F. Pointer: Red metal.

G. Window: Glass.

H. Ring: Stainless steel.

I. Connector: Adjustable angle type.

J. Stem: Metal, for thermowell installation and of length to suit installation.

K. Accuracy: Plus or minus 1 percent of range or plus or minus 1 scale division to maximum of 1.5 percent of range.

2.3 THERMOWELLS

A. Manufacturers: Same as manufacturer of thermometer being used.

B. Description: Pressure-tight, socket-type metal fitting made for insertion into piping and of type, diameter, and length required to hold thermometer.

2.4 PRESSURE GAUGES

A. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
   1. AMETEK, Inc.; U.S. Gauge Div.
   2. Ashcroft Commercial Instrument Operations; Dresser Industries; Instrument Div.
   3. Ernst Gage Co.
   4. Eugene Ernst Products Co.
   5. KOBOLD Instruments, Inc.
   6. Marsh Bellofram.
   7. Miljoco Corp.
   8. Noshok, Inc.
   9. Palmer - Wahl Instruments Inc.
   10. REO TEMP Instrument Corporation.
   11. Trerice, H. O. Co.
   12. Weiss Instruments, Inc.
   13. Weksler Instruments Operating Unit; Dresser Industries; Instrument Div.
   14. WIKA Instrument Corporation.
   15. Winters Instruments.
   16. Other prior approved equal.

B. Direct-Mounting, Dial-Type Pressure Gauges: Indicating-dial type complying with ASME B40.100.
   1. Case: Dry type, drawn steel or cast aluminum, minimum 4-1/2-inch diameter.
   2. Pressure-Element Assembly: Bourdon tube, unless otherwise indicated.
   3. Pressure Connection: Brass, NPS 1/4, bottom-outlet type unless back-outlet type is indicated.
   4. Movement: Mechanical, with link to pressure element and connection to pointer.
   5. Dial: Satin-faced, non-reflective aluminum with permanently etched scale markings.
   6. Pointer: Red metal.
   7. Window: Glass.
   8. Ring: Metal.
   9. Accuracy: Grade B, plus or minus 2 percent of middle half scale.
   10. Vacuum-Pressure Range: 30-in. Hg of vacuum to 15 psig of pressure.
   11. Range for Fluids under Pressure: Two times operating pressure.

C. Pressure-Gauge Fittings:
   1. Valves: NPS 1/4 brass or stainless-steel needle type.
   2. Snubbers: ASME B40.5, NPS 1/4 brass bushing with corrosion-resistant, porous-metal disc of material suitable for system fluid and working pressure.

PART 3 - EXECUTION

3.1 THERMOMETER APPLICATIONS

A. Install liquid-in-glass thermometers in the outlet of each domestic, hot-water storage tank.

B. Install dry-case-type, bimetallic-actuated dial thermometers at suction and discharge of each pump.

C. Provide the following temperature ranges for thermometers:
   1. Domestic Hot Water: 30 to 180 deg F, with 2-degree scale divisions.
   2. Domestic Cold Water: 0 to 100 deg F, with 2-degree scale divisions.

3.2 GAUGE APPLICATIONS

A. Install dry-case-type pressure gauges for discharge of each pressure-reducing valve.

B. Install dry-case-type pressure gauges at suction and discharge of each pump.

3.3 INSTALLATIONS

A. Install direct-mounting thermometers and adjust vertical and tilted positions.

B. Install thermowells with socket extending a minimum of 2 inches into fluid or one-third of diameter of pipe and in vertical position in piping tees where thermometers are indicated.

C. Install direct-mounting pressure gauges in piping tees with pressure gauge located on pipe at most readable position.

D. Install needle-valve and snubber fitting in piping for each pressure gauge.

E. Install thermometers and gauges adjacent to machines and equipment to allow service and maintenance for thermometers, gauges, machines, and equipment.

F. Adjust faces of thermometers and gauges to proper angle for best visibility.

END OF SECTION 15123

SECTION 15140 - DOMESTIC WATER PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes domestic water piping from locations indicated to fixtures and equipment inside the building.

PART 2 - PRODUCTS

2.1 PIPING MATERIALS

A. Mechanical-Joint, Ductile-Iron Pipe: AWWA C151, with mechanical-joint, bell- and plain-spigot end unless grooved or flanged ends are indicated.

1. Mechanical-Joint, Ductile-Iron Fittings: AWWA C110, ductile- or gray-iron standard pattern or AWWA C153, ductile-iron compact pattern.

    a. Glands, Gaskets, and Bolts: AWWA C111, ductile- or gray-iron glands, rubber gaskets, and steel bolts.

B. Soft Copper Tube: ASTM B 88, Type K (ASTM B 88M, Types A), water tube, annealed temper.–For underground use only.

1. Copper Pressure Fittings: ASME B16.18, cast-copper-alloy or ASME B16.22, wrought-copper, solder-joint fittings. Furnish wrought-copper fittings if indicated.
2. Bronze Flanges: ASME B16.24, Class 150, with solder-joint end.
3. Copper Unions: MSS SP-123, cast-copper-alloy, hexagonal-stock body, with ball-and-socket, metal-to-metal seating surfaces and solder-joint or threaded ends.

C. Hard Copper Tube: ASTM B 88, Type L (ASTM B 88M, Types B), water tube, drawn temper.–For aboveground use only.

1. Copper Pressure Fittings: ASME B16.18, cast-copper-alloy or ASME B16.22, wrought- copper, solder-joint fittings. Furnish wrought-copper fittings if indicated.
2. Bronze Flanges: ASME B16.24, Class 150, with solder-joint end.
3. Copper Unions: MSS SP-123, cast-copper-alloy, hexagonal-stock body, with ball-and-socket, metal-to-metal seating surfaces and solder-joint or threaded ends.

2.2 VALVES

A. Refer to Division 15 Section "Valves" for bronze and cast-iron, general-duty valves.

B. Refer to Division 15 Section "Plumbing Specialties" for balancing and drain valves.

PART 3 - EXECUTION

3.1 PIPING APPLICATIONS

A. Domestic Water Piping Aboveground: Use the following piping materials for each size range:
   1. NPS 4 and Smaller: Hard copper tube, Type L (Type B); copper pressure fittings; and soldered joints.

B. Domestic Water Piping Underground: Use the following piping materials for each size range:
   1. NPS 2 and Smaller: Soft Copper tube, Type K (ASTM B 88M, Types A), water tube; and soldered joints.

   2. NPS 4 and Larger: Mechanical-Joint, Ductile-Iron Pipe. Class 150 cast iron water main with mechanical joints and full cement lining conforming to ANSI A21.4 standards.

      a. Provide tie rods, clamps and concrete thrust blocks as per NFPA No. 24 standard. Provide stainless steel tee head bolts with hexagonal nuts. All bolts, rods and nuts shall be given a full coat of Bitumastic #50 after being placed. The coating shall be allowed to dry before backfilling.

3.2 VALVE APPLICATIONS

A. Drawings indicate valve types to be used. Where specific valve types are not indicated, the following requirements apply:

   1. Shutoff Duty: Use bronze ball for piping NPS 2 and smaller. Use cast-iron butterfly with flanged ends for piping NPS 2-1/2 and larger.
   2. Throttling Duty: Use bronze ball for piping NPS 2 and smaller. Use cast-iron butterfly valves with flanged ends for piping NPS 2-1/2 and larger.
   3. Hot-Water-Piping, Balancing Duty: Calibrated automatic flow control valves.
   4. Drain Duty: Hose-end drain valves.

3.3 PIPING INSTALLATION

A. Refer to Division 15 Section "Basic Mechanical Materials and Methods" for basic piping installation.

B. Extend domestic water service piping to exterior water distribution piping in sizes and locations indicated.

C. Install shutoff valve inside building at each domestic water service. Refer to Division 15 Section "Plumbing Specialties" for drain valves and strainers.

D. Install domestic water piping level or slope downward toward drain.

E. Fill water piping. Check components to determine that they are not air bound and that piping is full of water.

F. Perform the following steps before operation:

1. Close drain valves, hydrants, and hose bibbs.
2. Open shutoff valves to fully open position.
3. Open throttling valves to proper setting.
4. Remove plugs used during testing of piping and plugs used for temporary sealing of piping during installation.
5. Close drain valves and replace drain plugs.

G. Check plumbing equipment and verify proper settings, adjustments, and operation. Do not operate water heaters before filling with water.

1. Check plumbing specialties and verify proper settings, adjustments, and operation.

3.4 JOINT CONSTRUCTION

A. Refer to Division 15 Section "Basic Mechanical Materials and Methods" for basic piping joint construction.

B. Soldered Joints: Use ASTM B 813, water-flushable, lead-free flux; ASTM B 32, lead-free-alloy solder; and ASTM B 828 procedure, unless otherwise indicated.

3.5 VALVE INSTALLATION

A. Install sectional valve close to water main on each branch and riser serving plumbing fixtures or equipment. Use ball valves for piping NPS 2 and smaller. Use butterfly valves for piping NPS 2-1/2 and larger.

B. Install shutoff valve on each water supply to equipment and on each water supply to plumbing fixtures without supply stops. Use ball valves for piping NPS 2 and smaller. Use butterfly valves for piping NPS 2-1/2 and larger.

C. Install drain valves for equipment, at low points in horizontal piping, and where required to drain water piping.

1. Install hose-end drain valves at low points in water mains and branches.

D. Install calibrated automatic flow control valves in each hot-water circulation return branch and discharge side of each pump and circulator. Enlist the services of a certified test and balancing Contractor to set balancing valves to achieve equal flow in all return branches.

Provide a written report of the final settings and flows at each return branch and circulating pump. Refer to Division 15 Section "Plumbing Specialties" for automatic flow control valves.

3.6 HANGER AND SUPPORT INSTALLATION

A. Refer to Division 22 Section "Hangers and Supports" for pipe hanger and support devices. Install the following:

1. Vertical Piping: MSS Type 8 clamps.
2. Individual, Straight, Horizontal Piping Runs: According to the following:

    a. 100 Feet and Less: MSS Type 1, adjustable, steel clevis hangers.

B. Install supports according to Division 22 Section "Hangers and Supports".

C. Support vertical piping and tubing at base and at each floor.

D. Rod diameter may be reduced 1 size for double-rod hangers, to a minimum of 3/8 inch.

E. Install hangers for copper tubing with the following maximum horizontal spacing and minimum rod diameters:

1. NPS 3/4 and Smaller: 60 inches with 3/8-inch rod.
2. NPS 1 and NPS 1-1/4: 72 inches with 3/8-inch rod.
3. NPS 1-1/2 and NPS 2: 96 inches with 3/8-inch rod.
4. NPS 2-1/2): 108 inches with 1/2-inch rod.
5. NPS 3 to NPS 5: 10 feet with 1/2-inch rod.

F. Install supports for vertical copper tubing at every floor.

G. Support piping and tubing not listed above according to MSS SP-69 and manufacturer's written instructions.

3.7 CONNECTIONS

A. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Install piping adjacent to equipment and machines to allow service and maintenance.

C. Connect domestic water piping to exterior water service piping. Use dielectric fitting to join dissimilar piping materials.

D. Connect domestic water piping to service piping with shutoff valve, and extend and connect to the following:
1. Water Heaters: Cold-water supply and hot-water outlet piping in sizes indicated, but not smaller than sizes of water heater connections.

2. Plumbing Fixtures: Cold and hot water supply piping in sizes indicated, but not smaller than required by plumbing code. Refer to Division 22 Section "Plumbing Fixtures."
3. Equipment: Cold and hot water supply piping as indicated, but not smaller than equipment connections. Provide shutoff valve and union for each connection. Use flanges instead of unions for NPS 2-1/2 and larger.

3.8 FIELD QUALITY CONTROL

A. Inspect domestic water piping as follows:

1. Do not enclose, cover, or put piping into operation until it is inspected and approved by authorities having jurisdiction.
2. During installation, notify Authorities Having Jurisdiction at least 72 hours before inspection must be made. Perform tests specified below in presence of Authorities Having Jurisdiction:

    a. Roughing-in Inspection: Arrange for inspection of piping before concealing or closing-in after roughing-in and before setting fixtures.
    b. Final Inspection: Arrange for final inspection by authorities having jurisdiction to observe tests specified below and to ensure compliance with requirements.

3. Re-inspection: If authorities having jurisdiction find that piping will not pass test or inspection, make required corrections and arrange for re-inspection.
4. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.

B. Test domestic water piping as follows:

1. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired. If testing is performed in segments, submit separate report for each test, complete with diagram of portion of piping tested.
2. Leave uncovered and unconcealed new, altered, extended, or replaced domestic water piping until it has been tested and approved. Expose work that was covered or concealed before it was tested.
3. Cap and subject piping to static water pressure of 100 psig above operating pressure, without exceeding pressure rating of piping system materials. Isolate test source and allow test to stand for four hours. Leaks and loss in test pressure constitute defects that must be repaired.
4. Repair leaks and defects with new materials and retest piping or portion thereof until satisfactory results are obtained.
5. Prepare reports for tests and required corrective action.

3.9 CLEANING

A. Clean and disinfect potable domestic water piping as follows:

1. Purge new piping and parts of existing domestic water piping that have been altered, extended, or repaired before using.
2. Use purging and disinfecting procedures prescribed by authorities having jurisdiction or, if methods are not prescribed, procedures described in either AWWA C651 or AWWA C652 or as described below:

    a. Flush piping system with clean, potable water until dirty water does not appear at outlets.
    b. Fill and isolate system according to either of the following:

        1) Fill system or part thereof with water/chlorine solution with at least 50 ppm (50 mg/L) of chlorine. Isolate with valves and allow water to stand for 24 hours.
        2) Fill system or part thereof with water/chlorine solution with at least 200 ppm (200 mg/L) of chlorine. Isolate and allow water to stand for three hours.

    c. Flush system with clean, potable water until no chlorine is in water coming from system after the standing time.
    d. Submit water samples in sterile bottles to authorities having jurisdiction. Repeat procedures if biological examination shows contamination.

B. Prepare and submit reports of purging and disinfecting activities.

C. Clean interior of domestic water piping system. Remove dirt and debris as work progresses.

END OF SECTION 15140

SECTION 15150 - SANITARY WASTE AND VENT PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes soil and waste, sanitary drainage and vent piping inside the building.

PART 2 - PRODUCTS

2.1 PIPING MATERIALS

A. PVC Pipe: ASTM D 2665, schedule 40, solid-wall drain, waste and vent.

1. PVC Socket Fittings: ASTM D 2665, socket type, made to ASTM D 3311, drain, waste and vent patterns.

B. PBC Special Fittings: ASTM F 409, drainage-pattern tube and tubular fittings with ends as required for application.

PART 3 - EXECUTION

3.2 PIPING INSTALLATION

A. Refer to Division 15 Section "Basic Mechanical Materials and Methods" for basic piping installation.

B. Install cleanouts at grade and extend to where building sanitary drains connect to building sanitary sewers.

C. Make changes in direction for soil and waste drainage and vent piping using appropriate branches, bends, and long-sweep bends. Sanitary tees and short-sweep 1/4 bends may be used on vertical stacks if change in direction of flow is from horizontal to vertical. Use long-turn, double Y-branch and 1/8-bend fittings if 2 fixtures are installed back to back or side by side with common drain pipe. Straight tees, elbows, and crosses may be used on vent lines. Do not change direction of flow more than 90 degrees. Use proper size of standard increasers and reducers if pipes of different sizes are connected. Reducing size of drainage piping in direction of flow is prohibited.

D. Lay buried building drainage piping beginning at low point of each system. Install true to grades and alignment indicated, with unbroken continuity of invert. Place hub ends of piping upstream. Install required gaskets according to manufacturer's written instructions

for use of lubricants, cements, and other installation requirements. Maintain swab in piping and pull past each joint as completed.

E. Install soil and waste drainage and vent piping at the following minimum slopes, unless otherwise indicated:

1. Piping up to NPS 3: 1/4"/ft.
2. Piping NPS 4 and larger: 1/8"/ft.

F. Install PVC soil and waste and vent piping according to ASTM D 2665. Install underground PVC soil and waste drainage piping according to ASTM D 2321.

G. Do not enclose, cover, or put piping into operation until it is inspected and approved by authorities having jurisdiction.

H. Provide stainless steel hanger rods to support all sanitary sewer and vent piping installed below building slabs and all structurally supported slabs that are not building slabs (service yards, driveways, etc.). Rods shall be minimum 1/4" diameter, type 316 stainless steel spaced at 5'-0" maximum spacing with hanger occurring at all pipe joints. Additional, provide support at each joint or fitting and at each “P-trap” and closet bend.

I. Install test plugs, wood plugs or caps in all open pipes at time of installation and do not remove until the pipes are connected tight into the existing systems. All cost incurred from damage to the project due to failure to make plumbing systems tight shall be borne by the contractor.

3.3 JOINT CONSTRUCTION

A. Refer to Division 15 Section "Basic Mechanical Materials and Methods" for basic piping joint construction.

B. PVC Nonpressure Piping Joints: Join piping according to ASTM D 2665.

3.4 HANGER AND SUPPORT INSTALLATION

A. Refer to Division 15 Section "Hangers and Supports" for pipe hanger and support devices. Install the following:

1. Vertical Piping: MSS Type 8 clamps.
2. Above Ground Individual, Straight, Horizontal Piping Runs: According to the following:

    a. 100 Feet and Less: MSS Type 1, adjustable, steel clevis hangers.

B. Install supports according to Division 15 Section "Hangers and Supports."

C. Support vertical piping and tubing at base and at each floor.

D. Rod diameter may be reduced 1 size for double-rod hangers, with 3/8-inch minimum rods.

E. Install hangers for PVC piping with the following maximum horizontal spacing and minimum rod diameters:

1. NPS 1-1/2 and NPS 2: 48 inches with 3/8-inch rod.
2. NPS 3: 48 inches with 1/2-inch rod.
3. NPS 4 and NPS 5: 48 inches with 5/8-inch rod.

F. Install supports for vertical soil piping at each floor level.

G. Support piping and tubing not listed above according to MSS SP-69 and manufacturer's written instructions.

3.5 CONNECTIONS

A. Connect soil and waste piping to exterior sanitary sewerage piping.

B. Connect drainage and vent piping to the following:

1. Plumbing Fixtures: Connect drainage piping in sizes indicated, but not smaller than required by plumbing code. Refer to Division 15 Section "Plumbing Fixtures."
2. Plumbing Fixtures and Equipment: Connect atmospheric vent piping in sizes indicated, but not smaller than required by authorities having jurisdiction.
3. Plumbing Specialties: Connect drainage and vent piping in sizes indicated, but not smaller than required by plumbing code. Refer to Division 15 Section "Plumbing Specialties."
4. Equipment: Connect drainage piping as indicated. Provide shutoff valve, if indicated, and union for each connection. Use flanges instead of unions for connections NPS 2-1/2 and larger.

3.6 FIELD QUALITY CONTROL

A. During installation, notify authorities having jurisdiction at least 72 hours before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction.

1. Roughing-in Inspection: Arrange for inspection of piping before concealing or closing-in after roughing-in and before setting fixtures.
2. Final Inspection: Arrange for final inspection by authorities having jurisdiction to observe tests specified below and to ensure compliance with requirements.

B. Re-inspection: If authorities having jurisdiction find that piping will not pass test or inspection, make required corrections and arrange for re-inspection.

C. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.

D. Test sanitary drainage and vent piping according to procedures of authorities having jurisdiction.

1. Repair leaks and defects with new materials and retest piping, or portion thereof, until satisfactory results are obtained.
2. Prepare reports for tests and required corrective action.

3.7 CLEANING

A. Clean interior of piping. Remove dirt and debris as work progresses.

B. Protect drains during remainder of construction period to avoid clogging with dirt and debris and to prevent damage from traffic and construction work.

C. Place plugs in ends of uncompleted piping at end of day and when work stops.

END OF SECTION 15150

SECTION 15160 - STORM DRAINAGE PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes storm drainage piping inside the building and perforated drainage piping underground.

1.2 QUALITY ASSURANCE

A. Comply with NSF 14, "Plastics Piping Systems Components and Related Materials," for plastic piping components. Include marking with "NSF-drain" for plastic drain piping and "NSF-sewer" for plastic sewer piping.

1.3 LEED Submittals:

A. Product Data for Credit IEQ 4.1: For solvent cements and adhesive primers, documentation including printed statement of VOC content.

B. Laboratory Test Reports for Credit IEQ 4: For solvent cements and adhesive primers, documentation indicating that products comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

PART 2 - PRODUCTS

2.1 PIPING MATERIALS

A. PVC Pipe: ASTM D 2665, solid-wall drain, waste, and vent.
   1. PVC Socket Fittings: ASTM D 2665, made to ASTM D 3311, drain, waste, and vent patterns.

B. Hubless Cast-Iron Pipe and Fittings: ASTM A 888 or CISPI 301.
   1. Couplings: ASTM C 1277 assembly of metal housing, corrosion-resistant fasteners, and ASTM C 564 rubber sleeve with integral center pipe stop.
      a. Compact, Stainless-Steel Couplings: CISPI 310 with ASTM A 167, Type 301, stainless-steel corrugated shield; stainless-steel bands; and sleeve.
         1) NPS 1-1/2 to NPS 4: 2-1/8-inch wide shield with 2 bands.
         2) NPS 5 and NPS 6: 3-inch wide shield with 4 bands.
         3) NPS 8 and NPS 10: 4-inch wide shield with 4 bands.
         4) NPS 12 and NPS 15: 5-1/2-inch wide shield with 6 bands.

C. PVC Perforated Pipe: ASTM 1785, perforated to AASHTO M278 under-drain specifications, with 3/8” hole size, 3” center to center distance, four rows (two at 90 degrees and two at 160 degrees).
   1. PVC Socket Fittings: ASTM D 2665, made to ASTM D 3311, drain, waste and vent patterns.

PART 3 - EXECUTION

3.1 PIPING APPLICATIONS

A. Building Storm Drainage Piping: Use the following piping materials for each size range:
   1. Above ground: Cast iron pipe and fittings joined with stainless-steel corrugated shield; stainless-steel bands; and sleeve.
   2. Underground: PVC solid wall pipe with socket fittings and solvent-cemented joints.

B. Crawl Space Drainage: Perforated PVC solid wall pipe with socket fittings and solvent-cemented joints. Use PVC solid wall pipe without perforations where indicated on the drains for headers and terminal pipe.

3.2 PIPING INSTALLATION

A. Refer to Division 2 Section "Storm Drainage" for Project site storm sewer and drainage piping.

B. Refer to Division 15 Section "Basic Mechanical Materials and Methods" for basic piping installation.

C. Refer to Division 15 Section "Pipe Insulation" for piping insulation above ceilings.

D. Install cleanouts at grade and extend to where building storm drains connect to building storm sewers.

E. Install underground PVC storm drainage piping according to ASTM D 2321.

F. Make changes in direction for storm piping using appropriate branches, bends, and long-sweep bends. Do not change direction of flow more than 90 degrees. Use proper size of standard increasers and reducers if pipes of different sizes are connected. Reducing size of drainage piping in direction of flow is prohibited.

G. Lay buried building drain piping beginning at low point of each system. Install true to grades and alignment indicated, with unbroken continuity of invert. Place hub ends of piping upstream. Install required gaskets according to manufacturer's written instructions for use of lubricants, cements, and other installation requirements. Maintain swab in piping and pull past each joint as completed.

H. Install storm drainage piping at the following minimum slopes, unless otherwise indicated:
   1. Building Storm Drain: 1/8"/feet downward in direction of flow.
   2. Underground Storm-Drainage Piping: 1/8"/feet downward in direction of flow.
   3. Crawl Space Perforated Drainage Piping: Refer to plans and details.

I. Do not enclose, cover, or put piping into operation until it is inspected and approved by the architect.

J. Provide stainless steel hanger rods to support all storm drainage piping installed below all structurally supported slabs that are not building slabs (service yards, driveways, etc.). Rods shall be minimum 1/4" diameter, type 316 stainless steel spaced at 5'-0" maximum spacing with hanger occurring at all pipe joints or in accordance with N.O. S&WB, whichever is less. Provide 1” wide, 18 gauge, stainless steel strap or saddle at pipe. The rod shall be bent into the center of the slab and span a minimum two steel reinforcing bars.

K. Insulate roof drain bodies and horizontal piping located between roof drains and vertical leaders, including the first vertical fitting and 1’-6” of the vertical leader.

3.3 JOINT CONSTRUCTION

A. Refer to Division 15 Section "Basic Mechanical Materials and Methods" for basic piping joint construction.

B. PVC Non-pressure Piping Joints: Join piping according to ASTM D 2665.

3.4 HANGER AND SUPPORT INSTALLATION

A. Refer to Division 15 Section "Hangers and Supports" for pipe hanger and support devices. Install the following:
   1. Vertical Piping: MSS Type 8 or Type 42 clamps.
   2. Above Ground, Individual, Straight, Horizontal Piping Runs: According to the following:
      a. 100 Feet and Less: MSS Type 1, adjustable, steel clevis hangers.

B. Install supports according to Division 22 Section "Hangers and Supports."

C. Refer to drawings for pipe supports attached to “Lite-Deck” framing system.

D. Support vertical piping at base and at each floor.

E. Rod diameter may be reduced 1 size for double-rod hangers, with 3/8-inch minimum rods.

3.5 CONNECTIONS

A. Connect interior storm drainage piping to exterior storm drainage piping. Use transition fitting to join dissimilar piping materials.

3.6 FIELD QUALITY CONTROL

A. During installation, notify the Architect at least 72 hours before inspection must be made.
   1. Roughing-in Inspection: Arrange for inspection of piping before concealing or closing-in after roughing-in.
   2. Final Inspection: Arrange for final inspection by authorities having jurisdiction to observe tests specified below and to ensure compliance with requirements.

B. Re-inspection: If authorities having jurisdiction find that piping will not pass test or inspection, make required corrections and arrange for re-inspection.

C. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.

D. Test storm drainage piping according to procedures of authorities having jurisdiction.

3.7 CLEANING

A. Clean interior of piping. Remove dirt and debris as work progresses.

B. Protect drains during remainder of construction period to avoid clogging with dirt and debris and to prevent damage from traffic and construction work.

C. Place plugs in ends of uncompleted piping at end of day and when work stops.

END OF SECTION 15160

SECTION 15183 - REFRIGERANT PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes refrigerant piping used for air-conditioning applications.

B. See Division 15 Section "Meters and Gages" for thermometers and pressure gages.

C. The “Manufacturer” as used herein in this Specification Section shall mean the Manufacturer of the air cooled condensing units, chillers with remote air cooled condensers, other Direct Expansion (D/X) refrigeration equipment, etc. requiring field fabricated and installed refrigerant piping and associated specialties.

1.2 SUBMITTALS

A. Product Data: Submit calculations and layout drawings of each complete refrigerant piping installation including, but not limited to, size, pressure drop, layout, and location of the following: Piping, valves, filters, dryers, site glasses, etc. as required by the Manufacturer.

B. Shop Drawings: Show layout of refrigerant piping and specialties, including pipe, tube, and fitting sizes, flow capacities, valve arrangements and locations, slopes of horizontal runs, oil traps, double risers, wall and floor penetrations, and equipment connection details. Show interface and spatial relationship between piping and equipment. Shop drawings shall be submitted for manufacturer approval prior to submittal to the architect.
   1. Refrigerant piping indicated is schematic only. Size piping and design the actual piping layout, including oil traps, double risers, specialties, and pipe and tube sizes, to ensure proper operation and compliance with warranties of connected equipment.

C. Welding and brazing certificates

D. Field quality-control test reports.

E. Operation and maintenance data.

1.3 QUALITY ASSURANCE

A. ASHRAE Standard: Comply with ASHRAE 15, "Safety Code for Mechanical Refrigeration."

B. ASME Standard: Comply with ASME B31.5, "Refrigeration Piping."

C. UL Standard: Provide products complying with UL 207, "Refrigerant-Containing Components and Accessories, Nonelectrical"; or UL 429, "Electrically Operated Valves."

PART 2 - PRODUCTS

2.1 COPPER TUBE AND FITTINGS

A. Drawn-Temper Copper Tube: ASTM B 280, Type ACR.

B. Annealed-Temper Copper Tube: ASTM B 280, Type ACR.

C. Wrought-Copper Fittings: ASME B16.22.

D. Wrought-Copper Unions: ASME B16.22.

E. Bronze Filler Metals: AWS A5.8, Classification BAg-1 (silver)

2.2 VALVES

A. Diaphragm Packless Valves: 500-psig working pressure and 275 deg F working temperature; globe design with straight-through or angle pattern; forged-brass or bronze body and bonnet, phosphor bronze and stainless-steel diaphragms, rising stem and handwheel, stainless-steel spring, nylon seat disc, and with solder-end connections.

B. Packed-Angle Valves: 500-psig working pressure and 275 deg F working temperature; forged-brass or bronze body, forged-brass seal caps with copper gasket, back seating, rising stem and seat, molded stem packing, and with solder-end connections.

C. Check Valves Smaller Than NPS 1: 400-psig operating pressure and 285 deg F operating temperature; cast-brass body, with removable piston, polytetrafluoroethylene seat, and stainless-steel spring; globe design. Valve shall be straight-through pattern, with solder-end connections.

D. Check Valves, NPS 1 and Larger: 400-psig operating pressure and 285 deg F operating temperature; cast-bronze body, with cast-bronze or forged-brass bolted bonnet; floating piston with mechanically retained polytetrafluoroethylene seat disc. Valve shall be straight-through or angle pattern, with solder-end connections.

E. Service Valves: 500-psig pressure rating; forged-brass body with copper stubs, brass caps, removable valve core, integral ball check valve, and with solder-end connections.

F. Solenoid Valves: Comply with ARI 760; 250 deg F temperature rating and 400-psig working pressure; forged brass, with polytetrafluoroethylene valve seat, 2-way, straight-through pattern, and solder-end connections; manual operator; fitted with suitable NEMA 250 enclosure of type required by location, with 1/2-inch conduit

adapter and holding coil. Coordinate the solenoid valve type, normally open or closed, and voltage with Manufacturer and Control Contractor.

G. Pressure-Regulating Valves: Comply with ARI 770; pilot operated, forged brass or cast bronze, stainless-steel bottom spring, pressure-gage tappings, 24-V dc standard coil, and wrought-copper fittings for solder-end connections; suitable for refrigerant specified.

H. Pressure-Regulating Valves: Comply with ARI 770; direct acting, brass; with pilot operator, stainless-steel diaphragm, standard coil, and solder-end connection; suitable for refrigerant specified.

I. Pressure Relief Valves: Straight-through or angle pattern, brass body and disc, neoprene seat, and factory sealed and ASME labeled for standard pressure setting.

J. Thermostatic Expansion Valves: Comply with ARI 750; brass body with stainless-steel parts; thermostatic-adjustable, modulating type; size and operating characteristics as recommended by manufacturer, and factory set for superheat requirements; solder-end connections; with sensing bulb, distributor having side connection for hot-gas bypass line, and external equalizer line.

K. Hot-Gas Bypass Valve: Pulsating-dampening design, stainless-steel bellows and polytetrafluoroethylene valve seat; adjustable; sized for capacity equal to last step of compressor unloading; with solder-end connections.

2.3 REFRIGERANT PIPING SPECIALITIES

A. Straight- or Angle-Type Strainers: 500-psig working pressure; forged-brass or steel body with stainless-steel wire or brass-reinforced Monel screen of 80 to 100 mesh in liquid lines up to 1-1/8 inches , 60 mesh in larger liquid lines, and 40 mesh in suction lines; with screwed cleanout plug and solder-end connections.

B. Moisture/Liquid Indicators: 500-psig maximum working pressure and 200 deg F operating temperature; all-brass body with replaceable, polished, optical viewing window with color-coded moisture indicator; with solder-end connections.

C. Replaceable-Core Filter-Dryers: 500-psig maximum working pressure; heavy gage protected with corrosion-resistant-painted steel shell, flanged ring and spring, ductile-iron cover plate with steel cap screws; wrought-copper fittings for solder-end connections; with replaceable-core kit, including gaskets and the following:
   1. Filter-Dryer Cartridge: Pleated media with solid-core sieve with activated alumina, ARI 730 rated for capacity.

2.4 RECEIVERS

A. Receivers, 6-Inch Diameter and Smaller: ARI 495, UL listed, steel, brazed, 400-psig pressure rating, with tappings for inlet, outlet, and pressure relief valve.

B. Receivers Larger Than 6-Inch Diameter: ARI 495, welded steel, tested and stamped according to ASME Boiler and Pressure Vessel Code: Section VIII; 400-psig pressure rating, with tappings for liquid inlet and outlet valves, pressure relief valve, and liquid-level indicator.

PART 3 - EXECUTION

3.1 PIPING APPLICATIONS

A. Aboveground, within Building: Type ACR drawn-copper tubing.

3.2 VALVE APPLICATIONS

A. Valve applications are subject to approval for use by the Manufacturer. Valves shall be applied as specified unless the manufacturer does not approve of the application.

B. Install diaphragm packless or packed-angle valves in suction and discharge lines of compressor, for gage taps at hot-gas bypass regulators, on each side of strainers.

C. Install check valves in compressor discharge lines and in condenser liquid lines on multiple condenser systems.

D. Install packed-angle valve in liquid line between receiver shutoff valve and thermostatic expansion valve for system charging.

E. Install diaphragm packless or packed-angle valves on each side of strainers and dryers, in liquid and suction lines at evaporators, and elsewhere as indicated.

F. Install solenoid valves upstream from each expansion valve and hot-gas bypass valve.
1. Install solenoid valves in horizontal lines with coil at top.
2. Electrical wiring for solenoid valves is work of this division and shall comply with Division 16 Sections.

G. Install thermostatic expansion valves as close as possible to evaporator.
1. If refrigerant distributors are used, install them directly on expansion-valve outlet.
2. Install valve so diaphragm case is warmer than bulb.
3. Secure bulb to clean, straight, horizontal section of suction line using two bulb straps. Do not mount bulb in a trap or at bottom of the line. Locate bulb as recommended by the manufacturer.
4. If external equalizer lines are required, make connection where it will reflect suction-line pressure at bulb location.

H. Install pressure-regulating and pressure relief valves as required by ASHRAE 15. Pipe pressure relief valve discharge to outside.

3.3 SPECIALTY APPLICATIONS

A. Install liquid indicators as recommended by manufacturer.

B. Install strainers as recommended by manufacturer.

C. Install moisture-liquid indicators in liquid lines between filter-dryers and thermostatic expansion valves and in liquid line to receiver.

D. Install pressure relief valves on ASME receivers; pipe discharge to outdoors.

E. Install filter/dryers and suction line filters as required by the Manufacturer. Fabricate the piping at all filter/dryers and suction line filter so that the core can be removed horizontally or down.

F. Install solenoid valves as recommended by manufacturer.

G. Install receivers, sized to accommodate pump-down charge, on systems 5 tons (17.5 kW) and larger and on systems with long piping runs as recommended by manufacturer.

H. Install flexible connectors at or near compressors where piping configuration does not absorb vibration.

3.4 PIPING INSTALLATION

A. Install refrigerant piping according to ASHRAE 15.

B. Basic piping installation requirements are specified in Division 23 Section "Basic Mechanical Materials and Methods."

C. Install piping as short and direct as possible, with a minimum number of joints, elbows, and fittings.

D. Arrange piping to allow inspection and service of compressor and other equipment. Install valves and specialties in accessible locations to allow for service and inspection.

E. Install piping with adequate clearance between pipe and adjacent walls and hangers or between pipes for insulation installation. Use sleeves through floors, walls, or ceilings, sized to permit installation of full-thickness insulation.

F. Belowground, install copper tubing in protective conduit. Vent conduit outdoors.

G. Install copper tubing in rigid or flexible conduit in locations where copper tubing will be exposed to mechanical injury.

H. Slope refrigerant piping as follows:
   1. Pitch all horizontal refrigerant lines ½" per 10' in the direction of refrigerant flow
   2. Install the suction line so that it drops below the evaporator coil before any horizontal run.

3. If the A/C System(s) have paired condensing units serving single AHU's with Intertwined coils, expansion valves at the evaporator coils may have to be field changed or modified. Follow Manufacturer's requirements.
4. Install traps and double risers to entrain oil in vertical runs.

I. Install unions to allow removal of solenoid valves, pressure-regulating valves, and expansion valves and at connections to compressors and evaporators.

J. When brazing, remove solenoid-valve coils and sight glasses; also remove valve stems, seats, and packing, and accessible internal parts of refrigerant specialties. Do not apply heat near expansion valve bulb.

K. Hanger, support, and anchor products are specified in Division 15 Section "Hangers and Supports."

L. Install the following pipe attachments:
1. Adjustable steel clevis hangers for individual horizontal runs less than 20 feet (6.0 m) long.
2. Roller hangers and spring hangers for individual horizontal runs 20 feet (6.0 m) or longer.
3. Pipe rollers for multiple horizontal runs 20 feet (6.0 m) or longer, supported by a trapeze.
4. Spring hangers to support vertical runs.

M. Install hangers with the following maximum spacing and minimum rod sizes:
1. NPS 1/2: Maximum span, 60 inches; minimum rod size, 1/4 inch.
2. NPS 5/8: Maximum span, 60 inches; minimum rod size, 1/4 inch.
3. NPS 1: Maximum span, 72 inches; minimum rod size, 1/4 inch.
4. NPS 1-1/4: Maximum span, 96 inches; minimum rod size, 3/8 inch.
5. NPS 1-1/2: Maximum span, 96 inches; minimum rod size, 3/8 inch.
6. NPS 2: Maximum span, 96 inches; minimum rod size, 3/8 inch.
7. NPS 2-1/2: Maximum span, 108 inches; minimum rod size, 3/8 inch.
8. NPS 3: Maximum span, 10 feet; minimum rod size, 3/8 inch.
9. NPS 4: Maximum span, 12 feet; minimum rod size, 1/2 inch.

N. Support vertical runs at each floor.

3.5 PIPE JOINT CONSTRUCTION

A. Braze joints according to Division 15 Section "Basic Mechanical Materials and Methods."

B. Fill pipe and fittings with an inert gas (nitrogen or carbon dioxide) during brazing to prevent scale formation.

3.6 REFRIGERANT PIPE INSULATION

A. Insulate all suction lines as specified in Division 15 "Mechanical Pipe Insulation".

B. Do not insulate the liquid lines, except where they come in Contact with the suction lines.

C. Do not apply the insulation until the refrigerant piping system has passed all tests and inspections as specified herein, but not limited to, pressure testing and the Manufacturer inspection.

3.7 FIELD QUALITY CONTROL

A. Test and inspect refrigerant piping according to ASME B31.5, Chapter VI.
   1. Test refrigerant piping, specialties, and receivers. Isolate compressor, condenser, evaporator, and safety devices from test pressure.
   2. Test high- and low-pressure side piping of each system at not less than the lower of the design pressure or the setting of pressure relief device protecting high and low side of system.
      a. System shall maintain test pressure at the manifold gage throughout duration of test.
      b. Test joints and fittings by brushing a small amount of soap and glycerine solution over joint.
      c. Fill system with nitrogen to raise a test pressure of 150 psig or higher as required by authorities having jurisdiction.
      d. Remake leaking joints using new materials and retest until satisfactory results are achieved.

B. The contractor shall not startup the equipment served by the refrigerant piping system until given written approval by the Manufacturer with copies to the Architect/Engineer that the installed refrigerant piping system meets their standards and adheres to the submitted shop drawings.

3.8 SYSTEM CHARGING

A. Charge system using the following procedures:
   1. Install core in filter-dryer after leak test but before evacuation.
   2. Evacuate entire refrigerant system with a vacuum pump to a vacuum of 500 micrometers. If vacuum holds for 12 hours, system is ready for charging.
   3. Break vacuum with refrigerant gas, allowing pressure to build up to 2 psig.
   4. Charge system with a new filter-dryer core in charging line. Provide full-operating charge.

END OF SECTION 15183

SECTION 15194 - FUEL GAS PIPING

1PART - GENERAL

1.1 SUMMARY

A. This Section includes fuel gas piping, specialties, and accessories within the building.

1.2 PROJECT CONDITIONS

A. Gas System Pressure: One pressure range. 0.5 psig or less.

1.3 SUBMITTALS

A. Product Data:

1. Specialty valves. Include pressure rating, capacity, settings, and electrical connection data of selected models.

B. Field quality-control test reports.

C. Operation and maintenance data.

1.4 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

B. ANSI Standard: Comply with ANSI Z223.1, "National Fuel Gas Code."

C. UL Standard: Provide components listed in UL's "Gas and Oil Equipment Directory" if specified to be UL listed.

2PART - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where subparagraph titles below introduce lists, the following requirements apply for product selection:

1. Manufacturers: Subject to compliance with requirements, provide products by the manufacturers specified.

2.2 PIPING MATERIALS

A. Interior Pipe: ASTM A 53; Type E or S; Grade B; Schedule 40; black steel.

1. Malleable-Iron Threaded Fittings: ASME B16.3, Class 150, standard pattern, with threaded ends according to ASME B1.20.1.
2. Unions: ASME B16.39, Class 150, malleable iron with brass-to-iron seat, ground joint, and threaded ends according to ASME B1.20.1.
3. Cast-Iron Flanges and Flanged Fittings: ASME B16.1, Class 125.
4. Steel Welding Fittings: ASME B16.9, wrought steel or ASME B16.11, forged steel.
5. Steel Threaded Fittings: ASME B16.11, forged steel with threaded ends according to ASME B1.20.1.
6. Joint Compound and Tape: Suitable for natural gas.
7. Steel Flanges and Flanged Fittings: ASME B16.5.
8. Gasket Material: Thickness, material, and type suitable for natural gas.~~ASTM B 88, Type L (ASTM B 88M, Type B~~

B. Exterior Pipe: Hot dipped galvanized schedule 40 steel. All fittings and pipe shall be hot dipped galvanized with threaded connections.

C. Transition Fittings: Type, material, and end connections to match piping being joined.

D. Common Joining Materials: Refer to Division 22 Section "Basic Mechanical Materials and Methods" for joining materials not in this Section.

2.3 PROTECTIVE COATING

A. Furnish pipe and fittings with factory-applied, corrosion-resistant polyethylene coating for use underground.

2.4 VALVES

A. Valves, NPS 2 and Smaller: Threaded ends according to ASME B1.20.1 for pipe threads.

B. Valves, NPS 2-1/2 and Larger: Flanged ends according to ASME B16.5 for steel flanges and according to ASME B16.24 for copper and copper-alloy flanges.

C. Appliance Connector Valves: ANSI Z21.15 listed.

D. Gas Stops: Bronze body with AGA stamp, plug type with bronze plug and flat or square head, ball type with chrome-plated brass ball and lever handle, or butterfly valve with

stainless-steel disc and fluorocarbon elastomer seal and lever handle; 2-psig minimum pressure rating.

E. Gas Valves, NPS 2 and Smaller: ASME B16.33 and IAS-listed bronze body and 125-psig pressure rating.

F. Plug Valves, NPS 2-1/2 and Larger: ASME B16.38 and MSS SP-78 cast-iron, lubricated plug valves, with 125-psig pressure rating.

G. General-Duty Valves, NPS 2-1/2 and Larger: MSS SP-70, ASME B16.38, cast-iron body gate valves, OS&Y type with solid wedge, suitable for fuel gas service, with "WOG" indicated on valve body, and 125-psig pressure rating.

2.5 METERS

A. Service Meters: Service meter shall be provided and installed by local utility company. Contractor is responsible for all connection and service fees. Provide the necessary piping and appurtenances as required by the local utility company.

3PART - EXECUTION

3.1 PIPING APPLICATIONS

A. Use flanges, unions, transition, and special fittings in applications below, unless otherwise indicated.

1. NPS 1-1/2 and smaller: Steel pipe, malleable-iron threaded fittings, and threaded joints.
2. NPS 2 and larger: Steel pipe, steel welded fittings and welded joints.

3.2 VALVE APPLICATIONS

A. Appliance Shutoff Valves for Pressure 0.5 psig or Less: Appliance connector valve or gas stop.

B. Piping Line Valves, NPS 2 and Smaller: Gas valve.

C. Piping Line Valves, NPS 2-1/2 and Larger: Plug valve or general-duty valve.

D. Valves at Service Meter, NPS 2 and Smaller: Gas valve.

E. Valves at Service Meter, NPS 2-1/2 and Larger: Plug valve.

3.3 INSTALLATION

A. Refer to Division 15 Section "Basic Mechanical Materials and Methods" for basic piping installation requirements and piping joint construction.~~**NPS 1 (DN 25**~~
~~5.~~NPS 1 (DN 25~~NPS 1 (DN 25~~

B. Service Entrance Piping: Extend fuel gas piping and connect to fuel gas distribution for service entrance to building.

1. Exterior fuel gas distribution system piping, service pressure regulator, and service meter will be provided by gas utility.
2. Install dielectric fitting downstream from and adjacent to each service meter unless meter is supported from service-meter bar with integral dielectric fitting. Install shutoff valve downstream from and adjacent to dielectric fitting. Refer to Division 15 Section "Basic Mechanical Materials and Methods" for dielectric fittings.

C. Concealed Locations: Except as specified below, install concealed gas piping in airtight conduit constructed of Schedule 40, seamless, black steel pipe with welded joints. Vent conduit to outside and terminate with screened vent cap.

1. Above-Ceiling Locations: Gas piping may be installed in accessible spaces, subject to approval of authorities having jurisdiction, whether or not such spaces are used as plenums. Do not locate valves above ceilings.
2. In Partitions: Do not install concealed piping in solid partitions. Protect tubing from physical damage when installed inside partitions or hollow walls.
3. Prohibited Locations: Do not install gas piping in or through circulating air ducts, clothes or trash chutes, chimneys or gas vents (flues), ventilating ducts, or dumbwaiter or elevator shafts.

D. Drips and Sediment Traps: Install drips at points where condensate may collect. Include outlets of service meters. Locate where readily accessible for cleaning and emptying. Do not install where condensate would be subject to freezing.

1. Construct drips and sediment traps using tee fitting with bottom outlet plugged or capped. Use minimum-length nipple of 3 pipe diameters, but not less than 3 inches (75 mm) long, and same size as connected pipe. Install with space between bottom of drip and floor for removal of plug or cap.

E. Conceal pipe installations in walls, pipe spaces, utility spaces, above ceilings and below grade, unless indicated to be exposed to view.

F. Install fuel gas piping at uniform grade of 0.1 percent slope upward toward risers.

G. Use eccentric reducer fittings to make reductions in pipe sizes. Install fittings with level side down.

H. Connect branch piping from top or side of horizontal piping.

I. Install unions in pipes NPS 2 and smaller, adjacent to each valve, at final connection to each piece of equipment, and elsewhere as indicated. Unions are not required on flanged devices.

J. Install strainer on inlet of each line pressure regulator and automatic and electrically operated valve.

K. Install flanges on valves, specialties, and equipment having NPS 2-1/2 and larger connections.

3.4 HANGERS AND SUPPORTS

A. Refer to Division 15 Section "Hangers and Supports" for pipe hanger and support devices.

B. Install hangers for horizontal steel piping with the following maximum spacing and minimum rod sizes:

1. NPS 3/44 and Smaller: Maximum span, 96 inches; minimum rod size, 3/8 inch.
2. NPS 1-1/4: Maximum span, 108 inches; minimum rod size, 3/8 inch.
3. NPS 1-1/2 and NPS 2: Maximum span, 108 inches; minimum rod size, 3/8 inch.
4. NPS 2-1/2 to NPS 4: Maximum span, 10 feet; minimum rod size, 1/2 inch.

3.5 CONNECTIONS

A. Install piping adjacent to appliances to allow service and maintenance. Connect piping to appliances using gas with shutoff valves and unions. Install valve upstream from and within 72 inches of each appliance. Install union downstream from valve.

3.6 FIELD QUALITY CONTROL

A. Inspect, test, and purge piping according to ANSI Z223.1, Part 4 "Inspection, Testing, and Purging," and requirements of authorities having jurisdiction. Repair leaks and defects with new materials and retest system until satisfactory results are obtained.

END OF SECTION 15194

SECTION 15410 - PLUMBING FIXTURES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes plumbing fixtures and related components.

B. See Division 15 Section "Plumbing Specialties" for backflow preventers and specialty fixtures not in this Section.

1.2 DEFINITIONS

A. Accessible Fixture: Plumbing fixture that can be approached, entered, and used by people with disabilities.

1.3 SUBMITTALS

A. Product Data: Include selected fixture and trim, fittings, accessories, appliances, appurtenances, equipment, and supports and indicate materials and finishes, dimensions, construction details, and flow-control rates for each type of fixture indicated.

B. Wiring Diagrams: Power, signal, and control wiring.

C. Operation and maintenance data.

1.4 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

B. Regulatory Requirements: Comply with requirements in ICC A117.1, "Accessible and Usable Buildings and Facilities"[; Public Law 90-480, "Architectural Barriers Act"; and Public Law 101-336, "Americans with Disabilities Act";] about plumbing fixtures for people with disabilities.

C. Regulatory Requirements: Comply with requirements in U.S. Architectural & Transportation Barriers Compliance Board's "Uniform Federal Accessibility Standards (UFAS), 1985-494-187" about plumbing fixtures for people with disabilities.

D. Regulatory Requirements: Comply with requirements in Public Law 102-486, "Energy Policy Act," about water flow and consumption rates for plumbing fixtures.

E. NSF Standard: Comply with NSF 61, "Drinking Water System Components--Health Effects," for fixture materials that will be in contact with potable water.

F. Select combinations of fixtures and trim, faucets, fittings, and other components that are compatible.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where subparagraph titles below introduce lists, the following requirements apply for product selection:
   1. Products: Subject to compliance with requirements, provide one of the products specified.
   2. Manufacturers: Subject to compliance with requirements, provide products by the manufacturers specified.

2.2 PLUMBING FIXTURES

A. Refer to drawing fixture schedule for plumbing fixtures

PART 3 - EXECUTION

3.1 FIXTURE INSTALLATION

A. Assemble fixtures, trim, fittings, and other components according to manufacturers' written instructions.

B. For wall-hanging fixtures, install off-floor supports affixed to building substrate.
   1. Use carrier supports with waste fitting and seal for back-outlet fixtures.
   2. Use carrier supports without waste fitting for fixtures with tubular waste piping.
   3. Use chair-type carrier supports with rectangular steel uprights for accessible fixtures.

C. Install back-outlet, wall-hanging fixtures onto waste fitting seals and attach to supports.

D. Install floor-mounting fixtures on closet flanges or other attachments to piping or building substrate.

E. Install wall-hanging fixtures with tubular waste piping attached to supports.

F. Install floor-mounting, back-outlet water closets attached to building floor substrate and wall bracket and onto waste fitting seals.

G. Install counter-mounting fixtures in and attached to casework.

H. Install fixtures level and plumb according to manufacturers' written instructions and roughing-in drawings.

I. Install water-supply piping with stop on each supply to each fixture to be connected to water distribution piping. Attach supplies to supports or substrate within pipe spaces behind fixtures. Install stops in locations where they can be easily reached for operation.
   1. Exception: Use ball, gate, or globe valve if stops are not specified with fixture. Refer to Division 15 Section "Valves" for general-duty valves.

J. Install trap and tubular waste piping on drain outlet of each fixture to be directly connected to sanitary drainage system.

K. Install flushometer valves for accessible water closets and urinals with handle mounted on wide side of compartment. Install other actuators in locations that are easy for people with disabilities to reach.

L. Install tanks for accessible, tank-type water closets with lever handle mounted on wide side of compartment.

M. Install toilet seats on water closets.

N. Install faucet-spout fittings with specified flow rates and patterns in faucet spouts if faucets are not available with required rates and patterns. Include adapters if required.

O. Install water-supply, flow-control fittings with specified flow rates in fixture supplies at stop valves.

P. Install faucet, flow-control fittings with specified flow rates and patterns in faucet spouts if faucets are not available with required rates and patterns. Include adapters if required.

Q. Install shower, flow-control fittings with specified maximum flow rates in shower arms.

R. Install traps on fixture outlets.
   1. Exception: Omit trap on fixtures with integral traps.

S. Install escutcheons at piping wall ceiling penetrations in exposed, finished locations and within cabinets and millwork. Use deep-pattern escutcheons if required to conceal protruding fittings. Refer to Division 22 Section "Basic Mechanical Materials and Methods" for escutcheons.

T. Set service basins in leveling bed of cement grout. Refer to Division 15 Section "Basic Mechanical Materials and Methods" for grout.

U. Seal joints between fixtures and walls, floors, and counters using sanitary-type, one-part, mildew-resistant, silicone sealant. Match sealant color to fixture color.

3.2 CONNECTIONS

A. Connect water supplies from water distribution piping to fixtures.

B. Connect drain piping from fixtures to sanitary sewer piping.

C. Supply and Waste Connections to Plumbing Fixtures: Connect fixtures with water supplies, stops, risers, traps, and waste piping. Use size fittings required to match fixtures. Connect to plumbing piping.

D. Supply and Waste Connections to Fixtures and Equipment Specified in Other Sections: Connect fixtures and equipment with water supplies, stops, risers, traps, and waste piping specified. Use size fittings required to match fixtures and equipment. Connect to plumbing piping.

3.3 PROTECTION

A. Provide protective covering for installed fixtures and fittings.

B. Do not allow use of fixtures for temporary facilities unless approved in writing by Owner.

END OF SECTION 15410

SECTION 15430 - PLUMBING SPECIALTIES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following plumbing specialties:
   1. Backflow preventers.
   2. Thermostatic water mixing valves.
   3. Outlet boxes.
   4. Wall hydrants.
   5. Trap seal primer valves.
   6. Miscellaneous piping specialties.
   7. Cleanouts.
   8. Floor drains.
   9. Trough drains.
   10. Floor sinks.

1.2 PERFORMANCE REQUIREMENTS

A. Provide components and installation capable of producing piping systems with following minimum working-pressure ratings, unless otherwise indicated:
   1. Domestic Water Piping: 125 psig.
   2. Sanitary Waste and Vent Piping: 10-foot head of water.

1.3 SUBMITTALS

A. Product Data: Include rated capacities and indicate materials, finishes, dimensions, required clearances, and methods of assembly of components; and piping and wiring connections for the following:
   1. Backflow preventers and water regulators.
   2. Thermostatic water mixing valves.
   3. Water hammer arresters, air vents, and trap seal primer valves and systems.
   4. Hose bibbs and hydrants.
   5. Cleanouts, floor drains and open receptors.

B. Field quality-control test reports.

C. Operation and maintenance data for the following:
   1. Backflow preventers and water regulators.
   2. Thermostatic water mixing valves.
   3. Trap seal primer valves.

1.4 QUALITY ASSURANCE

A. Plumbing specialties shall bear label, stamp, or other markings of specified testing agency.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

C. ASME Compliance: Comply with ASME B31.9, "Building Services Piping," for piping materials and installation.

D. NSF Compliance:
   1. Comply with NSF 14, "Plastics Piping Components and Related Materials," for plastic domestic water piping components. Include marking "NSF-PW" on plastic potable-water piping and "NSF-DWV" on plastic drain, waste, and vent piping.
   2. Comply with NSF 61, "Drinking Water System Components--Health Effects, Sections 1 through 9," for potable domestic water plumbing specialties.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where subparagraph titles below introduce lists, the following requirements apply for product selection:
   1. Products: Subject to compliance with requirements, provide one of the products specified.
   2. Manufacturers: Subject to compliance with requirements, provide products by the manufacturers specified.

2.2 BACKFLOW PREVENTERS

A. The double check backflow preventer assembly shall be factory assembled and tested. The unit shall consist of two independent Tri-Link Check modules located within a single housing; a sleeve access port; four bronze body nickel plated test cocks; and two drip-tight, butterfly shut off valves. The check valve modules must be removable and serviceable without the use of special tools. The unit’s housing shall be constructed of type 304 stainless steel schedule 40 pipe having grooved connections. The check valves shall have reversible EPDM elastomer discs and shall provide drip tight closure against reverse flow of liquids caused by back pressure or back siphonage. All pins, fasteners and springs shall be constructed of stainless steel. The unit shall be approved for installation in both the horizontal and vertical position

B. Hose-Connection Vacuum Breakers: ASSE 1011, nickel plated, with non-removable and manual drain features, and ASME B1.20.7, garden-hose threads on outlet. Units attached to rough-bronze-finish hose connections may be rough bronze.

2.3 THERMOSTATIC WATER MIXING VALVES

A. General: ASSE 1070 certified, manually adjustable, thermostatic water mixing valve with bronze body. Include check stop and union on hot-and-cold-supply inlets, adjustable temperature setting and thermometer.

2.4 OUTLET BOXES

A. Manufacturers:
1. Guy Gray Manufacturing Co., Inc.
2. Oatey.
3. Symmons Industries, Inc.
4. Zurn Industries, Inc.; Jonespec Div.

B. General: Recessed-mounting outlet boxes with supply fittings complying with ASME A112.18.1M. Include box with faceplate, services indicated for equipment connections, and wood-blocking reinforcement.

C. Clothes Washer Outlet Boxes: With hot- and cold-water hose connections, drain, and the following:
1. Box and Faceplate: Enameled or epoxy-painted steel.
2. Shutoff Fitting(s): Two hose bibbs.
3. Supply Fittings: Two NPS 3/4 gate, globe, or ball valves and NPS 3/4 copper, water tubing.
4. Drain: NPS 2 standpipe, P-trap, and direct waste connection to drainage piping.

D. Icemaker Outlet Boxes: With hose connection and the following:
1. Box and Faceplate: Enameled or epoxy-painted steel.
2. Shutoff Fitting: Hose bibb.
3. Supply Fitting: NPS 1/4 gate, globe, or ball valve and NPS 1/2 copper, water tubing.

2.5 WALL BOX HYDRANT

A. Manufacturers:
1. NIBCO INC.
2. Watts Industries, Inc.; Water Products Div.
3. Woodford Manufacturing Co.
4. Zurn Industries, Inc.; Jonespec Div.

B. Description: Frost-proof design similar to ASME A112.21.3M, for wall mounting with wheel-handle operation, NPS 3/4 threaded or solder-joint inlet, casing and operating rod to match wall thickness, and projecting outlet with ASME B1.20.7 garden-hose threads on outlet. Include wall clamp; integral vacuum breaker or nonremovable, drainable hose-connection vacuum breaker complying with ASSE 1011 or backflow preventer complying with ASSE 1052; and garden-hose threads complying with ASME B1.20.7 on outlet.

2.6 TRAP SEAL PRIMER VALVES

A. Supply-Type Trap Seal Primer Valves: ASSE 1018, water-supply-fed type, with the following characteristics:
   1. Manufacturers:
      a. Precision Plumbing Products, Inc.
      b. Smith, Jay R. Mfg. Co.
      c. Watts Industries, Inc.; Water Products Div.
   2. 125-psig minimum working pressure.
   3. Bronze body with atmospheric-vented drain chamber.
   4. Inlet and Outlet Connections: NPS 1/2 threaded, union, or solder joint.
   5. Gravity Drain Outlet Connection: NPS 1/2 threaded or solder joint.
   6. Finish: Chrome plated, or rough bronze for units used with pipe or tube that is not chrome finished.

2.7 DRAIN VALVES

A. Hose-End Drain Valves: MSS SP-110, NPS 3/4 ball valve, rated for 400-psig minimum CWP. Include two-piece, copper-alloy body with standard port, chrome-plated brass ball, replaceable seats and seals, blowout-proof stem, and vinyl-covered steel handle.

   1. Inlet: Threaded or solder joint.
   2. Outlet: Short-threaded nipple with ASME B1.20.7, garden-hose threads and cap.

2.8 MISCELLANEOUS PIPING SPECIALTIES

A. Water Hammer Arresters: ASSE 1010 or PDI-WH 201, metal-bellows type with pressurized metal cushioning chamber. Size per ASSE 1010 or PDI-WH 201 recommendations, Sizes A through F.
   1. Manufacturers:
      a. Smith, Jay R. Mfg. Co.
      b. Precision Plumbing Products, Inc.

B. Air Vents: Float type for automatic air venting.
   1. Bolted Construction: Bronze body with replaceable, corrosion-resistant metal float and stainless-steel mechanism and seat; threaded NPS 1/2 minimum inlet; 125-psig minimum pressure rating at 140 deg F; and threaded vent outlet.

C. Open Drains: Shop or field fabricate from ASTM A 74, Service class, hub-and-spigot, cast-iron, soil-pipe fittings. Include P-trap, hub-and-spigot riser section; and where required, increaser fitting, joined with ASTM C 564, rubber gaskets.

2.9 CLEANOUTS AND CLEANOUT COVERS

A. Cleanouts shall consist of cast iron bodies or ferrule material and brass closure plugs with tapered threads.

B. Cleanout covers shall be flush scoriated, secured tops and frames with nickel bronze finish for all uncarpeted areas, equal to “J.R. Smith” Model 4810. In carpeted areas

cleanout covers shall be installed flush with floor under the carpet and provided with screw marker. Minimum opening shall be 10 inches clear.

C. Exterior cleanouts shall be brought to grade and recessed in a 20" x 20” x 6" deep concrete box with cast iron access cover and frame.

2.10 FLOOR DRAINS

A. Floor drains and shower drains shall be supplied with cast iron bodies with flashing collar and round adjustable strainer head with nickel bronze finish, equal to “J.R. Smith” Model 2005-A.

B. Strainers shall be minimum 5" diameter for 2" floor drains and minimum 8" diameter for 4" drains.

C. Floor drains shall be provided with trap primer inlet connection.

2.11 TROUGH DRAINS

A. Trough Drains shall be equal to “J.R. Smith” model 9600. Drain shall be supplied with ADA compliant stainless steel grate.

2.12 FLOOR SINKS

A. Floor sinks shall be furnished with cast iron bodies with acid resistant coated interior, medium depth sumps, trap primer inlet connection, minimum 8” nickel bronze square tops with secured half grates and sediment buckets.

2.13 ROOF FLASHING FOR VENT STACKS

A. Flashing shall be lead of not less than four pounds per square feet and shall be tall enough to turn into the top of the vent pipe 12" above the roof and extend out from the roof stacks at least 12" on each side.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Refer to Division 15 Section "Basic Mechanical Materials and Methods" for piping joining materials, joint construction, and basic installation requirements.

B. Install trap seal primer valves with outlet piping pitched down toward drain trap a minimum of 1 percent and connect to floor-drain body, trap, or inlet fitting. Adjust valve for proper flow.

C. Install cleanouts in aboveground piping and building drain.

D. Install cleanout access covers with top flush with finished floor.

E. Install cleanout wall access covers, of types indicated, with frame and cover flush with finished wall, for cleanouts located in concealed piping.

F. Install floor drains at low points of surface areas to be drained. Set grates of drains flush with finished floor, unless otherwise indicated.
   1. Position floor drains for easy access and maintenance.
   2. Install floor-drain flashing collar or flange so no leakage occurs between drain and adjoining flooring. Maintain integrity of waterproof membranes where penetrated.
   3. Install individual traps for floor drains connected to sanitary building drain, unless otherwise indicated.

G. Install interceptors according to authorities having jurisdiction and with clear space for servicing.
   1. Flush with Floor Installation: Set unit and extension, if required, with cover flush with finished floor.
   2. Install cleanout immediately downstream from interceptors.

H. Fasten wall-hanging plumbing specialties securely to supports attached to building substrate if supports are specified and to building wall construction if no support is indicated.

I. Fasten recessed-type plumbing specialties to reinforcement built into walls.

J. Install wood-blocking reinforcement for wall-mounting and recessed-type plumbing specialties.

K. Install individual shutoff valve in each water supply to plumbing specialties. Use ball valve. Install shutoff valves in accessible locations. Refer to Division 15 Section "Valves" for general-duty ball, butterfly and check valves.

L. Install air vents at piping high points. Include ball valve in inlet and drain piping from outlet to floor drain.

M. Install traps on plumbing specialty drain outlets. Omit traps on indirect wastes unless trap is indicated.

N. Install escutcheons at wall, floor, and ceiling penetrations in exposed finished locations and within cabinets and millwork. Use deep-pattern escutcheons if required to conceal protruding pipe fittings.

O. All fixtures equipped with quick closing valves and flush valves shall be provided with a pre-manufactured shock absorber installed at the fixture connection or battery when multiple fixtures are served by a header.

3.2 CONNECTIONS

A. Install piping adjacent to equipment to allow service and maintenance.

B. Connect plumbing specialties and devices that require power according to Division 26 Sections.

3.3 PROTECTION

A. Protect drains during remainder of construction period to avoid clogging with dirt and debris and to prevent damage from traffic and construction work.
   1. Place plugs in ends of uncompleted piping at end of each day or when work stops

B. Test and certify backflow preventers in accordance with the Louisiana State Plumbing Code.

END OF SECTION 15430

SECTION 15485 – ELECTRIC DOMESTIC WATER HEATERS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes commercial electric water heaters.

1.2 SUBMITTALS

A. Product Data: Include rated capacities, furnished specialties, and accessories for each type and size of water heater indicated.

1.3 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

B. ASHRAE Standards: Comply with performance efficiencies prescribed for the following:

1. ASHRAE 90.1, "Energy Efficient Design of New Buildings except Low-Rise Residential Buildings," for commercial water heaters.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where subparagraph titles below introduce lists, the following requirements apply for product selection:
1. Manufacturers: Subject to compliance with requirements, provide products by the manufacturers specified.

2.3 LIGHT-COMMERCIAL, STORAGE, ELECTRIC WATER HEATERS

A. Description: Comply with UL 174 or UL 1453, and listed by manufacturer for commercial applications.
1. Manufacturers:

a. Rheem Manufacturing Co.; Ruud Water Heater Div.
b. Smith, A. O. Water Products Co.
c. State Industries, Inc.

2. Storage Tank Construction: Non-ASME-code steel with 150-psig working-pressure rating. Tank shall be U.L. label service listed and National Board stamped.

    a. Tappings: Factory fabricated of materials compatible with tank for piping connections, relief valve, pressure gage, thermometer, drain, anode rod, and controls as required. Attach tappings to tank before testing and labeling. Include ASME B1.20.1, pipe thread.
    b. Interior Finish: Materials and thicknesses complying with NSF 61, barrier materials for potable-water tank linings. Extend finish into and through tank fittings and outlets. Provide full three year factory tank warranty.
    c. Insulation: Comply with ASHRAE 90.1. Surround entire storage tank except connections and controls.
    d. Jacket: Steel, with enameled finish.

3. Heating Elements: Electric, screw-in, immersion type.
4. Temperature Control: Adjustable thermostat for each element with wiring arrangement for simultaneous operation.
5. Safety Controls: Automatic, high-temperature-limit and low-water cutoff devices or systems.
6. Drain Valve: ASSE 1005, corrosion-resistant metal, factory installed.
7. Anode Rod: Factory installed, magnesium.
8. Dip Tube: Factory installed. Not required if cold-water inlet is near bottom of storage tank.
9. Special Requirement: NSF 5 construction.
10. Gauges: Combination temperature and pressure type or separate thermometers and pressure gauges.

2.4 WATER HEATER ACCESSORIES

A. Combination Temperature and Pressure Relief Valves: ASME rated and stamped and complying with ASME PTC 25.3. Include relieving capacity at least as great as heat input and include pressure setting less than water heater working-pressure rating. Select relief valve with sensing element that extends into tank.

1. Option: Separate temperature and pressure relief valves are acceptable instead of combination relief valve.
2. Exception: Omit combination temperature and pressure relief valve for tankless water heater, and furnish pressure relief valve for installation in piping.

B. Pressure Relief Valves: ASME rated and stamped and complying with ASME PTC 25.3. Include pressure setting less than heat-exchanger working-pressure rating.

C. Vacuum Relief Valves: Comply with ASME PTC 25.3. Furnish for installation in piping.

1. Exception: Omit if water heater has integral vacuum-relieving device.

D. Expansion Tank: Pre-charged steel thermal expansion tank with a fixed FDA approved butyl diaphragm. The tank shall have a top NPT stainless steel system connection and a charging valve connection (standard tire valve) to facilitate on-site charging of the

tank to meet the system requirements. The tank shall be constructed in accordance with Section VIII of the ASME Boiler and Pressure Vessel Code and stamped for 150 psig working pressure.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install water heaters, level and plumb, according to layout drawings, original design, and referenced standards. Maintain manufacturer's recommended clearances.

B. Install temperature and pressure relief valves in top portion of storage tanks. Use relief valves with sensing elements that extend into tanks. Extend relief valve outlet with water piping in continuous downward pitch and discharge onto closest floor drain.

C. Install vacuum relief valves in cold-water-inlet piping.

D. Install water heater drain piping as indirect waste to spill into open drains or over floor drains. Install hose-end drain valves at low points in water piping for water heaters that do not have tank drains. Refer to Division 15 Section "Plumbing Specialties" for drain valves.

E. Install piping-type heat traps on inlet and outlet piping of water heater storage tanks without integral or fitting-type heat traps.

F. Install piping adjacent to heaters to allow service and maintenance.

3.2 CONNECTIONS

A. Connect hot and cold water piping with shutoff valves and unions.

B. Make connections with dielectric fittings where piping is made of dissimilar metal.

C. Electrical Connections: Power wiring and disconnect switches are specified in Division 16 Sections. Arrange wiring to allow unit service.

D. Expansion Tank: Sized thermal expansion tank per manufacturer’s recommendations.

3.3 FIELD QUALITY CONTROL

A. In addition to manufacturer's written installation and startup checks, perform the following:

1. Check for clear relief valve inlets, outlets, and drain piping.
2. Test operation of safety controls, relief valves, and devices.
3. Adjust operating controls.
4. Adjust hot-water-outlet temperature settings. Do not set above 120 degrees F, unless piping system application requires higher temperature.

B. The Contractor shall schedule an inspection by the State Fire Marshal or National ASME Board Commissioned Inspector for all commercial installation domestic water heaters of 50 gallons or greater capacity prior to the final State Fire Marshal inspection or substantial completion, whichever is earlier. The contractor is responsible for all inspection fees.

END OF SECTION 15485

SECTION 15486 - GAS~~FUEL~~-FIRED DOMESTIC WATER HEATERS

1PART - GENERAL

1.1 SUMMARY

A. This Section includes commercial, gas-fired water heaters.

1.2 SUBMITTALS

A. Product Data: Include rated capacities, furnished specialties, and accessories for each type and size of water heater indicated.

B. Shop Drawings: Detail water heater assemblies and indicate dimensions, required clearances, method of field assembly, components, and location and size of each field connection.

1. Wiring Diagrams: Power, signal, and control wiring.

C. Operation and maintenance data.

D. Warranties.

1.3 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

B. ANSI Compliance: Water heaters shall comply with ANSI standards for gas water heaters and related products and bear AGA certification label.

C. ASME Compliance: Water heater, hot-water storage tanks shall be fabricated and labeled according to ASME Boiler and Pressure Vessel Code: Section VIII, "Pressure Vessels," Division 1.

D. ASHRAE Standards:

1. ASHRAE 90.1, "Energy Efficient Design of New Buildings except Low-Rise Residential Buildings," for commercial water heaters.

2PART - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where subparagraph titles below introduce lists, the following requirements apply for product selection:

1. Manufacturers: Subject to compliance with requirements, provide products by the manufacturers specified.

2.2 COMMERCIAL, STORAGE, GAS WATER HEATERS

A. Description: Comply with ANSI Z21.10.3.

1. Manufacturers:

a. PVI Industries, Inc.
b. Rheem Manufacturing Co.; Rheem Water Heater Div.
c. Smith, A. O. Water Products Co.
d. State Industries.

2. Storage Tank Construction: ASME-code steel with 150-psig working-pressure rating.

a. Tappings: Factory fabricated of materials compatible with tank for piping connections, relief valve, pressure gage, thermometer, drain, anode rods, and controls as required. Attach tappings to tank shell before testing and labeling.

1) NPS 2 and Smaller: Threaded ends according to ASME B1.20.1, pipe threads.
2) NPS 2-1/2 and Larger: Flanged ends according to ASME B16.5 for steel and stainless-steel flanges and according to ASME B16.24 for copper and copper-alloy flanges.

b. Tank: The tank shall be constructed in accordance with ASME Code Section IV Part HLS and stamped with the appropriate symbol for 150 psig working pressure and 225 psig test pressure and be National Board stamped and registered. The tubes shall be covered with pure, dead soft copper, expanded, and welded into the tube sheet. After complete tank fabrication, the interior tank surfaces shall be coated with three separate coats of a thermosetting, polymerized fluorocarbon lining with high temperature resistance and hydrophobic qualities. Manufacturer’s warranty shall be a part of the submittals and the water heater tank shall be covered by the manufacturer’s three year non-prorated warranty against failure.
c. Insulation: The tank shall be insulated with heavy density fiberglass insulation and trimmed with a baked enamel steel jacket. The water heater shall have factory installed ASME rated temperature and pressure relief valve and solid brass drain valve. The entire water heater shall ve Underwrites Laboratories listed and tested under ANSI Z21.10.3 as a complete unit.
d. Jacket: Steel, with enameled finish.
e. Tank shall be mounted on factory channel skids.

3. Burner: Power burner for use with tank type water heaters for natural-gas fuel.

a. Temperature Control: Adjustable thermostat.
b. Safety Controls: Manual reset high-temperature-limit and low-water cutoff devices or systems.
c. Automatic Ignition: ANSI Z21.20, automatic gas-ignition system and components.
d. Automatic Damper: ANSI Z21.66, gas-fired-appliance, automatic-vent-damper device.

4. Ignition: Heater shall have intermittent electronic ignition ,120VAC control system. Heater may be equipped with electrically operated flue damper as required by Federal Energy Policy Act of 1992.
5. Anode Rods: Factory installed, magnesium.
6. Dip Tube: Factory installed. Not required if cold-water inlet is near bottom of storage tank.
7. Drain Valve: ASSE 1005, corrosion-resistant metal, factory installed.
8. Provide flame inspection port.
9. Provide diaphram air flow switch for proof of blower operation.
~~11.150 psig (1035 kPa~~

2.3 EXPANSION TANKS

A. Description: Steel, pressure-rated tank constructed with welded joints and factory-installed, butyl-rubber diaphragm. Include air pre-charge to minimum system-operating pressure at tank.

1. Manufacturers:

a. Amtrol, Inc.
b. Smith, A. O. ; Aqua-Air Div.
c. State Industries.
d. Elbi of America

2. Construction: 150-psig working-pressure rating.
3. Tappings: Factory-fabricated steel, welded to tank before testing and labeling. Include ASME B1.20.1, pipe thread.
4. Tank Interior Finish: Materials and thicknesses complying with NSF 61, barrier materials for potable-water tank linings. Extend finish into and through tank fittings and outlets.
5. Tank Exterior Finish: Manufacturer's standard, unless finish is indicated
6. Air-Charging Valve: Factory installed.

2.4 WATER HEATER ACCESSORIES

A. Combination Temperature and Pressure Relief Valves:

1. Gas Water Heaters: ANSI Z21.22, combination temperature and pressure relief valve.

B. Vacuum Relief Valves:

1. Gas Water Heaters: ANSI Z21.22.
2. Exception: Omit if water heater has integral vacuum-relieving device.

C. Gas Shutoff Valves: ANSI Z21.15, manually operated. Furnish for installation in piping. Provide redundant solenoid gas valve downstream of manual valve.

D. Gas Pressure Regulators: ANSI Z21.18, appliance type, factory or field installed. Include pressure rating, capacity, and pressure differential required for water heater and gas supply.

E. Piping-Type Heat Traps: Field-fabricated piping arrangement according to ASHRAE 90.1 or ASHRAE 90.2.

3PART - EXECUTION

3.1 INSTALLATION

A. Install commercial water heaters on concrete floor.

B. Install water heaters, level and plumb, according to layout drawings, original design, and referenced standards. Maintain manufacturer's recommended clearances. Arrange units so controls and devices needing service are accessible.

C. Install and connect gas water heaters according to NFPA 54.

1. Install appliance, gas pressure regulators on gas-burner inlets of water heaters without pressure regulators.
2. Install vent piping from gas-train pressure regulators and valves to outside of building where required. Terminate vent piping with brass-screened vent cap fitting. Do not combine vents except with approval of authorities having jurisdiction.

D. Install temperature and pressure relief valves in top portion of storage tanks. Use relief valves with sensing elements that extend into tanks. Extend relief valve outlet with water piping in continuous downward pitch and discharge onto closest floor drain.

E. Install vacuum relief valves in cold-water-inlet piping.

F. Install water heater drain piping as indirect waste to spill into open drains or over floor drains. Install hose-end drain valves at low points in water piping for water heaters that do not have tank drains. Refer to Division 15 Section "Plumbing Specialties " for drain valves..

G. Arrange for insulation on equipment and piping not furnished with factory-applied insulation.

H. Install piping-type heat traps on inlet and outlet piping of water heater storage tanks without integral or fitting-type heat traps.

I. Charge expansion tanks with air.

3.2 CONNECTIONS

A. Install piping adjacent to machine to allow service and maintenance.

B. Connect hot- and cold-water piping with shutoff valves and unions. Connect hot-water-circulating piping with shutoff valve, check valve, and union.

C. Connect gas piping to gas burner with drip leg, tee, shutoff valve, and union; minimum size same as inlet connection.

D. Make connections with dielectric fittings where piping is made of dissimilar metal.

E. Gas, Water Heater Vent Connections: Connect to vent system. Include draft hoods and diverters where required. Use vents same size as or larger than water heater outlets, but not smaller than indicated unless smaller vent size has been calculated according to NFPA 54. Comply with gas utility requirements for sizing.

F. Electrical Connections: Power wiring and disconnect switches are specified in Division 16 Sections. Arrange wiring to allow unit service.

3.3 FIELD QUALITY CONTROL

A. Engage a factory-authorized service representative to perform startup service and to train Owner's maintenance personnel to adjust, operate, and maintain water heaters.

B. In addition to manufacturer's written installation and startup checks, perform the following:

1. Check for clear relief valve inlets, outlets, and drain piping.
2. Test operation of safety controls, relief valves, and devices.
3. Adjust operating controls.
4. Adjust hot-water-outlet temperature settings. Do not set above 140 degrees F unless piping system application requires higher temperature.
5. Balance water flow through manifolds of multiple-unit installations.
6. Check and adjust controls for automatic draft fan system.

C. The contractor shall schedule an inspection by the State Fire Marshal or National ASME Board Commissioned Inspector for all commercial installation domestic water heaters of 50 gallons or greater capacity or 100,000 Btuh or greater input prior to the final state fire marshal inspection or substantial completion, whichever is earlier. The contractor is responsible for all inspection fees.

3.4 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain fuel-fired, domestic water heaters. Refer to Division 1 Section "Closeout Procedures ."

END OF SECTION 15486

SECTION 15489 - SUMP PUMPS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Submersible sump pumps.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Wiring Diagrams: For power, signal, and control wiring.

1.3 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

1.4 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. UL Compliance: Comply with UL 778 for motor-operated water pumps.

PART 2 - PRODUCTS

2.1 SUBMERSIBLE SUMP PUMPS

A. Submersible, Fixed-Position, Single-Seal Sump Pumps:

1. Manufacturers: Subject to compliance with requirements available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. Bell & Gossett Domestic Pump; ITT Corporation.
b. Glentronics, Inc.
c. Goulds Pumps; ITT Corporation.
d. Grundfos Pumps Corp.
e. Weil Pump Company, Inc.

2. Description: Factory-assembled and -tested sump-pump unit.
3. Pump Type: Submersible, end-suction, single-stage, close-coupled, overhung-impeller, centrifugal sump pump as defined in HI 1.1-1.2 and HI 1.3.
4. Pump Casing: Cast iron, with strainer inlet, legs that elevate pump to permit flow into impeller, and vertical discharge for piping connection.
5. Impeller: Statically and dynamically balanced, ASTM A 48/A 48M, Class No. 25 A cast iron design for clear wastewater handling, and keyed and secured to shaft.
6. Pump and Motor Shaft: Stainless steel [or steel], with factory-sealed, grease-lubricated ball bearings.
7. Seal: Mechanical.
8. Motor: Hermetically sealed, capacitor-start type; with built-in overload protection; lifting eye or lug; and three-conductor, waterproof power cable of length required and with grounding plug and cable-sealing assembly for connection at pump.

    a. Motor Housing Fluid: Air.

9. Controls:
    a. Switch Type: Mechanical-float type in NEMA 250 Type 6 enclosure.

2.2 MOTORS

A. Comply with NEMA designation, temperature rating, service factor, enclosure type, and efficiency requirements for motors specified in Division 15 Section "Common Motor Requirements for Plumbing Equipment."

1. Motor Sizes: Minimum size as indicated. If not indicated, large enough so driven load will not require motor to operate in service factor range above 1.0.
2. Controllers, Electrical Devices, and Wiring: Comply with requirements for electrical devices and connections specified in Division 26 Sections.

B. Motors for submersible pumps shall be hermetically sealed.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Pump Installation Standard: Comply with HI 1.4 for installation of sump pumps.

B. Route elevator sump discharge piping through oil water separator and discharge to storm drain.

END OF SECTION 15489

SECTION 15500 – AUTOMATIC SPRINKLER SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings & General Provisions of Contract, including General& Supplementary Conditions & Division 1.

B. Each of the following Specification Sections:

SECTION 15500 – AUTOMATIC SPRINKLER SYSTEMS
SECTION 15501 - COMMON WORK RESULTS FOR FIRE-SUPPRESSION
SECTION 15502 - FIRE PROTECTION PIPING, VALVES AND ACCESSORIES
SECTION 15517 - SLEEVES AND SLEEVE SEALS FOR FIRE-SUPPRESSION PIPING
SECTION 15548 - VIBRATION AND SEISMIC CONTROLS FOR FIRE-SUPPRESSION PIPING
SECTION 15553 – IDENTIFICATION FOR FIRE SUPRESSION PIPING AND EQUIPMENT

1.2 WORK INCLUDED

A. This section of the specifications includes the furnishing and installation of the Fire Suppression systems as described herein and as indicated on the Drawings.

1.3 SYSTEM DESCRIPTION

A. System to provide coverage for entire building.

B. Provide system to NFPA 13, 2007 edition.

C. Interface system with building fire and smoke alarm system.

D. Provide fire department connections as indicated.

1.4 SYSTEM DESIGN

A. Sprinkler systems shall be designed in accordance with the 2007 edition of NFPA 13 requirements and shall be hydraulically designed to provide 0.10 gpm/S.F. applied to the hydraulically most demanding 1500 square foot area for Light Hazard areas, 0.15 gpm/S.F. applied to the hydraulically most demanding 1500 square foot area for Ordinary Hazard, Group 1 areas, 0.20 gpm/S.F. applied to the hydraulically most demanding 1500 square foot area for Ordinary Hazard, Group 2 areas. Where quick

response sprinkler heads are installed throughout, the hydraulic area may be reduced as allowed by NFPA 13:112.3.2.3 requirements.

B. The Contractor shall include a minimum 5.0 psig safety margin in his calculations between the system demand pressure and the available pressure at the required demand flow.

1.5 SUBMITTALS

A. Submit under provisions of Division 1.

B. Shop Drawings: Provide hydraulic calculations, detailed pipe layout, hangers and supports, components and accessories. Indicate system controls. Shop drawings shall show reflected ceiling layout, lights, diffusers, etc.

C. Product Data: Provide data on sprinkler heads, valves, and specialties, including manufacturer’s catalog information. Submit performance ratings rough-in details, weights, support requirements, and piping connections.

D. Submit shop drawings, product data and hydraulic calculations to Owner's insurance underwriter for approval. Submit proof of approval to Architect.

E. Fire Hydrant Flow Test Report.

F. Contractor shall fill out and submit "Plan Review Application for Fire Protection Systems" application for review by the Louisiana Department of Public Safety and Corrections - Office of State Fire Marshal along with a check for the appropriate plan review fee.

G. Contractor shall fill out and submit a "Signaling/Suppression Permit Application", as required by the City of New Orleans - Department of Fire (New Orleans Fire Prevention Division), along with a check for the appropriate permit fee.

H. Manufacturer's Certificate: Certify that systems have been tested and meet, or exceed, the specified requirements.

I. Contractor’s Certificate: Submit Contractor’s “Test and Materials Certificates” to show that the system has been tested and meets or exceeds the specified requirements.

1.6 PROJECT RECORD DOCUMENTS

A. Submit under provisions of Division 1.

B. Record actual locations of sprinkler heads and deviations of piping from Drawings. Indicate drain and test locations.

1.7 OPERATION AND MAINTENANCE DATA

A. Submit under provisions of Division 1.

B. Maintenance Data: Include components of system, servicing requirements, Record Drawings, inspection data, replacement part numbers and availability, and location and numbers of service depot.

1.8 QUALITY ASSURANCE

A. Perform Work in accordance with NFPA 13 requirements.

B. Equipment and Components: Bear UL and FM label or marking.

1.9 QUALIFICATIONS

A. Installer: Company specializing in performing work of this Section with minimum five (5) years experience.

B. Design sprinkler system under direct supervision of a Certified "NICET" Level - III Designer experienced in design of this work and licensed in the State of Louisiana.

1.10 REGULATORY REQUIREMENTS

A. Hydraulic Calculations, Product Data, Shop Drawings: Bear stamp of approval of the State Fire Marshal and the Owner's fire insurance underwriter.

1.11 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store and protect products to site under provisions of Division 1.

B. Store products in shipping containers and maintain in place until installation. Provide temporary inlet and outlet caps. Maintain caps in place until installation.

1.12 EXTRA MATERIALS

A. Furnish under provisions of Division 1.

B. Provide extra sprinkler heads as required by the provisions of NFPA 13.

C. Provide suitable wrenches for each head type.

D. Provide metal storage cabinet to be located where directed by the Architect.

PART 2 - PRODUCTS

2.1 SPRINKLER HEADS

A. Quick response, fully concealed, flush pendant style, chrome plated finished head with 3 mm glass bulb rated for nominal 155 degree F temperature rating for sprinkler and 135 degree F temperature rating for cover plate. Cover plate shall be factory finished to match adjacent ceiling.

B. Quick response, upright style, brass finish with glass bulb rated for nominal 155 degree F temperature rating for wet pipe system.

C. Quick response, semi-recessed, horizontal sidewall style, chrome plated finished head with glass bulb rated for nominal 155 degree F temperature rating for wet pipe system with matching white push on escutcheon plate.

PART 3 - EXECUTION

3.1 PREPARATION

A. Coordinate work of this Section with other affected work.

3.2 INSTALLATION

A. Install equipment in accordance with manufacturer’s instructions.

B. Locate outside water alarm bell on building wall as indicated.

C. Place pipe runs to minimize obstruction to other work.

D. Place piping in concealed spaces above finished ceilings.

E. Center sprinklers in two directions in ceiling tile and provide piping offsets as required.

F. Apply masking tape or paper cover to ensure concealed sprinkler cover plates do not receive field paint finish.

G. Flush entire piping system of foreign matter.

H. Hydrostatically test entire system.

I. Require test be witnessed by the State Fire Marshal, the Owner's insurance underwriter and the Architect.

END OF SECTION 15500

SECTION 15501 - COMMON WORK RESULTS FOR FIRE SUPPRESSION

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Piping materials and installation instructions common to most piping systems.
2. Mechanical sleeve seals.
3. Sleeves.
4. Escutcheons.
5. Grout.
6. Fire-suppression demolition.
7. Concrete bases.
8. Supports and anchorages.

1.2 DEFINITIONS

A. Finished Spaces: Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe chases, unheated spaces immediately below roof, spaces above ceilings, unexcavated spaces, crawlspaces, and tunnels.

B. Exposed, Interior Installations: Exposed to view indoors. Examples include finished occupied spaces and mechanical equipment rooms.

C. Exposed, Exterior Installations: Exposed to view outdoors or subject to outdoor ambient temperatures and weather conditions. Examples include rooftop locations.

D. Concealed, Interior Installations: Concealed from view and protected from physical contact by building occupants. Examples include above ceilings and in chases.

E. Concealed, Exterior Installations: Concealed from view and protected from weather conditions and physical contact by building occupants but subject to outdoor ambient temperatures. Examples include installations within unheated shelters.

1.3 SUBMITTALS

A. Welding certificates.

1.4 QUALITY ASSURANCE

A. Steel Support Welding: Qualify processes and operators according to AWS D1.1, "Structural Welding Code--Steel."

B. Steel Pipe Welding: Qualify processes and operators according to ASME Boiler and Pressure Vessel Code: Section IX, "Welding and Brazing Qualifications."

1. Comply with provisions in ASME B31 Series, "Code for Pressure Piping."
2. Certify that each welder has passed AWS qualification tests for welding processes involved and that certification is current.

C. Electrical Characteristics for Fire-Suppression Equipment: Equipment of higher electrical characteristics may be furnished provided such proposed equipment is approved in writing and connecting electrical services, circuit breakers, and conduit sizes are appropriately modified. If minimum energy ratings or efficiencies are specified, equipment shall comply with requirements.

PART 2 - PRODUCTS

2.1 PIPE, TUBE, AND FITTINGS

A. Refer to individual Division 15 piping Sections for pipe, tube, and fitting materials and joining methods.

B. Pipe Threads: ASME B1.20.1 for factory-threaded pipe and pipe fittings.

2.2 JOINING MATERIALS

A. Refer to individual Division 15 piping Sections for special joining materials not listed below.

B. Pipe-Flange Gasket Materials: ASME B16.21, nonmetallic, flat, asbestos-free, 1/8-inch maximum thickness unless thickness or specific material is indicated.

C. Plastic, Pipe-Flange Gasket, Bolts, and Nuts: Type and material recommended by piping system manufacturer, unless otherwise indicated.

D. Solder Filler Metals: ASTM B 32, lead-free alloys. Include water-flushable flux according to ASTM B 813.

E. Brazing Filler Metals: AWS A5.8, BCuP Series or BAg1, unless otherwise indicated.

F. Welding Filler Metals: Comply with AWS D10.12.

G. Solvent Cements for Joining CPVC Plastic Piping: ASTM F 493.

2.3 MECHANICAL SLEEVE SEALS

A. Description: Modular sealing element unit, designed for field assembly, to fill annular space between pipe and sleeve.

B. Sealing Elements: EPDM or NBR interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe.

C. Pressure Plates: Stainless steel. Include two for each sealing element.

D. Connecting Bolts and Nuts: Stainless steel of length required to secure pressure plates to sealing elements. Include one for each sealing element.

2.4 SLEEVES

A. Galvanized-Steel Sheet: 0.0239-inch minimum thickness; round tube closed with welded longitudinal joint.

B. Steel Pipe: ASTM A 53, Type E, Grade B, Schedule 40, galvanized, plain ends.

C. Cast Iron: Cast or fabricated "wall pipe" equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop, unless otherwise indicated.

D. Stack Sleeve Fittings: Manufactured, cast-iron sleeve with integral clamping flange. Include clamping ring and bolts and nuts for membrane flashing.

1. Underdeck Clamp: Clamping ring with set screws.

E. Molded PVC: Permanent, with nailing flange for attaching to wooden forms.

F. PVC Pipe: ASTM D 1785, Schedule 40.

G. Molded PE: Reusable, PE, tapered-cup shaped, and smooth-outer surface with nailing flange for attaching to wooden forms.

2.5 ESCUTCHEONS

A. Description: Manufactured wall and ceiling escutcheons and floor plates, with an ID to closely fit around pipe, tube, and insulation of insulated piping and an OD that completely covers opening.

B. One-Piece, Deep-Pattern Type: Deep-drawn, box-shaped brass with polished chrome-plated finish.

C. One-Piece, Cast-Brass Type: With set screw.

1. Finish: Polished chrome-plated and rough brass.

D. Split-Casting, Cast-Brass Type: With concealed hinge and set screw.

1. Finish: Polished chrome-plated and rough brass.

2.6 GROUT

A. Description: ASTM C 1107, Grade B, nonshrink and nonmetallic, dry hydraulic-cement grout.

1. Characteristics: Post-hardening, volume-adjusting, nonstaining, noncorrosive, nongaseous, and recommended for interior and exterior applications.
2. Design Mix: 5000-psi (34.5-MPa), 28-day compressive strength.
3. Packaging: Premixed and factory packaged.

PART 3 - EXECUTION

3.1 FIRE-SUPPRESSION DEMOLITION

A. Refer to Division 01 Section "Cutting and Patching" and Division 02 Section "Selective Structure Demolition" for general demolition requirements and procedures.

B. Disconnect, demolish, and remove fire-suppression systems, equipment, and components indicated to be removed.

1. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.
2. Piping to Be Abandoned in Place: Drain piping and cap or plug piping with same or compatible piping material.
3. Equipment to Be Removed: Disconnect and cap services and remove equipment.
4. Equipment to Be Removed and Reinstalled: Disconnect and cap services and remove, clean, and store equipment; when appropriate, reinstall, reconnect, and make equipment operational.
5. Equipment to Be Removed and Salvaged: Disconnect and cap services and remove equipment and deliver to Owner.

C. If pipe, insulation, or equipment to remain is damaged in appearance or is unserviceable, remove damaged or unserviceable portions and replace with new products of equal capacity and quality.

3.2 PIPING SYSTEMS - COMMON REQUIREMENTS

A. Install piping according to the following requirements and Division 15 Sections specifying piping systems.

B. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.

C. Install piping in concealed locations, unless otherwise indicated and except in equipment rooms and service areas.

D. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

E. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.

F. Install piping to permit valve servicing.

G. Install piping at indicated slopes.

H. Install piping free of sags and bends.

I. Install fittings for changes in direction and branch connections.

J. Install piping to allow application of insulation.

K. Select system components with pressure rating equal to or greater than system operating pressure.

L. Install escutcheons for penetrations of walls, ceilings, and floors.

M. Install sleeves for pipes passing through concrete and masonry walls, gypsum-board partitions, and concrete floor and roof slabs.

N. Aboveground, Exterior-Wall Pipe Penetrations: Seal penetrations using sleeves and mechanical sleeve seals. Select sleeve size to allow for 1-inch annular clear space between pipe and sleeve for installing mechanical sleeve seals.

1. Install steel pipe for sleeves smaller than 6 inches in diameter.
2. Install cast-iron "wall pipes" for sleeves 6 inches and larger in diameter.
3. Mechanical Sleeve Seal Installation: Select type and number of sealing elements required for pipe material and size. Position pipe in center of sleeve. Assemble mechanical sleeve seals and install in annular space between pipe and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

O. Underground, Exterior-Wall Pipe Penetrations: Install cast-iron "wall pipes" for sleeves. Seal pipe penetrations using mechanical sleeve seals. Select sleeve size to allow for 1-inch annular clear space between pipe and sleeve for installing mechanical sleeve seals.

1. Mechanical Sleeve Seal Installation: Select type and number of sealing elements required for pipe material and size. Position pipe in center of sleeve. Assemble mechanical sleeve seals and install in annular space between pipe and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

P. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestop materials. Refer to Division 07 Section "Penetration Firestopping" for materials.

Q. Verify final equipment locations for roughing-in.

R. Refer to equipment specifications in other Sections of these Specifications for roughing-in requirements.

3.3 PIPING JOINT CONSTRUCTION

A. Join pipe and fittings according to the following requirements and Division 21 Sections specifying piping systems.

B. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.

C. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.

D. Soldered Joints: Apply ASTM B 813, water-flushable flux, unless otherwise indicated, to tube end. Construct joints according to ASTM B 828 or CDA's "Copper Tube Handbook," using lead-free solder alloy complying with ASTM B 32.

E. Brazed Joints: Construct joints according to AWS's "Brazing Handbook," "Pipe and Tube" Chapter, using copper-phosphorus brazing filler metal complying with AWS A5.8.

F. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:

1. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.
2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.

G. Welded Joints: Construct joints according to AWS D10.12, using qualified processes and welding operators according to Part 1 "Quality Assurance" Article.

H. Flanged Joints: Select appropriate gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Use suitable lubricants on bolt threads.

I. Plastic Piping Solvent-Cement Joints: Clean and dry joining surfaces. Join pipe and fittings according to the following:

1. Comply with ASTM F 402, for safe-handling practice of cleaners, primers, and solvent cements.
2. CPVC Piping: Join according to ASTM D 2846/D 2846M Appendix.

J. Plastic Pressure Piping Gasketed Joints: Join according to ASTM D 3139.

3.4 CONCRETE BASES

A. Concrete Bases: Anchor equipment to concrete base according to equipment manufacturer's written instructions and according to seismic codes at Project.

1. Construct concrete bases of dimensions indicated, but not less than 4 inches larger in both directions than supported unit.
2. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch centers around the full perimeter of the base.
3. Install epoxy-coated anchor bolts for supported equipment that extend through concrete base, and anchor into structural concrete floor.
4. Place and secure anchorage devices. Use supported equipment manufacturer's setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
5. Install anchor bolts to elevations required for proper attachment to supported equipment.
6. Install anchor bolts according to anchor-bolt manufacturer's written instructions.
7. Use 3000-psi, 28-day compressive-strength concrete and reinforcement as specified in Division 03 Section "Cast-in-Place Concrete".

3.5 ERECTION OF METAL SUPPORTS AND ANCHORAGES

A. Refer to Division 05 Section "Metal Fabrications" for structural steel.

B. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor fire-suppression materials and equipment.

C. Field Welding: Comply with AWS D1.1.

3.6 GROUTING

A. Mix and install grout for fire-suppression equipment base bearing surfaces, pump and other equipment base plates, and anchors.

B. Clean surfaces that will come into contact with grout.

C. Provide forms as required for placement of grout.

D. Avoid air entrapment during placement of grout.

E. Place grout, completely filling equipment bases.

F. Place grout on concrete bases and provide smooth bearing surface for equipment.

G. Place grout around anchors.

H. Cure placed grout.

END OF SECTION 15501

SECTION – 15502 FIRE PROTECTION PIPING, VALVES AND ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and General Provisions of Contract, including General and Supplementary Conditions and Division 1.

1.2 SUMMARY

A. This section of the specifications includes the furnishing and installation of the Fire Protection systems as described herein and as indicated on the drawings.

1.3 COORDINATION

A. Coordination Drawings for Acoustical and Drywall Ceilings, Plumbing, HVAC, Data, Fire Suppression, and Electrical:

1. Coordination drawings are required for the trades noted above. The HVAC contractor shall prepare reproducible coordination layout and installation drawings. (At least 1/8" scale or as approved by the Architect) for resolution of interferences and conflicts of other trades. drawings and verify layout and elevations to eliminate conflicts. Any conflicts shall be highlighted and these drawings shall be forwarded to the Architect for resolution. Priority shall be given to "gravity" systems above the ceiling. Each trade shall initial acknowledgement that the preceding has been completed. No fabrication of ductwork, fire protection, or other prefabricated systems shall begin until these coordination drawings have been completed and reviewed by the Architect/Engineers. Any subcontractor that fabricates and installs items above the ceiling before the coordinated drawings are reviewed and conflicts resolved shall do so at their own risk, and be responsible to relocate said equipment in the event conflicts arise, at no cost to the Owner.

2. Additionally, all trades shall show the proposed location of access panels (for maintenance) in "hard" ceilings for access to HVAC boxes, control' valves, fire damper motors, plumbing valves, valves, light fixture remote ballasts, ceiling hung equipment, etc., for coordination with the reflected ceiling plans. Indicate on same drawings the location of access panels in walls as well as location of plumbing cleanouts.

3. Upon A/E completion of the review of the coordination drawings, General Contractor and Subcontractors shall conduct a pre-installation coordination meeting for all "fit-up" above ceilings. No ceiling shall be lowered without the expressed approval of the Owner and the Architect.

1.4 SUBMITTALS

A. Submit under provisions of Division 1.

B. Shop Drawings: Indicate pipe materials used; jointing methods; supports; floor and wall penetration seals. Indicate installation, layout, weights, mounting and support details, and piping connections.

C. Product Data: Provide manufacturers catalogue information. Indicate valve data and ratings.

1.5 OPERATION AND MAINTENANCE DATA

A. Submit under provisions of Division 1.

B. Maintenance Instructions: Include installation instructions, spare parts lists, procedures, and treatment programs.

1.6 QUALITY ASSURANCE

A. Sprinkler Systems: Perform work to NFPA 13 Standards, 2007 edition.

B. Manual Dry Standpipe and Fire Department Valve Systems: Perform work to NFPA 14 Standards 2007 edition.

C. Underground Piping Systems: Perform work to NFPA 24 Standards, 2007 edition.

D. Welding Materials and Procedures: Perform to ASME Code.

E. Valves: Bear UL and FM label or marking. Provide manufacturer's name and pressure rating marked on valve body.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, protect and handle products to site under provisions of Division 1.

B. Deliver and store valves in shipping containers with labeling in place.

C. Provide temporary protective coating on cast iron and steel valves.

D. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.

1.8 FIRESTOPPING

A. Fire safe all floor and wall penetrations thru rated walls and floors to prevent the passage of smoke and to maintain integrity of fire rating of the barrier being penetrated. Materials and installation shall be in accordance with standard U.L. listed assemblies.

1.9 AS-BUILT DRAWINGS

A. Maintain updated drawings showing all deviations from the approved fabrication drawings. At the end of the project, furnish one set of "as-built" drawings showing dimensional locations of pipes, risers, valves, etc.

1.10 SHOP DRAWINGS

A. Product Data: Include rated capacities and indicate materials, finishes, dimensions, required clearances and methods of assembly of components; electrical characteristics and wiring for the following:

1. Pipe and Fittings.
2. Valves
3. Backflow Preventer
4. Water Motor Gong
5. Fire Department Connections
6. Fire Department Hose Valves
7. Flow and Tamper Switches

B. Field Quality-Control Test Reports

1. Certification of backflow preventers
2. Laboratory analysis of water supply test

C. Operation and Maintenance Date for the Following:

1. Backflow Preventers
2. Flow and Tamper Switches
3. Electric Alarm Bell

PART 2 - PRODUCTS

2.1 SPRINKLER PIPING, BURIED

A. Ductile Iron Pipe: ANSI/AWWA C151, with AWWA C105 polyethylene encasement, and AWWA C104 cement mortar lining.

B. Fittings: ANSI/AWWA C110, standard thickness, restrained type, with AWWA C104 cement mortar lining.

C. Joints: ANSI/AWWA C111, rubber gasket.

D. Underground Piping shall be restrained joint type system equal to "American Ductile Iron Pipe" flex-ring system.

E. Ductile-Iron Deflection Fittings:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. EBAA Iron, Inc.
b. ROMAC Industries, Inc.

2. Description: Compound, ductile-iron coupling fitting with sleeve and one or two flexing sections for up to 15-degree deflection, gaskets, and restrained-joint ends complying with AWWA C110 or AWWA C153. Include AWWA C111, ductile-iron glands, rubber gaskets, and steel bolts.
3. Pressure Rating: 250 psig minimum.

2.2 SPRINKLER AND STANDPIPE PIPING, ABOVE GROUND

A. Wet Pipe Sprinkler System: Steel Pipe: ASTM A53; ASTM A795; ANSI/ASTM A135; Schedule 10 for pipe sizes 2" and larger and schedule 40 for 1-1/2" and smaller, black.

B. Wet Pipe Sprinkler System Steel Fittings: ANSI/ASME B16.9, wrought steel, butt welded; ANSI/ASME B16.25, butt weld ends; ASTM A234, wrought carbon steel and alloy steel; ANSI/ASME B16.5, steel flanges and fittings; ANSI/ASME B16.11, forged steel socket welded and threaded.

C. Wet Pipe Sprinkler System Cast Iron Fittings: ANSI/ASME B16.1, flanges and fittings; ANSI/ASME B16.4, screwed fittings.

D. Dry Pipe Standpipe System: Steel Pipe, ASTM A53; Schedule 40 for all pipe sizes, galvanized.

E. Mechanical Tee Fittings for Galvanized System: UL 213, ductile iron housing with pressure responsive gasket, bolts and threaded outlet.

F. Mechanical Grooved Couplings: Malleable iron housing clamps to engage and lock, "C" shaped composition sealing gasket, steel bolts, nuts, and washers.

2.3 SPECIAL PIPE FITTINGS

A. Ductile-Iron Flexible Expansion Joints

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. EBAA Iron, Inc.
b. ROMAC Industries, Inc.
c. Star Pipe Products.

2. Description: Compound, ductile-iron fitting with combination of flanged and mechanical-joint ends complying with AWWA C110 or AWWA C153. Include two gasketed ball-joint sections and one or more gasketed sleeve sections. Assemble

components for offset and expansion indicated. Include AWWA C111, ductile-iron glands, rubber gaskets, and steel bolts.

3. Pressure Rating: 250 psig minimum.

B. Ductile-Iron Deflection Fittings:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. EBAA Iron, Inc.
b. ROMAC Industries, Inc.

2. Description: Compound, ductile-iron coupling fitting with sleeve and one or two flexing sections for up to 15-degree deflection, gaskets, and restrained-joint ends complying with AWWA C110 or AWWA C153. Include AWWA C111, ductile-iron glands, rubber gaskets, and steel bolts.

3. Pressure Rating: 250 psig minimum.

2.4 GATE VALVES

A. Up to and including 2 Inches: UL 262, bronze body, bronze trim, rising stem, handwheel, inside screw, single wedge or disc, threaded ends.

B. Over 2 Inches: UL 262, iron body, bronze trim, rising stem, handwheel, OS&Y, single wedge, flanged ends.

2.5 GLOBE OR ANGLE VALVES

A. Up to 2 Inches: Bronze body, bronze trim, rising stem and hand wheel, inside screw, renewable composition discs, screwed ends, with back seating capacity re-packable under pressure.

B. Over 2 Inches: Iron body, bronze trim, rising stem, hand wheel, OS&Y, plug-type disc, flanged ends, renewable seat and disc.

2.6 BUTTERFLY VALVES

A. UL 1091, bronze body, stainless steel disc, resilient replaceable seat, threaded ends, extended neck, hand wheel and gear drive and integral indicating device, and built-in tamper proof switch rated 1.0 amps at 24 volts DC.

B. Cast or ductile iron body, chrome plated ductile iron disc, resilient replaceable EPDM seat, wafer or lug ends, extended neck, hand wheel and gear drive and integral indicating device, and built-in tamper proof switch rated 1.0 amps at 24 volts DC.

2.7 CHECK VALVES

A. Up to and including 2 Inches: UL 312 or MSS SP-80, Class 150, bronze swing disc, screwed ends.

B. Over 2 Inches: UL 312, iron body, bronze trim, swing disc, renewable disc and seat, flanged ends.

C. Iron body, bronze trim, stainless steel spring, renewable composition disc, screwed, wafer or flanged ends.

2.8 FIRE DEPARTMENT HOSE VALVES

A. UL Listed, 300 psig minimum rating, brass construction. NPS 2-1/2 female inlet and fire hose threaded outlet that matches New Orleans Fire Department thread requirements; 90 degree angle pattern as indicated.

2.9 ALARM VALVES

A. The dry pipe valve shall be UL a positive latching clapper, differential type dry valve. Dry valve shall be U.L. listed and Factory Mutual approved. Air pressure to water pressure area differential shall be approximately a 6 to 1 ratio. Dry pipe valve trim shall be galvanized. Dry pipe valves shall be equipped with conventional and accelerator trim packages. Dry pipe valve shall be equal to Viking Corporation model E.

2.10 DOUBLE CHECK (BACKFLOW PREVENTER) ASSEMBLY - BUTTERFLY VALVES

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. Watts Model 757NDCDAOSY w/ by-pass meter
b. Ames C300 OSY w/ by-pass meter

B. Back flow preventer shall be factory assembled and tested. The unit shall consist of two independent Tri-Link Check modules located within a single housing ; a sleeve access port; four bronze body, nickel plated test cocks; and two drip tight, OS&Y gate shut off valves with tamper switches. The check valve modules must be removable and serviceable without the use of special tools. The unit’s housing shall be constructed of type 304 stainless steel schedule 40 pipe having grooved connections. The check valves shall have reversible EPDM elastomer discs and shall provide drip tight closure against reverse flow of liquids caused by back pressure or back siphonage. All pins, fasteners and springs shall be constructed of stainless steel. The by-pass assembly shall consist of a meter registering in gallons, a double check valve assembly and required test cocks. The unit shall be U.L. listed and Factory Mutual approved for installation in both the horizontal and vertical position and listed for sprinkler system service. The plumbing contractor shall remove the factory supplied by-pass meter and install a new by-pass meter to be supplied by the New Orleans Sewerage and Water

Board. The unit shall be certified by the plumbing contractor upon start up of the system.

2.11 DRAIN VALVES

A. Bronze compression stop with hose thread nipple and cap.

B. Brass ball valve with cap and chain, 3/4 inch hose thread.

2.12 TEST AND DRAIN VALVES

A. Up to 1-1/4 inches: Brass Ball Valve with lever handle, 3-position (Off-Test-Drain) with integral site glass, screwed ends, with ½" nominal test orifice.

2.13 WATER MOTOR GONG.

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. Tyco
b. Viking

B. U.L. 753, mechanical operation type with pelton-wheel operator with shaft length, bearings, and sleeve to suite wall construction; 10 inch diameter, cast aluminum gong with red enamel factory finish. Include 3/4'' inlet and 1" drain connections.

2.14 FIRE DEPARTMENT INLET CONNECTION (SPRINKLER SYSTEM)

A. Flush, wall mounted type with chrome plated finish, two 2-1/2" outlets threaded to suit local fire department standards. Provide caps and chains of matching material and finish and 3/4" automatic drip drain. Letter escutcheon plate to indicate “Auto-Sprinklers”.

2.15 FIRE DEPARTMENT INLET CONNECTION (STANDPIPE SYSTEM)

A. Flush, wall mounted type with chrome plated finish, two 2-1/2" outlets threaded to suit local fire department standards. Provide caps and chains of matching material and finish and 3/4" automatic drip drain. Letter escutcheon plate to indicate “Manual Standpipes”.

2.16 FLOW SWITCH

A. UL 347, vane type designed to detect a sustained flow of water exceeding 10 gpm. Switch body, base and housing shall be cast aluminum with vandal proof cover. Switch shall be provided with a built-in adjustable (0-90 seconds) pneumatic retard

device and two single pole, double throw switches with form “C” contacts rated for 2.5 amps at 24 volts DC.

2.17 TAMPER SWITCH

A. Provide UL 753 supervisory switches to monitor the open condition of all O.S.&Y. Valves. Provide two sets of single pole double throw contacts and necessary hardware to mount switch. Switch shall be rated for 2.5 amps at 24 volts DC.

2.18 WATER SUPPLY TESTING

A. Contractor shall test water supply to determine if the supply can contribute to microbiologically influenced corrosion (MIC).

B. Test shall be performed in accordance with and results analysis by an approved testing laboratory equal to “Bioindustrial Technologies, Inc. (BTI), 231 So. Clover Drive, Suites 1 & 2, Bayfield, CO 81122 (1-800-798-4650).

C. Contractor shall provide written report of the water analysis.

PART 3 - EXECUTION

3.1 GENERAL REQUIREMENTS

A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.

B. Remove scale and foreign material, from inside and outside, before assembly.

C. Prepare piping connections to equipment with flanges or unions.

D. The backflow preventer shall be tested and it’s operation certified by a licensed plumbing contractor certified in backflow preventer testing.

3.2 INSTALLATION

A. Install piping in accordance with NFPA 13 for sprinkler systems NFPA 14 for standpipe and hose systems and NFPA 24 for service mains.

B. Route piping in orderly manner, plumb and parallel to building structure. Maintain gradient.

C. Install piping to conserve building space, and not interfere with use of space and other work.

D. Group piping whenever practical at common elevations.

E. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.

F. Slope piping and arrange systems to drain at low points. Use eccentric reducers to maintain top of pipe level.

G. Prepare pipe, fittings, supports, and accessories for finish painting. Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc rich primer to welding. Refer to Division 9.

H. Do not penetrate building structural members unless indicated.

I. Provide UL Fire Rated Assembly System of sleeves when penetrating rated floors and walls. Seal pipe and sleeve penetrations to achieve fire resistance equivalent to fire separation required.

J. Die cut screw joints with full cut standard taper pipe threads with red lead and linseed oil or other non-toxic joint compound applied to male threads only.

K. Valves for general requirements for installing valves. Install fire protection specialty valves, trim, fittings, controls and specialties in accordance with NFPA 13 requirements and the manufacturer's written instructions. Install valves with stems upright or horizontal, not inverted. Remove protective coatings after installation.

L. Provide gate or butterfly valves for shut-off or isolating service.

M. Provide supervisory switches for all valves. Connect all alarm devices (flow and tamper switches) to the fire alarm system.

N. Provide drain valves at main shut-off valves, low points of piping and apparatus.

O. No welding shall be permitted on galvanized piping systems. The contractor shall "make-up" all galvanized piping systems by using mechanical rolled grooved tees, couplings and fittings. All mechanical (joint) tees shall be equal to Victaulic style 72 threaded outlet couplings. If Contractor wishes to use welded outlets, all piping shall be hot dip galvanized after welding is performed. Cold galvanized spray coatings will not be permitted.

P. Flush the entire system in accordance with NFPA 13 requirements.

END OF SECTION 15502

SECTION 15517 - SLEEVES AND SLEEVE SEALS FOR FIRE-SUPPRESSION PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Sleeves.
2. Stack-sleeve fittings.
3. Sleeve-seal systems.
4. Sleeve-seal fittings.
5. Grout.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

PART 2 - PRODUCTS

2.1 SLEEVES

A. Cast-Iron Wall Pipes: Cast or fabricated of cast or ductile iron and equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop unless otherwise indicated.

B. Galvanized-Steel Wall Pipes: ASTM A 53/A 53M, Schedule 40, with plain ends and welded steel collar; zinc coated.

C. Galvanized-Steel-Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, zinc coated, with plain ends.

D. PVC-Pipe Sleeves: ASTM D 1785, Schedule 40.

E. Galvanized-Steel-Sheet Sleeves: 0.0239-inch minimum thickness; round tube closed with welded longitudinal joint.

F. Molded-PE or -PP Sleeves: Removable, tapered-cup shaped, and smooth outer surface with nailing flange for attaching to wooden forms.

G. Molded-PVC Sleeves: With nailing flange for attaching to wooden forms.

2.2 STACK-SLEEVE FITTINGS

A. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

1. Smith, Jay R. Mfg. Co.
2. Zurn Specification Drainage Operation; Zurn Plumbing Products Group.
3. Other prior approved equal.

B. Description: Manufactured, cast-iron sleeve with integral clamping flange. Include clamping ring, bolts, and nuts for membrane flashing.

1. Underdeck Clamp: Clamping ring with setscrews.

2.3 SLEEVE-SEAL SYSTEMS

A. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

1. Advance Products & Systems, Inc.
2. CALPICO, Inc.
3. Metraflex Company (The).
4. Pipeline Seal and Insulator, Inc.
5. Proco Products, Inc.
6. Other prior approved equal.

B. Description: Modular sealing-element unit, designed for field assembly, for filling annular space between piping and sleeve.

1. Sealing Elements: EPDM-rubber or NBR interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe.
2. Pressure Plates: Stainless steel.
3. Connecting Bolts and Nuts: Stainless steel of length required to secure pressure plates to sealing elements.

2.4 SLEEVE-SEAL FITTINGS

A. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

1. Presealed Systems.
2. Other prior approved equal.

B. Description: Manufactured plastic, sleeve-type, waterstop assembly made for imbedding in concrete slab or wall. Unit has plastic or rubber waterstop collar with center opening to match piping OD.

2.5 GROUT

A. Standard: ASTM C 1107/C 1107M, Grade B, post-hardening and volume-adjusting, dry, hydraulic-cement grout.

B. Characteristics: Nonshrink; recommended for interior and exterior applications.

C. Design Mix: 5000-psi, 28-day compressive strength.

D. Packaging: Premixed and factory packaged.

PART 3 - EXECUTION

3.1 SLEEVE INSTALLATION

A. Install sleeves for piping passing through penetrations in floors, partitions, roofs, and walls.

B. For sleeves that will have sleeve-seal system installed, select sleeves of size large enough to provide 1-inch annular clear space between piping and concrete slabs and walls.

1. Sleeves are not required for core-drilled holes.

C. Install sleeves in concrete floors, concrete roof slabs, and concrete walls as new slabs and walls are constructed.

1. Permanent sleeves are not required for holes in slabs formed by molded-PE or -PP sleeves.
2. Cut sleeves to length for mounting flush with both surfaces.

a. Exception: Extend sleeves installed in floors of mechanical equipment areas or other wet areas 2 inches above finished floor level.

3. Using grout, seal the space outside of sleeves in slabs and walls without sleeve-seal system.

D. Install sleeves for pipes passing through interior partitions.

1. Cut sleeves to length for mounting flush with both surfaces.
2. Install sleeves that are large enough to provide 1/4-inch annular clear space between sleeve and pipe or pipe insulation.
3. Seal annular space between sleeve and piping or piping insulation; use joint sealants appropriate for size, depth, and location of joint. Comply with requirements for sealants specified in Division 07 Section "Joint Sealants."

E. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestop materials. Comply

with requirements for firestopping specified in Division 07 Section "Penetration Firestopping."

3.2 STACK-SLEEVE-FITTING INSTALLATION

A. Install stack-sleeve fittings in new slabs as slabs are constructed.

1. Install fittings that are large enough to provide 1/4-inch annular clear space between sleeve and pipe or pipe insulation.
2. Secure flashing between clamping flanges for pipes penetrating floors with membrane waterproofing. Comply with requirements for flashing specified in Division 07 Section "Sheet Metal Flashing and Trim."
3. Install section of cast-iron soil pipe to extend sleeve to 2 inches above finished floor level.
4. Extend cast-iron sleeve fittings below floor slab as required to secure clamping ring if ring is specified.
5. Using grout, seal the space around outside of stack-sleeve fittings.

B. Fire-Barrier Penetrations: Maintain indicated fire rating of floors at pipe penetrations. Seal pipe penetrations with firestop materials. Comply with requirements for firestopping specified in Division 07 Section "Penetration Firestopping."

3.3 SLEEVE-SEAL-SYSTEM INSTALLATION

A. Install sleeve-seal systems in sleeves in exterior concrete walls and slabs-on-grade at service piping entries into building.

B. Select type, size, and number of sealing elements required for piping material and size and for sleeve ID or hole size. Position piping in center of sleeve. Center piping in penetration, assemble sleeve-seal system components, and install in annular space between piping and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make a watertight seal.

3.4 SLEEVE-SEAL-FITTING INSTALLATION

A. Install sleeve-seal fittings in new walls and slabs as they are constructed.

B. Assemble fitting components of length to be flush with both surfaces of concrete slabs and walls. Position waterstop flange to be centered in concrete slab or wall.

C. Secure nailing flanges to concrete forms.

D. Using grout, seal the space around outside of sleeve-seal fittings.

3.5 SLEEVE AND SLEEVE-SEAL SCHEDULE

A. Use sleeves and sleeve seals for the following piping-penetration applications:

1. Exterior Concrete Walls above Grade:

    a. Piping Smaller Than NPS 6: Galvanized-steel wall sleeves or Galvanized-steel-pipe sleeves, Sleeve-seal fittings.
    b. Piping NPS 6 and Larger: Galvanized-steel wall sleeves or Galvanized-steel-pipe sleeves.

2. Exterior Concrete Walls below Grade:

    a. Piping Smaller Than NPS 6: Galvanized-steel wall sleeves with sleeve-seal system or Galvanized-steel-pipe sleeves with sleeve-seal system, Sleeve-seal fittings.

        1) Select sleeve size to allow for 1-inch annular clear space between piping and sleeve for installing sleeve-seal system.

    b. Piping NPS 6 and Larger: Galvanized-steel wall sleeves with sleeve-seal system or Galvanized-steel-pipe sleeves with sleeve-seal system.

        1) Select sleeve size to allow for 1-inch annular clear space between piping and sleeve for installing sleeve-seal system.

3. Concrete Slabs-on-Grade:

    a. Piping Smaller Than NPS 6: Galvanized-steel wall sleeves with sleeve-seal system or Galvanized-steel-pipe sleeves with sleeve-seal system, Sleeve-seal fittings.

        1) Select sleeve size to allow for 1-inch annular clear space between piping and sleeve for installing sleeve-seal system.

    b. Piping NPS 6 and Larger: Galvanized-steel wall sleeves with sleeve-seal system or Galvanized-steel-pipe sleeves with sleeve-seal system.

        1) Select sleeve size to allow for 1-inch annular clear space between piping and sleeve for installing sleeve-seal system.

4. Concrete Slabs above Grade:

    a. Piping Smaller Than NPS 6: Galvanized-steel-pipe sleeves or PVC-pipe sleeves, Stack-sleeve fittings.
    b. Piping NPS 6 and Larger: Galvanized-steel-pipe sleeves or PVC-pipe sleeves, Stack-sleeve fittings.

5. Interior Partitions:

    a. Piping Smaller Than NPS 6: Galvanized-steel-pipe sleeves or PVC-pipe sleeves.
    b. Piping NPS 6 and Larger: Galvanized-steel-sheet sleeves.

END OF SECTION 15517

SECTION 15548 - VIBRATION SUPPRESSION PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Isolation pads.
2. Isolation mounts.
3. Restrained elastomeric isolation mounts.
4. Restraining braces.

1.2 DEFINITIONS

A. IBC: International Building Code.

B. ICC-ES: ICC-Evaluation Service.

C. OSHPD: Office of Statewide Health Planning and Development for the State of California.

1.3 SUBMITTALS

A. Product Data: For each product indicated.

B. Delegated-Design Submittal: For vibration isolation and seismic-restraint calculations and details indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

C. Welding certificates.

D. Qualification Data: For professional engineer.

1.4 QUALITY ASSURANCE

A. Comply with seismic-restraint requirements in the IBC and NFPA 13 unless requirements in this Section are more stringent.

B. Welding: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

C. Seismic-restraint devices shall have horizontal and vertical load testing and analysis and shall bear anchorage preapproval OPA number from OSHPD, preapproval by ICC-ES, or preapproval by another agency acceptable to authorities having jurisdiction,

showing maximum seismic-restraint ratings. Ratings based on independent testing are preferred to ratings based on calculations. If preapproved ratings are not available, submittals based on independent testing are preferred. Calculations (including combining shear and tensile loads) to support seismic-restraint designs must be signed and sealed by a qualified professional engineer.

PART 2 - PRODUCTS

2.1 VIBRATION ISOLATORS

A. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:

1. Ace Mountings Co., Inc.
2. Amber/Booth Company, Inc.
3. California Dynamics Corporation.
4. Isolation Technology, Inc.
5. Kinetics Noise Control.
6. Mason Industries.
7. Vibration Eliminator Co., Inc.
8. Vibration Isolation.
9. Vibration Mountings & Controls, Inc.
10. Other prior approved equal.

B. Pads: Arranged in single or multiple layers of sufficient stiffness for uniform loading over pad area, molded with a nonslip pattern and galvanized-steel baseplates, and factory cut to sizes that match requirements of supported equipment.

1. Resilient Material: Oil- and water-resistant neoprene or rubber.

C. Mounts: Double-deflection type, with molded, oil-resistant rubber, hermetically sealed compressed fiberglass, or neoprene isolator elements with factory-drilled, encapsulated top plate for bolting to equipment and with baseplate for bolting to structure. Color-code or otherwise identify to indicate capacity range.

1. Materials: Cast-ductile-iron or welded steel housing containing two separate and opposing, oil-resistant rubber or neoprene elements that prevent central threaded element and attachment hardware from contacting the housing during normal operation.
2. Neoprene: Shock-absorbing materials compounded according to the standard for bridge-bearing neoprene as defined by AASHTO.

D. Restrained Mounts: All-directional mountings with seismic restraint.

1. Materials: Cast-ductile-iron or welded steel housing containing two separate and opposing, oil-resistant rubber or neoprene elements that prevent central threaded element and attachment hardware from contacting the housing during normal operation.

2. Neoprene: Shock-absorbing materials compounded according to the standard for bridge-bearing neoprene as defined by AASHTO.

2.2 SEISMIC-RESTRAINT DEVICES

A. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:

1. Amber/Booth Company, Inc.
2. California Dynamics Corporation.
3. Cooper B-Line, Inc.; a division of Cooper Industries.
4. Hilti, Inc.
5. Kinetics Noise Control.
6. Loos & Co.; Cableware Division.
7. Mason Industries.
8. TOLCO Incorporated; a brand of NIBCO INC.
9. Unistrut; Tyco International, Ltd.
10. Other prior approved equal.

B. General Requirements for Restraint Components: Rated strengths, features, and applications shall be as defined in reports by an evaluation service member of ICC-ES, OSHPD, or an agency acceptable to authorities having jurisdiction.

1. Structural Safety Factor: Allowable strength in tension, shear, and pullout force of components shall be at least four times the maximum seismic forces to which they will be subjected.

C. Channel Support System: MFMA-3, shop- or field-fabricated support assembly made of slotted steel channels with accessories for attachment to braced component at one end and to building structure at the other end and other matching components and with corrosion-resistant coating; and rated in tension, compression, and torsion forces.

D. Hanger Rod Stiffener: Steel tube or steel slotted-support-system sleeve with internally bolted connections or Reinforcing steel angle clamped to hanger rod.

E. Bushings for Floor-Mounted Equipment Anchor Bolts: Neoprene bushings designed for rigid equipment mountings, and matched to type and size of anchor bolts and studs.

F. Resilient Isolation Washers and Bushings: One-piece, molded, oil- and water-resistant neoprene, with a flat washer face.

G. Mechanical Anchor Bolts: Drilled-in and stud-wedge or female-wedge type in zinc-coated steel for interior applications and stainless steel for exterior applications. Select anchor bolts with strength required for anchor and as tested according to ASTM E 488. Minimum length of eight times diameter.

PART 3 - EXECUTION

3.1 VIBRATION-CONTROL AND SEISMIC-RESTRAINT DEVICE INSTALLATION

A. Equipment Restraints:

1. Install resilient bolt isolation washers on equipment anchor bolts where clearance between anchor and adjacent surface exceeds 0.125 inch.
2. Install seismic-restraint devices using methods approved by an evaluation service member of ICC-ES, OSHPD, or an agency acceptable to authorities having jurisdiction providing required submittals for component.

B. Piping Restraints:

1. Comply with requirements in MSS SP-127 and NFPA 13.
2. Space lateral supports a maximum of 40 feet o.c., and longitudinal supports a maximum of 80 feet o.c.
3. Brace a change of direction longer than 10 feet.

C. Install seismic-restraint devices using methods approved by an evaluation service member of ICC-ES, OSHPD, an agency acceptable to authorities having jurisdiction providing required submittals for component.

D. Install bushing assemblies for anchor bolts for floor-mounted equipment, arranged to provide resilient media between anchor bolt and mounting hole in concrete base.

E. Attachment to Structure: If specific attachment is not indicated, anchor bracing to structure at flanges of beams, at upper truss chords of bar joists, or at concrete members.

F. Drilled-in Anchors:

1. Identify position of reinforcing steel and other embedded items prior to drilling holes for anchors. Do not damage existing reinforcing or embedded items during coring or drilling. Notify the structural engineer if reinforcing steel or other embedded items are encountered during drilling. Locate and avoid prestressed tendons, electrical and telecommunications conduit, and gas lines.
2. Do not drill holes in concrete or masonry until concrete, mortar, or grout has achieved full design strength.
3. Wedge Anchors: Protect threads from damage during anchor installation. Heavy-duty sleeve anchors shall be installed with sleeve fully engaged in the structural element to which anchor is to be fastened.
4. Set anchors to manufacturer's recommended torque, using a torque wrench.
5. Install zinc-coated steel anchors for interior and stainless-steel anchors for exterior applications.

3.2 ACCOMMODATION OF DIFFERENTIAL SEISMIC MOTION

A. Install flexible connections in piping where they cross seismic joints, where adjacent sections or branches are supported by different structural elements, and where the connections terminate with connection to equipment that is anchored to a different structural element from the one supporting the connections as they approach equipment. Comply with requirements in Division 15 Section "Automatic Sprinkler System" for piping flexible connections.

END OF SECTION 15548

SECTION 15553 - IDENTIFICATION FOR FIRE-SUPPRESSION PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Equipment labels.
2. Warning signs and labels.
3. Pipe labels.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Equipment-Label Schedule: Include a listing of all equipment to be labeled and the proposed content for each label.

PART 2 - PRODUCTS

2.1 EQUIPMENT LABELS

A. Metal Labels for Equipment:

1. Material and Thickness: Brass, 0.032 inch thick, with predrilled holes for attachment hardware.
2. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.
3. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.
4. Fasteners: Stainless-steel rivets or self-tapping screws.
5. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

B. Plastic Labels for Equipment:

1. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/8 inch thick, with predrilled holes for attachment hardware.
2. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.
3. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately

larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.

4. Fasteners: Stainless-steel rivets or self-tapping screws.
5. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

C. Label Content: Include equipment's Drawing designation or unique equipment number, Drawing numbers where equipment is indicated (plans, details, and schedules), and the Specification Section number and title where equipment is specified.

D. Equipment-Label Schedule: For each item of equipment to be labeled, on 8-1/2-by-11-inch bond paper. Tabulate equipment identification number and identify Drawing numbers where equipment is indicated (plans, details, and schedules) and the Specification Section number and title where equipment is specified. Equipment schedule shall be included in operation and maintenance data.

2.2 WARNING SIGNS AND LABELS

A. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/8 inch thick, with predrilled holes for attachment hardware.

B. Letter Color: White.

C. Background Color: Black.

D. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.

E. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.

F. Fasteners: Stainless-steel rivets or self-tapping screws.

G. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

H. Label Content: Include caution and warning information, plus emergency notification instructions.

2.3 PIPE LABELS

A. General Requirements for Manufactured Pipe Labels: Preprinted, color-coded, with lettering indicating service and showing flow direction.

B. Pretensioned Pipe Labels: Precoiled, semirigid plastic formed to [partially cover] [cover full] circumference of pipe and to attach to pipe without fasteners or adhesive.

C. Self-Adhesive Pipe Labels: Printed plastic with contact-type, permanent-adhesive backing.

D. Pipe-Label Contents: Include identification of piping service using same designations or abbreviations as used on Drawings; pipe size; and an arrow indicating flow direction.

1. Flow-Direction Arrows: Integral with piping-system service lettering to accommodate both directions, or as separate unit on each pipe label to indicate flow direction.
2. Lettering Size: At least 1-1/2 inches high.

PART 3 - EXECUTION

3.1 PREPARATION

A. Clean piping and equipment surfaces of substances that could impair bond of identification devices, including dirt, oil, grease, release agents, and incompatible primers, paints, and encapsulants.

3.2 LABEL INSTALLATION

A. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.

B. Coordinate installation of identifying devices with locations of access panels and doors.

C. Install or permanently fasten labels on each major item of mechanical equipment.

D. Locate equipment labels where accessible and visible.

E. Piping Color-Coding: Painting of piping is specified in Division 09 Section "Interior Painting."

F. Pipe-Label Locations: Locate pipe labels where piping is exposed or above accessible ceilings in finished spaces; machine rooms; accessible maintenance spaces such as shafts, tunnels, and plenums; and exterior exposed locations as follows:

1. Near each valve and control device.
2. Near each branch connection excluding short takeoffs. Where flow pattern is not obvious, mark each pipe at branch.
3. Near penetrations through walls, floors, ceilings, and inaccessible enclosures.
4. At access doors, manholes, and similar access points that permit view of concealed piping.
5. Near major equipment items and other points of origination and termination.
6. Spaced at maximum intervals of 50 feet along each run. Reduce intervals to 25 feet in areas of congested piping and equipment.
7. On piping above removable acoustical ceilings. Omit intermediately spaced labels.

END OF SECTION 15553

SECTION 15732 -ROOFTOP AIR CONDITIONERS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following rooftop air conditioners:

1. Cooling and heating units.

1.2 SUBMITTALS

A. Product Data: For each model indicated.

B. Shop Drawings: Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection. Prepare the following by or under the supervision of a qualified professional engineer:

1. Design Calculations: Calculate requirements for selecting vibration isolators and for designing vibration isolation bases.
2. Detail mounting, securing, and flashing of roof curb to roof structure. Indicate coordinating requirements with roof membrane system.
3. Wiring Diagrams: Power, signal, and control wiring.

C. Field quality-control test reports.

D. Operation and maintenance data.

E. Warranties: Special warranties specified in this Section.

1.3 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

B. Fabricate and label refrigeration system to comply with ASHRAE 15, "Safety Code for Mechanical Refrigeration."

C. Energy-Efficiency Ratio: Equal to or greater than prescribed by ASHRAE 90.1, "Energy Efficient Design of New Buildings except Low-Rise Residential Buildings."

D. Coefficient of Performance: Equal to or greater than prescribed by ASHRAE 90.1, "Energy Efficient Design of New Buildings except Low-Rise Residential Buildings."

E. ARI Compliance for Units with Capacities Less Than 135,000 Btuh: Rate rooftop air-conditioner capacity according to ARI 210/240, "Unitary Air-Conditioning and Air-Source Heat Pump Equipment."

1. Sound Power Level Ratings: Comply with ARI 270, "Sound Rating of Outdoor Unitary Equipment."

F. ARI Compliance for Units with Capacities 135,000 Btuh and More: Rate rooftop air-conditioner capacity according to ARI 340/360, "Commercial and Industrial Unitary Air-Conditioning and Heat Pump Equipment."

1. Sound Power Level Ratings: Comply with ARI 270, "Sound Rating of Outdoor Unitary Equipment."

1.4 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to replace components of rooftop air conditioners that fail in materials or workmanship within specified warranty period.
1. Warranty Period for Compressors: Manufacturer's standard, but not less than five years from date of Substantial Completion.

PART 2 - PRODUCTS

1.1 MANUFACTURERS

A. In other Part 2 articles where subparagraph titles below introduce lists, the following requirements apply for product selection:
1. Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the manufacturers specified.

1.2 ROOFTOP AIR CONDITIONERS 6 TONS AND SMALLER

A. Manufacturers:

1. Carrier Corp.
2. Lennox Industries Inc.
3. McQuay International.
4. Trane Company (The); North American Commercial Group.
5. YORK International Corporation.

B. Description: Factory assembled and tested; designed for exterior installation; consisting of compressor, indoor and outside refrigerant coils, indoor fan and outside coil fan, refrigeration and temperature controls, filters, and dampers.

C. Casing: Galvanized-steel construction with enamel paint finish, removable panels or access doors with neoprene gaskets for inspection and access to internal parts, minimum 1/2-inch- thick thermal insulation, knockouts for electrical and piping connections, exterior condensate drain connection, and lifting lugs.

D. Indoor Fan: Forward curved, centrifugal, directly driven by multispeed motor.

E. Outside Coil Fan: Propeller type, directly driven by motor.

F. Condenser Coils: Aluminum-plate fin and seamless copper tube in steel casing. Provide louvered metal hail guard.

G. Refrigerant Coils: Aluminum-plate fin and seamless copper tube in steel casing with equalizing-type vertical distributor.

H. Compressor: Hermetic reciprocating or scroll compressor with integral vibration isolators, internal overcurrent and over temperature protection, internal pressure relief, and crankcase heater.

I. Refrigerant: R-410a

J. Refrigeration System:

1. Compressor.
2. Outside coil and fan.
3. Indoor coil and fan.
4. Four-way reversing valve and suction line accumulator.
5. Expansion valve with replaceable thermostatic element.
6. Refrigerant dryer.
7. High-pressure switch.
8. Low-pressure switch.
9. Thermostat for coil freeze-up protection during low-ambient temperature operation or loss of air.
10. Low-ambient switch.
11. Brass service valves installed in discharge and liquid lines.
12. Charge of refrigerant.

K. Filters: 2-inch- thick, fiberglass, MERV 7, pleated, throwaway filters in filter rack. Provide additional set of filters upon completion of project.

L. Supplemental Electric Heat: Helix-wound, nickel-chrome, electric-resistance elements, and factory wired for single-point wiring connection; with time delay for element staging, and overcurrent and overheat protective devices.

M. Outside-Air Damper: Linked damper blades, for 0 to 25 percent outside air, with manual slide and two position automatic damper motor and hood.

N. Power Connection: Provide for single connection of power to unit with unit-mounted disconnect switch accessible from outside unit and control-circuit transformer with built-in circuit breaker.

O. Duct Mounted Smoke Detectors: Provide duct mounted smoke detectors in supply and return ducts for units over 2000 CFM or nominal 5-tons or higher. Smoke detectors shall include a remote audio/visual alarm located in the occupied space. Smoke detector shall disable RTU and activate alarm upon detection of smoke.

P. Roof Curb: G90 galvanized steel, factory painted, gasketing, and factory-installed wood nailer; complying with NRCA standards; minimum height of 16 inches.

1.3 MOTORS

A. General requirements for motors are specified in Division 23 Section "Motors."

B. Motor Sizes: Minimum size as indicated; if not indicated, large enough so driven load will not require motor to operate in service factor range above 1.0.

C. Electrical devices and wiring are specified in Division 16 Sections.

PART 3 - EXECUTION

1.1 INSTALLATION

A. Install units level and plumb, maintaining manufacturer's recommended clearances

B. Curb Support: Install roof curb on roof structure, level and secure, according to NRCA's "Low-Slope Membrane Roofing Construction Details Manual," Illustration "Raised Curb Detail for Rooftop Air Handling Units and Ducts." Install and secure rooftop air conditioners on curbs and coordinate roof penetrations and flashing with roof construction. Secure units to curb support with anchor bolts.

C. Through bolt curbs to roof with angle iron backers at all corners of curb and in center where curb exceeds 6’ in length.

1.2 CONNECTIONS

A. Duct installation requirements are specified in other Division 15 Sections. Drawings indicate the general arrangement of ducts. The following are specific connection requirements:

1. Install ducts through roof curb to RTU penetration.
2. Remove roof decking only as required for passage of ducts. Do not cut out decking under entire roof curb.
3. Terminate supply and return-air duct with flange in RTU. Run through roof structure and insulate space between roof. Provide flexible connection.

B. Electrical System Connections: Comply with applicable requirements in Division 26 Sections for power wiring, switches, and motor controls.

C. Ground equipment according to Division 16 Section "Grounding and Bonding."

1.3 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including connections. Report results in writing.

B. Perform the following field quality-control tests and inspections and prepare test reports:
   1. After installing rooftop air conditioners and after electrical circuitry has been energized, test units for compliance with requirements.
   2. Inspect for and remove shipping bolts, blocks, and tie-down straps.
   3. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
   4. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

C. Remove malfunctioning units, replace with new units, and retest as specified above.

1.4 ADJUSTING

A. Adjust initial temperature and humidity set points.

B. Set field-adjustable switches and circuit-breaker trip ranges as indicated.

END OF SECTION 15732

SECTION 15738- SPLIT SYSTEM AIR CONDITIONING UNITS

1PART - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes split-system air-conditioning and heat pump units consisting of separate evaporator-fan and compressor-condenser components. Units are designed for exposed or concealed mounting, and may be connected to ducts.

1.3 DEFINITIONS

A. Evaporator-Fan Unit: The part of the split-system air-conditioning unit that contains a coil for cooling (heat rejection for heating operation in heat pump units) and a fan to circulate air to conditioned space.

B. Compressor-Condenser Unit: The part of the split-system air-conditioning unit that contains a refrigerant compressor and a coil for condensing refrigerant (evaporator for heating operation in heat pump units).

1.4 SUBMITTALS

A. Product Data: Include rated capacities; shipping, installed, and operating weights; furnished specialties; and accessories for each type of product indicated. Include performance data in terms of capacities, outlet velocities, static pressures, sound power characteristics, motor requirements, and electrical characteristics.

B. Shop Drawings: Diagram power, signal, and control wiring and differentiate between manufacturer-installed and field-installed wiring.

C. Samples for Initial Selection: Manufacturer's color charts consisting of units of sections of units showing the full range of colors available for units with factory-applied color finishes.

D. Maintenance Data: For split-system air-conditioning units to include in maintenance manuals specified in Division 1.

E. Warranties: Special warranties specified in this Section.

1.5 QUALITY ASSURANCE

A. Product Options: Drawings indicate size, profiles, and dimensional requirements of split-system units and are based on the specific system indicated. Other manufacturers' systems with equal performance characteristics may be considered. Refer to Division 1.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

1.6 COORDINATION

A. Coordinate size and location of concrete bases for units. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork are specified in Division 3.

B. Coordinate size, location, and connection details with roof curbs, equipment supports, and roof penetrations specified in Division 7.

1.7 WARRANTY

A. General Warranty: Special warranty specified in this article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.

B. Special Warranty: Written warranty, executed by manufacturer agreeing to repair or replace components of split-system air-conditioning units that fail in materials or workmanship within specified warranty period.

C. Warranty Period: Five years from date of substantial completion.

1.8 EXTRA MATERIALS

A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Filters: One set of filters for each unit.
2. Fan Belts: One set of belts for each unit.

2PART - PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Carrier Air Conditioning; Div. of Carrier Corp.
2. Lennox Industries Inc.
3. Trane Co. (The); Unitary Products Group.
4. York International Corp.

2.2 CONCEALED EVAPORATOR-FAN COMPONENTS

A. Chassis: Galvanized steel with flanged edges, removable panels for servicing, and insulation on back of panel.

1. Insulation: Faced, glass-fiber duct liner.
2. Drain Pans: Galvanized steel, with connection for drain; insulated.

B. Refrigerant Coil: Copper tube, with mechanically bonded aluminum fins, complying with ARI 210/240, and with thermal-expansion valve.

C. Electric Coil: Helical, nickel-chrome, resistance-wire heating elements with refractory ceramic support bushings; automatic-reset thermal cutout; built-in magnetic contactors; manual-reset thermal cutout; airflow proving device; and one-time fuses in terminal box for overcurrent protection.

D. Fan: Forward-curved, double-width wheel of galvanized steel; directly connected to motor.

E. Fan Motor: Multispeed, PSC type.

F. Disposable Filters: 1 inch thick pleated in fiberboard frames.

G. Wiring Terminations: Connect motor to chassis wiring with plug connection.

2.3 AIR-COOLED, COMPRESSOR-CONDENSER COMPONENTS

A. Casing: Steel, finished with baked enamel, with removable panels for access to controls, weep holes for water drainage, and mounting holes in base. Provide brass service valves, fittings, and gage ports on exterior of casing.

B. Compressor: Hermetically sealed with crankcase heater and mounted on vibration isolation. Compressor motor shall have thermal- and current-sensitive overload devices, start capacitor, relay, and contactor.

1. Compressor Type: Scroll

2. Two-speed compressor motor with manual-reset high-pressure switch and automatic-reset low-pressure switch.

C. Refrigerant Coil: Copper tube, with mechanically bonded aluminum fins, complying with ARI 210/240, and with liquid subcooler.

D. Fan: Aluminum-propeller type, directly connected to motor.

E. Motor: Permanently lubricated, with integral thermal-overload protection.

F. Low Ambient Kit: Permits operation down to 45 deg F. Refer to schedule for additional low ambient requirements.

2.4 ACCESSORIES

A. Automatic-reset timer to prevent rapid cycling of compressor.

B. Coil Wire Guard.

C. Provide phase monitoring relay on all 3-phase condensing units including phase loss, phase imbalance, phase reversal, and under/over voltage protection. All settings shall be user adjustable to prevent nuisance trips. Phase monitor shall be connected into control circuit to disable condensing unit when tripped. Unit shall have led indicator for specific fault trip auto reset capability with adjustable time delay. Macromatic Series PMP or equal.

3PART - EXECUTION

3.1 INSTALLATION

A. Install units level and plumb.

B. Install evaporator-fan components using manufacturer's standard mounting devices securely fastened to building structure.

C. Install roof-mounted compressor-condenser components on equipment supports specified in Division 7. Anchor units to supports with removable, cadmium-plated fasteners.

D. Install compressor-condenser components on restrained, spring isolators with a minimum static deflection of 1 inch. Refer to Division 15.

E. Connect refrigerant tubing to component's quick-connect fittings. Install tubing to allow access to unit.

3.2 CONNECTIONS

A. Piping installation requirements are specified in other Division 15 Sections. Drawings do not depict refrigerant piping routing. Contractor shall field verify refrigerant piping routing and size piping in strict accordance with factory recommendations.

B. Install piping adjacent to unit to allow service and maintenance.

C. Unless otherwise indicated, connect piping with unions and shutoff valves to allow units to be disconnected without draining piping. Refer to piping system Sections for specific valve and specialty arrangements.

D. Ground equipment.

1. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

E. Duct work. Unless noted otherwise on plans, connect new evaporator unit to existing duct work. Provide flexible connection at unit.

3.3 FIELD QUALITY CONTROL

A. Installation Inspection: Engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including piping and electrical connections, and to prepare a written report of inspection.

B. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.

C. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation. Remove malfunctioning units, replace with new components, and retest.

D. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

3.4 COMMISSIONING

A. Engage a factory-authorized service representative to perform startup service.

B. Verify that units are installed and connected according to the Contract Documents.

C. Lubricate bearings, adjust belt tension, and change filters.

D. Perform startup checks according to manufacturer's written instructions and do the following:

1. Fill out manufacturer's checklists.
2. Check for unobstructed airflow over coils.
3. Check operation of condenser capacity-control device.
4. Verify that vibration isolation devices and flexible connectors dampen vibration transmission to structure.

3.5 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain units.

1. Train Owner's maintenance personnel on procedures and schedules for starting and stopping, troubleshooting, servicing, and maintaining units.
2. Review data in maintenance manuals. Refer to Division 1 Section "Contract Closeout."
3. Review data in maintenance manuals. Refer to Division 1 Section "Operation and Maintenance Data."
4. Schedule training with Owner, through Architect, with at least seven days' advance notice.

END OF SECTION 15738

SECTION 15740 - 100% OUTSIDE AIR PACKAGED ROOFTOP UNITS

1PART - GENERAL

1.1 SUMMARY

A. This section includes the following 100% outside air rooftop air conditioners:

1. D/X cooling with hot gas reheat, energy recovery wheel, and electric strip heat.

1.2 SUBMITTALS

A. Product Data: For each model indicated.

B. Shop Drawings: Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection. Prepare the following by or under the supervision of a qualified professional engineer:

1. Design Calculations: Calculate requirements for selecting vibration isolators and for designing vibration isolation bases.
2. Detail mounting, securing, and flashing of roof curb to roof structure. Indicate coordinating requirements with roof membrane system.
3. Wiring Diagrams: Power, signal, and control wiring.

C. Field quality-control test reports.

D. Operation and maintenance data.

E. Warranties: Special warranties specified in this Section.

1.3 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

B. Fabricate and label refrigeration system to comply with ASHRAE 15, "Safety Code for Mechanical Refrigeration."

C. Energy-Efficiency Ratio: Equal to or greater than prescribed by ASHRAE 90.1, "Energy Efficient Design of New Buildings except Low-Rise Residential Buildings."

D. Coefficient of Performance: Equal to or greater than prescribed by ASHRAE 90.1, "Energy Efficient Design of New Buildings except Low-Rise Residential Buildings."

E. ARI Compliance for Units with Capacities 135,000 BTU/h and More: Rate rooftop air-conditioner capacity according to ARI 340/360, "Commercial and Industrial Unitary Air-Conditioning and Heat Pump Equipment."

F. Sound Power Level Ratings: Comply with ARI 270, "Sound Rating of Outdoor Unitary Equipment."

G. Furnish factory mounted and tested energy recovery wheel as specified. Sizes, arrangements, capacities and performance shall be as indicated on plans and schedules. Unit manufacturer shall be registered under ISO 9001. Cooling performance shall be rated in accordance with ARI standards. Unit shall be ETL or UL listed.

H. Packaged condensing units shall be factory pre-assembled, tested and shipped complete with all components necessary to maintain humidity and temperature control levels independent of load variations within design limits. Unit(s) shall be designed for year-round 24 hr/day service.

1.4 WARRANTY & START-UP

A. Manufacturer must warrant the enthalpy wheels to be free of defects in material and workmanship for a period of up to five years (pro-rated) from the purchase date.

B. Special Warranty: Manufacturer's standard form in which manufacturer agrees to replace components of rooftop air conditioners that fail in materials or workmanship within specified warranty period.

1. Warranty Period for Heat Exchangers: Manufacturer's standard, but not less than ten years from date of Substantial Completion.
2. Warranty Period for Control Boards: Manufacturer's standard, but not less than three years from date of Substantial Completion.
3. Warranty Period for Variable-Speed Fan Motors: Manufacturer's standard, but not less than three years from date of Substantial Completion.

C. Units shall be started-up by a factory certified technician from the equipment manufacturer. Completed start-up documentation shall be sent to the owner after the job is completed.

2PART - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. AAON, Inc.
2. Addison Products Company.
3. Trane
4. Carrier
5. Valent

B. Provide Energy Recovery Unit with this specification, drawing details and the corresponding Schedule of Performance and Schedule Notes. The Energy Recovery system shall be shop manufactured and assembled as specified.

C. Arrangement of all units shall be as shown on the Drawings. Performance shall be rated in accordance with ARI testing procedures. All units shall be factory assembled, internally wired, and 100% run tested to check operation, fan and blower rotation and control sequence (if applicable) before leaving the factory.

2.2 GENERAL DESCRIPTION

A. Packaged rooftop unit shall include compressors, evaporator coils, filters, supply blowers, dampers, condenser coils, condenser fans, water-cooled condensers, reheat coils, gas heaters, electric heaters, exhaust fans, and unit controls.

B. Unit shall be factory assembled and tested including helium leak testing of the coils, pressure testing of the refrigeration circuit, and run testing of the completed unit. Run test report shall be supplied with the unit in the controls compartment's literature pocket.

C. Unit shall have decals and tags to indicate lifting and rigging, service areas, and caution areas for safety and to assist service personnel.

D. Unit components shall be labeled, including pipe stub outs, refrigeration system components, and electrical and controls components.

E. Estimated sound power levels (dB) shall be shown on the unit ratings sheet.

F. Installation, Operation, and Maintenance manual shall be supplied within the unit.

G. Laminated color-coded wiring diagram shall match factory installed wiring and be provided in both point-to-point and ladder form and affixed to the interior of the control compartment's hinged access door.

H. Unit nameplate shall be provided in two locations on the unit, affixed to the exterior of the unit and affixed to the interior of the control compartment's hinged access door.

2.3 CONSTRUCTION

A. All cabinet walls, access doors and roof shall be fabricated of rigid, impact resistant, double wall, high performance composite panels with G90 galvanized steel on both sides and a closed cell polyurethane foam interior core.

B. Foam shall have a minimum density of 2 pounds/cubic foot and shall be tested in accordance with ASTM D-1929 for a minimum flash ignition temperature of 610°F.

C. Panel deflection shall not exceed L/240 ratio at 125% of design static pressure, maximum 8 inches of positive or negative static pressure. Deflection shall be measured at the midpoint of the panel height and width.

D. Cabinet leakage rate shall not exceed 1% when tested at 6 inches of static pressure.

E. Insulation shall have an R-value of 13.

F. All cabinet walls, access doors and roof shall have a thermal break with no metal path to inside to outside.

G. Units with cooling coils shall include double sloped 304 stainless steel drain pans and a factory provided p-trap, for field installation.

H. Roof of the air tunnel shall be sloped to provide complete drainage.

I. Unit shall have rain break overhangs above access doors.

J. Exterior paint finish shall be capable of withstanding at least 2500 hours, with no visible corrosive effects, when tested in a salt spray and fog atmosphere in accordance with ASTM B 117-95 test procedure.

K. Access to filters, dampers, economizers, cooling coils, power exhaust and return blowers, controls, compressors, and heaters shall be through hinged access doors with quarter turn, zinc cast, lockable handles. Full length stainless steel piano hinges shall be included on the doors.

L. All openings through the base pan of the unit shall have upturned flanges of at least 0.5 inches in height around the opening through the base pan.

M. Unit shall be mounted on a continuous base rail support suitable for mounting on structural point load supports.

N. Unit shall include lifting lugs on the top of the unit.

O. Options:

1. Unit shall include interior corrosion protection which shall be capable of withstanding at least 2500 hours, with no visible corrosive effects, when tested in a salt spray and fog atmosphere in accordance with ASTM B 117-95 test procedure. Air tunnel, blowers, dampers, and economizer shall all include the corrosion protection.
2. Unit base pan shall be provided with 1 inch thick, 1.5 pound/cubic foot fiberglass insulation.
3. Unit shall include factory wired, marine service lights.
4. Unit shall include factory installed, painted galvanized steel condenser coil guards on the face of the condenser coil.

2.4 ELECTRICAL

A. Unit shall be provided with factory installed and factory wired, non-fused disconnect switch in the unit control panel.

B. Unit shall be provided with factory installed and field wired 115V, 20 amp GFI outlet in the unit control panel.

C. Unit shall be provided with phase and brown out protection which shuts down all motors in the unit if the electrical phases are more that 10% out of balance on voltage, the voltage is more that 10% under design voltage, or on phase reversal.

2.5 BLOWERS

A. Fan assemblies shall be direct-drive without the use of belts or adjustable sheaves.

B. Manufacturer shall provide a variable frequency drive for each fan section.

C. Variable frequency drive shall be mounted, wired, and programmed by the manufacturer.

D. Variable frequency drive shall be located in an enclosed compartment outside of the supply or exhaust air stream.

E. Fan wheels shall have backward inclined blades constructed out of corrosion-resistant, fiber-reinforced polyamide or welded aluminum.

F. Fan wheel shall be tested in accordance to AMCA 210.

2.6 MOTORS

A. Fan motor shall be VFD rated, ODP type, EPACT compliant.

B. Fan motor shall be of premium efficiency (PE).

2.7 DIRECT EXPANSION (D/X) COOLING COILS

A. Coils shall be designed for use with R-410A refrigerant and constructed of copper tubes with copper fins mechanically bonded to the tubes and 304 stainless steel end casings. Fin design shall be sine wave rippled.

B. Coils shall have interlaced circuitry and shall be standard capacity.

C. Coils shall be helium leak tested.

D. Coil shall be furnished with a factory installed thermostatic expansion valve.

2.8 REFRIGERATION SYSTEM

A. Unit shall be factory charged with R-410A refrigerant.

B. Compressors shall be scroll type with thermal overload protection, independently circuited, and carry a 5 year non-prorated warranty.

C. Compressors shall be mounted in an isolated service compartment which can be accessed without affecting unit operation. Lockable hinged compressor access doors shall be fabricated of double wall, high performance composite panels with an R-value of 13 to prevent the transmission of noise outside the cabinet.

D. Compressors shall be isolated from the base pan with the compressor manufacturer's recommended rubber vibration isolators, to reduce any transmission of noise from the compressor into the building area.

E. Each refrigeration circuit shall be equipped with thermostatic expansion valve type refrigerant flow control.

F. Each refrigeration circuit shall be equipped with automatic reset low pressure and manual reset high pressure refrigerant safety controls, Schrader type service fittings on both the high pressure and low pressure sides, and factory installed liquid line filter driers.

G. Compressors shall be capable of minimum 10% of rated capacity.

H. Options:

1. Unit shall include a modulating capacity scroll compressor on the first refrigeration circuit which shall be capable of modulation from 10-100% of its capacity.
2. Each refrigeration circuit shall be provided with hot gas reheat coil, modulating valves, electronic controller, supply air temperature sensor and a control signal terminal which allow the unit to have a dehumidification mode of operation, which includes supply air temperature control to prevent supply air temperature swings and overcooling of the space.
3. Each refrigeration circuit shall be equipped with a liquid line sight glass.
4. Each refrigeration circuit shall be equipped with suction and discharge compressor isolation valves.
5. Each capacity stage shall be equipped with a 5 minute off, delay timer to prevent compressor short cycling.
6. Each capacity stage shall be equipped with an adjustable, 20 second delay timer to prevent multiple capacity stages from starting all at once.
7. All refrigeration circuits shall be provided with factory installed hot gas bypass for coil freeze protection and to prevent excessive compressor cycling.
8. All refrigeration circuits shall be provided with hot gas reheat coil and on/off control valves and a control signal terminal which allow the unit to have a dehumidification mode of operation. Dehumidification signal must be provided by unit controller or field installed humidistat.

2.9 AIR-COOLED CONDENSERS

A. Condenser fans shall be vertical discharge axial flow direct drive fans. First capacity stage shall be provided with variable speed condenser fan control for partial load control. Fan cycling control is not acceptable.

B. Coils shall be designed for use with R-410A refrigerant and constructed of copper tubes with copper fins mechanically bonded to the tubes and 304 stainless steel end casings. Fin design shall be sine wave rippled.

C. Options:
1. Coil shall have a flexible, epoxy polymer e-coat uniformly applied to all coil surface areas without material bridging between fins. Humidity and water immersion resistance shall be up to a minimum 1000 and 250 hours respectively (ASTM D2247-92 and ASTM D870-92). Corrosion durability shall be confirmed through testing to no less than 6000 hours salt spray per ASTM B117-90. Coated coils shall receive a spray-applied, UV-resistant polyurethane topcoat to prevent UV degradation of the e-coat.

2.10 ELECTRIC HEAT

A. Electrical Heating Coils, Controls, and Accessories: Only required where scheduled. Comply with UL 1995.

B. Casing Assembly: Flanged type with galvanized-steel frame.

C. Heating Elements: Coiled resistance wire of 80 percent nickel and 20 percent chromium surrounded by compacted magnesium-oxide powder in tubular-steel sheath; with spiral-wound, copper-plated, steel fins continuously brazed to sheath.

D. Provide SCR modulating control.

2.11 FILTERS

A. Unit shall include 2 inch thick, pleated panel filters with an ASHRAE efficiency of 30% and MERV rating of 7, upstream of the cooling coil.

B. Options:
1. Unit shall include a 2 inch thick, permanent filter frame with replaceable media, upstream of the cooling coil.
2. Unit shall include 5/16 inch lint screen pre filters upstream of the standard filters.
3. Unit shall include a clogged filter switch.
4. Units shall include a Magnehelic gauge mounted in the controls compartment.

2.12 INTAKE DAMPER

A. Unit shall include 100% motor operated outside air damper assembly constructed of extruded aluminum, hollow core, airfoil blades with rubber edge seals and aluminum end seals. Damper blades shall be gear driven and designed to have no more than 15 CFM of leakage per sq. ft. of damper area when subjected to 2 inches w.g. air pressure differential across the damper. Damper assembly shall be controlled by spring return, 2 position actuator. Unit shall include outside air opening bird screen and outside air hood with rain lip.

2.13 ENERGY RECOVERY

A. Unit shall contain a factory mounted and tested energy recovery wheel. The energy recovery wheel shall be mounted in a rigid frame containing the wheel drive motor, drive belt, wheel seals and bearings. Frame shall slide out for service and removal from the cabinet.

B. The energy recovery component shall incorporate a rotary wheel in an insulated cassette frame complete with seals, drive motor and drive belt.

C. Total energy recovery wheels shall be coated with silica gel desiccant permanently bonded by a process without the use of binders or adhesives, which may degrade desiccant performance. The substrate shall be lightweight polymer and shall not degrade nor require additional coatings for application in marine or coastal environments. Coated segments shall be washable with detergent or alkaline coil cleaner and water. Desiccant shall not dissolve nor deliquesce in the presence of water or high humidity.

D. The wheel shall be wound continuously with one flat and one structured layer in an ideal parallel plate geometry providing laminar flow and minimum pressure drop-to-efficiency ratios. The layers shall be effectively captured in stainless steel wheel frames or aluminum and stainless steel segment frames that provide a rigid and self-supporting matrix.

E. Wheels shall be provided with removable energy transfer matrix. Wheel frame construction shall be a welded hub, spoke and rim assembly of stainless, plated and/or coated steel and shall be self-supporting without matrix segments in place. Segments shall be removable without the use of tools to facilitate maintenance and cleaning. Wheel bearings shall be selected to provide an L-10 life in excess of 400,000 hours. Rim shall be continuous rolled stainless steel and the wheel shall be connected to the shaft by means of taper locks.

F. All diameter and perimeter seals shall be provided as part of the cassette assembly and shall be factory set. Drive belts of stretch urethane shall be provided for wheel rim drive without the need for external tensioners or adjustment.

G. The energy recovery cassette shall be an Underwriters Laboratories Recognized Component for electrical and fire safety. The wheel drive motor shall be an Underwriters Laboratory Recognized Component and shall be mounted in the cassette frame and supplied with a service connector or junction box. Thermal performance shall be certified by the manufacturer in accordance with ASHRAE Standard 84, Method of Testing Air-to-Air Heat Exchangers and ARI Standard 1060, Rating Air-to-Air Energy Recovery Ventilation Equipment. Cassettes shall be listed in the ARI Certified Product.

H. Units shall include 2 inch thick, pleated panel outside air and exhaust air filters with an ASHRAE efficiency of 30% and MERV rating of 7.

I. Provide wheel rotation alarm.

J. Hinged service access door shall allow access to the wheel(s).

2.14 DRAIN PANS

A. The drain pan is to be constructed of welded 304 SS and bolted in place. The cooling coil drain pan shall extend the entire length of the coil and extend a minimum of 4 inches beyond the air leaving side of the coil. The drain pan shall be a minimum of 2 inches deep and have a

minimum pitch of 1 inch. The drain pan shall be sloped to ensure zero standing water. Drain connection shall extend through unit base. Connection to be 1 inch male NPT.

2.15 CONTROLS

A. General: The unit shall have microprocessor control with a unit mounted operator interface/display and shall include BACnet MS/TP communications for integration into new building management system interface. Coordinate communication protocol with controls contractor prior to submittal process.

B. Microprocessor controller shall include a Web UI interface for remote web-based access.

C. Factory Installed and Factory Provided Controller

1. Unit controller shall be capable of controlling all features and options of the unit. Controller shall be factory installed in the unit controls compartment and factory tested. Unit controller shall provide visual display of all unit parameters including set points, monitored points, and alarms. At a minimum the panel shall display the following:

a. Entering air temperature, %Rh, and dew point.
b. Entering air dew point set point for dehumidification. Located downstream of energy recovery wheel and upstream of cooling coil.
c. Cooling and heating supply temperature set points. Dehumidification set point shall be same as cooling.
d. Unit operating mode cooling/heating/dehumidification.
e. Cooling coil supply air temperature and set point.
f. Compressor status and % activation.
g. Hot gas reheat status and % activation.
h. Electric reheat status and % activation.
i. Unit discharge temperature and %RH, alarm, and manual reset.
j. Factory alarm conditions (low pressure, high pressure, erv wheel, voltage, phase loss, etc.).

2. With modulating hot gas reheat option, an entering air humidity sensor, supply air temperature sensor, and a field installed space air temperature sensor shall be furnished to control the amount of reheat during dehumidification. All set points shall be adjustable at the unit.
3. Controller shall include non-volatile memory to retain all programmed values without the use of a battery, in the event of a power failure.
4. Controller shall contain diagnostics to indicate controller power, communications, unit alarms, and sensor failures.

2.16 SEQUENCE OF OPERATION

A. FAN/UNIT CONTROL

1. Occupied Mode:

a. OA Two-Position Damper rotates to 100% Open

b. EA Two Position Damper rotates to 100% Open
2. The Enthalpy Wheel will rotate anytime the OA unit is activated.
3. Fans shall be disabled and dampers close when unit is disabled during unoccupied mode.
4. Refer to plans and control specifications for automatic interlock requirements with other equipment.

B. DEHUMIDIFICATION MODE:

1. The controller will receive a signal from the Entering Air Temp/Humidity sensor located downstream of the enthalpy wheel. When the entering dew point is above set point (62 deg F adjustable) the controller will stage on compressors to maintain a cooling coil discharge air temperature set point (55 deg F adjustable).
2. The controller will receive a signal from the Supply Air Temp Sensor and will modulate the Hot Gas Bypass and electric reheat to maintain the supply air temperature set point (70 deg F adjustable). Unit shall be capable of activating supplemental compressor stages or electric reheat to provide supplemental heat when required to achieve supply air set point.
3. Dehumidification mode shall take precedence over cooling and heating modes of operation.

C. COOLING MODE:

1. Unit shall be capable of cooling anytime air temp downstream of ERV is above cooling supply temperature set point.
2. Controller will stage compressors to maintain cooling supply temperature set point.

D. HEATING MODE:

1. Unit shall be capable of heating anytime air temp downstream of ERV is below heating supply temperature set point.
2. Unit controller will modulate hot water heating control valve to maintain space temp set point (65 deg F adjustable).

2.17 ACCESSORIES

A. Options:

1. Unit shall be provided with smoke detectors sensing the outside air and exhaust air of the unit, wired to shut off the unit's control circuit in the event of smoke detection.

2.18 CONNECTIONS

A. Duct installation requirements are specified in other Division 15 Sections. Drawings indicate the general arrangement of ducts.

B. Electrical System Connections: Comply with applicable requirements in Division 16 Sections for power wiring, switches, and motor controls.

C. Ground equipment according to Division 16 Section "Grounding and Bonding."

END OF SECTION 15740

SECTION 15800 - HVAC FUNCTIONAL CHECK OUT

PART 1 - GENERAL

1.1 SUMMARY

A. This section includes the functional check out (FCO) of the HVAC systems to ensure proper operation and control in all modes of operation. HVAC systems installed under this contract are to be inspected, tested, signed off as complete and operational, and operated for functional check out agency verification as described in Part 3 of this Section. This includes, but is not necessarily limited to the work listed. The HVAC system will not be considered substantially complete until such time that the functional check out procedure is complete.

B. The intent of the FCO is to verify that the HVAC system is performing as intended and in no way is the FCO intended to supplant the contractor's responsibility of verifying that the HVAC system is complete and operable including all troubleshooting, T&B and control commissioning work.

C. The functional checkout services shall be performed by an independent test and balance agency or commissioning agent. The agencies services shall be included in the base contract.

D. Functional check out services are to be provided in four (4) phases: pre-construction, construction, acceptance, and post-acceptance as outlined in part 3 of this section.

1.2 QUALITY ASSURANCE

A. Agent Qualifications: Engage a testing, adjusting, and balancing agent certified by AABC or NEBB or a certified commissioning agent.

B. All procedures shall be in accordance with the AABC Commissioning Group Guidelines.

PART 2 - EXECUTION

2.1 FUNCTIONAL CHECK OUT AGENCY RESPONSIBILITIES:

A. General: The functional check out agency, hereafter referred to as the agency or agent, is responsible for coordinating all functional check out activities and maintaining written records. All records shall be submitted to the Engineer with copies distributed to the Architect and Contractor.

B. It is the Agency's responsibility to provide written verification that each phase of the FCO is complete before proceeding with the next phase.

C. During the preconstruction phase the functional checkout agent shall carry out the following scope of work:
   1. Review the design documents (drawings and specifications) to ensure inclusion of material covering the Contractor's responsibilities for functional check out; provide comments and suggestions for designer consideration.
   2. Prepare the construction-phase functional check out plan. The FCO plan shall include an itemized check sheet of all HVAC systems and the required verification data for those systems. At a minimum, the FCO plan shall address each sequence and set point for all HVAC systems including set points and system. The FCO plan shall also include a schedule for the FCO activities. Refer to documentation section for additional information on FCO plan. The FCO plan shall be submitted to the design team for review.
   3. Schedule a pre-construction meeting with the Architect, Engineer, Mechanical Subcontractor, and Contractor to review FCO plan and design document review comments.
   4. Provide a written report of pre-construction activities including the following:
      a. Proposed revisions or clarifications.
      b. List all required submittal and shop drawing data required for agent review.
      c. Approved FCO plan.

D. During the construction phase the agency shall carry out the following scope of work:
   1. Organize and direct the functional check out team in executing the FCO plan. The agency shall schedule and document all functional checkout activities.
   2. Review shop drawings and equipment submittals for information affecting the functional check out process. Provide a written review.
   3. Update the functional check out plan to reflect equipment and controls data from the submittals, and provide functional check out schedule information that the Contractor can integrate into the project schedule.
   4. Schedule and lead functional check out meetings.
   5. Establish and maintain a system for tracking issues needing resolution.
   6. Reviews the project schedule periodically to ensure functional check out activities are properly incorporated.
   7. Perform on-site observations during construction and provide written observation reports.
   8. Monitor correct component and equipment installation; including controls point-to-point checkouts. Document all observations.
   9. Witness equipment and system start-ups and review Contractor documentation of procedures.
   10. Provide written report of construction phase activities including all items required in the functional check out plan.

E. During the acceptance phase the agency shall carry out the following scope of work:
   1. Review the as-built documents and address any concerns in writing.
   2. Review the test and balance report and provide a written response identifying any issues or concerns. Field performance testing shall not commence until the testing and balancing process is substantially complete including Engineer review and acceptance of the final testing and balancing report.
   3. Coordinate functional performance testing of sub-systems, systems, and interactions between systems, leading to acceptance of the completed work. All HVAC systems shall be operated in every mode until such point that the system stabilizes. Document results on FCO check sheets.

4. Measure and record space, and equipment operating dry and wet bulb temperatures during functional tests and compare to control system set points and sensor readings.
5. Upon completion of the acceptance phase the agency shall schedule a final acceptance meeting to be attended by the Engineer, Contractor, and Subcontractors. The purpose of the meeting is to verify that all parties are in agreement that the acceptance phase is complete and all systems are performing as intended.

F. During the post-acceptance phase the agency shall carry out the following scope of work:
1. Conduct functional performance testing of sub-systems, systems, and interactions between systems that could not be carried out prior to acceptance.
2. Prepare and submit a final functional check out report. The report shall provide definitive acceptance or rejection of each HVAC system along with a detailed recount of any remaining deficiencies.
3. The agency shall attend and review the owner O&M training and documentation to ensure that the owner is provided with the practical knowledge required to operate and maintain the HVAC system.

2.2 CONTRACTOR RESPONSIBILITIES

A. This Section of the specifications defines the Contractor's responsibilities with respect to the functional check out process. The Contractor and Subcontractors shall review this Section, and shall include in their bids for carrying out the work described, as it applies to each Division and Section of these specifications, individually and collectively. The FCO is intended as an addition to the construction process and it remains the Contractor's sole responsibility to provide a complete and operable HVAC system.

B. The Contractor shall assign a representative to the FCO team, and submit the person's name to the FCO agency, within one (1) month of the award of the contract. The representative shall have the authority to make decisions on behalf of the Contractor as they relate to the organization and scheduling of HVAC FCO. The representative shall facilitate communications among all Contractors and suppliers and other team members, and shall foster the necessary cooperative action. One specific responsibility shall be to attend FCO meetings, and ensure action items arising from them are attended to as required to allow the FCO process to precede on schedule.

C. The Contractor, Mechanical Subcontractor, all Division 15 Subcontractors, and the Electrical Contractor shall be responsible for cooperating, and coordinating their work, with the Agency. They shall also be responsible for carrying out all the activities required for installation of components and systems, and operating them during the functional check out process as required in this Section.

D. In the event that any scheduled equipment or system start-ups or functional performance tests are terminated because the agency or designer discover deficient or incomplete work, or due to the non-attendance of required Contractor or supplier personnel, the Contractor or Subcontractor responsible for the termination shall also be responsible for paying reasonable costs of time and travel expenses of any or all of the

following representatives who were physically present for the purpose of witnessing the FCO activity: the agency, engineer, and the owner. The agent shall provide a statement to the Contractor identifying the specific activity that was terminated, the scheduled date, and a list of those in attendance, along with their reasonable time and travel expense costs.

E. During the preconstruction phase the Contractor shall carry out the following scope of work:
   1. Provide the functional checkout agency with a all mechanical shop drawings, equipment and control submittals and other pertinent information requested by the agency. It is the Contractor's responsibility to provide the Agency a copy of the approved shop drawings after review by the design team.
   2. Participate in the pre-construction meeting.
   3. Provide a written response to the Agency's pre-construction report identifying proposed changes that represent a change in scope requiring a change proposal. Failure to respond will be interpreted as acceptance of the Agency's proposed changes.
   4. Incorporate the agents FCO scheduling information into the construction schedule and provide scheduling information to the Agency for those milestones included in the FCO plan that are the responsibility of the Contractor (i.e. pressure tests, equipment start up, etc.).

F. During the construction phase the Contractor shall carry out the following scope of work:
   1. Cooperate and participate in FCO activities in accordance with FCO plan. Incorporate the FCO plan milestones into the project schedule. Keep the Agency abreast of any scope or schedule revisions that would impact the FCO plan and provide a minimum 2-week advance notice to the agency, engineer and owner for scheduled activities.
   2. Implement approved revisions proposed during pre-construction phase.
   3. Facilitate and document all tasks outlined in the construction phase FCO plan that are charged to the Contractor.
   4. Provide full start up of the HVAC and control systems to verify that the system is complete and operable prior to FCO acceptance phase.

G. During the acceptance phase the Contractor shall carry out the following scope of work:
   1. The Contractor shall perform basic HVAC functional tests to ensure that all equipment is functioning properly prior to the formal performance FCO.
   2. Perform the functional performance testing of sub-systems, systems, and interactions between systems to be witnessed and documented by the Agency. All HVAC systems shall be tested in every mode of operation such that the control, sequencing and capacity of the HVAC systems is proven to be stable and in accordance with the design intent. For the purpose of testing it may be necessary to modify the system set points to trigger the sequences of operation. The functional performance tests shall progress from the individual subsystems to the larger systems for ease of identifying potential problems.
   3. The Contractor shall involve the necessary Subcontractors including, but not limited to, HVAC, electrical, sheet metal, controls, and test and balancing. Each Subcontractor shall make available the necessary personnel to identify and

address any aspects of the HVAC system that require repair or adjustment during the functional check out.

4. The Contractor shall make whatever repairs or revisions are necessary to achieve system performance in accordance with the construction documents and subsequent approved revisions in a timely fashion and at no additional cost to the owner.

H. During the post-acceptance phase the agency shall carry out the following scope of work:
   1. Provide the FCO agent with a complete set of as-built documents including HVAC equipment, duct work and controls.
   2. Provide the owner with the required O&M training and documentation.

2.3 DOCUMENTATION

A. Functional Check Out Plan: The FCO plan shall list all scheduled activities, milestones and the requirements, time line and responsible party for each respective task. The FCO plan shall be developed by the agency with Engineer approval prior to release. At a minimum the plan shall include the following:
   1. Required meetings: At a minimum, the FCO team shall hold pre-construction, pre-control commissioning, pre-T&B, pre-verification and final verification meetings. Additional progress meetings shall be scheduled or called as required for coordination purposes.
   2. Milestones: Include all construction milestones and required documentation thereof including but not limited to duct pressure testing, hydronic system testing, mechanical equipment installation, T&B, controls commissioning and overall HVAC system performance verification.
   3. Required submittals and shop drawings: Include a complete list of all required submittals that the Contractor will supply to the agency.
   4. Functional check out report requirements: A FCO report form is required for each individual HVAC system. The report form shall outline the tasks in a format according to the AABC Commissioning Group System Verification and Start up check lists.
   5. Acceptance phase verification requirements: For each HVAC system identify the verification process for the modes of operation and the specific points to be verified during acceptance. Provide a written form for each HVAC system to be completed during the acceptance phase and included in the final report.

B. Status Reports: As Work progresses, prepare reports to describe completed procedures, procedures in progress, and scheduled procedures. Include a list of deficiencies and problems found in systems being tested.

C. Performance Test Report Data: Performance Test Report Data shall follow a Test and Balance report format showing the design, actual and control system readings for all control and input points. Separate reports shall be provided for each system under all modes of operation. The space conditions shall also be monitored (representative samples are acceptable for large systems) for each mode of operation.

D. Final Acceptance Report: The final acceptance report shall include final documentation of all items addressed in the FCO plan. The report shall not be submitted until the FCO process is complete and accepted by the agency.

END OF SECTION 15800

SECTION 15815 - METAL DUCT

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes metal, rectangular ducts and fittings for supply, return, outside, and exhaust air-distribution systems in pressure classes from minus 2- to plus 10-inch wg.

B. See Division 23 Section "Duct Accessories" for dampers, sound-control devices, duct-mounting access doors and panels, turning vanes, and flexible ducts.

1.2 SUBMITTALS

A. Shop Drawings: Show fabrication and installation details for metal ducts.
   1. Penetrations through fire-rated and other partitions.
   2. Duct accessories, including access doors and panels.

1.3 QUALITY ASSURANCE

A. NFPA Compliance:
   1. NFPA 90A, "Installation of Air Conditioning and Ventilating Systems."
   2. NFPA 90B, "Installation of Warm Air Heating and Air Conditioning Systems."

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
   1. Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers specified.
   2. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

2.2 SHEET METAL MATERIALS

A. Comply with SMACNA's "HVAC Duct Construction Standards--Metal and Flexible" for acceptable materials, material thicknesses, and duct construction methods, unless otherwise indicated. Sheet metal materials shall be free of pitting, seam marks, roller marks, stains, discolorations, and other imperfections.

B. Galvanized Sheet Steel: Lock-forming quality; complying with ASTM A 653/A 653M and having [G60] [G90] coating designation; ducts shall have mill-phosphatized finish for surfaces exposed to view.

C. Reinforcement Shapes and Plates: Galvanized-steel reinforcement where installed on galvanized sheet metal ducts.

D. Tie Rods: Galvanized steel, 1/4-inch minimum diameter for lengths 36 inches or less; 3/8-inch minimum diameter for lengths longer than 36 inches.

2.3 SEALANT MATERIALS

A. Joint and Seam Tape: 2 inches wide; glass-fiber-reinforced fabric.

B. Tape Sealing System: Woven-fiber tape impregnated with gypsum mineral compound and modified acrylic/silicone activator to react exothermically with tape to form hard, durable, airtight seal.

C. Water-Based Joint and Seam Sealant: Flexible, adhesive sealant, resistant to UV light when cured, UL 723 listed, and complying with NFPA requirements for Class 1 ducts.

D. Solvent-Based Joint and Seam Sealant: One-part, nonsag, solvent-release-curing, polymerized butyl sealant formulated with a minimum of 75 percent solids.

E. Flanged Joint Mastic: One-part, acid-curing, silicone, elastomeric joint sealant complying with ASTM C 920, Type S, Grade NS, Class 25, Use O.

F. Flange Gaskets: Butyl rubber or EPDM polymer with polyisobutylene plasticizer.

2.4 HANGERS AND SUPPORTS

A. Building Attachments: Concrete inserts, powder-actuated fasteners, or structural-steel fasteners appropriate for construction materials to which hangers are being attached.
   1. Use powder-actuated concrete fasteners for standard-weight aggregate concretes or for slabs more than 4 inches thick.
   2. Exception: Do not use powder-actuated concrete fasteners for lightweight-aggregate concretes or for slabs less than 4 inches thick.

B. Hanger Materials: Galvanized sheet steel or threaded steel rod.
   1. Hangers Installed in Corrosive Atmospheres: Electrogalvanized, all-thread rods or galvanized rods with threads painted with zinc-chromate primer after installation.
   2. Strap and Rod Sizes: Comply with SMACNA's "HVAC Duct Construction Standards--Metal and Flexible" for steel sheet width and thickness and for steel rod diameters.

C. Duct Attachments: Sheet metal screws, blind rivets, or self-tapping metal screws; compatible with duct materials.

D. Trapeze and Riser Supports: Galvanized-steel shapes and plates complying with ASTM A 36/A 36M.

2.5 RECTANGULAR DUCT FABRICATION

A. Fabricate ducts, elbows, transitions, offsets, branch connections, and other construction according to SMACNA's "HVAC Duct Construction Standards--Metal and Flexible" and complying with requirements for metal thickness, reinforcing types and intervals, tie-rod applications, and joint types and intervals.
   1. Lengths: Fabricate rectangular ducts in lengths appropriate to reinforcement and rigidity class required for pressure class.
   2. Deflection: Duct systems shall not exceed deflection limits according to SMACNA's "HVAC Duct Construction Standards--Metal and Flexible."

B. Transverse Joints: Prefabricated slide-on joints and components constructed using manufacturer's guidelines for material thickness, reinforcement size and spacing, and joint reinforcement.
   1. Manufacturers:
      a. Ductmate Industries, Inc.
      b. Nexus Inc.
      c. Ward Industries, Inc.

C. Formed-On Flanges: Construct according to SMACNA's "HVAC Duct Construction Standards--Metal and Flexible," Figure 1-4, using corner, bolt, cleat, and gasket details.
   1. Manufacturers:
      a. Ductmate Industries, Inc.
      b. Lockformer.
   2. Duct Size: Maximum 30 inches wide and up to 2-inch wg pressure class.
   3. Longitudinal Seams: Pittsburgh lock sealed with noncuring polymer sealant.

D. Cross Breaking or Cross Beading: Cross break or cross bead duct sides 19 inches and larger and 0.0359 inch thick or less, with more than 10 sq. ft. of nonbraced panel area unless ducts are lined.

PART 3 - EXECUTION

3.1 DUCT APPLICATIONS

A. Static-Pressure Classes: Unless otherwise indicated, construct ducts according to the following:
   1. Supply Ducts: 2-inch wg.
   2. Return Ducts (Negative Pressure): 1-inch wg. Round duct shall be longitudinal seam duct.
   3. Exhaust Ducts (Negative Pressure): 2-inch wg. Round duct shall be longitudinal seam duct.

3.2 DUCT INSTALLATION

A. Construct and install ducts according to SMACNA's "HVAC Duct Construction Standards--Metal and Flexible," unless otherwise indicated.

B. Install ducts with fewest possible joints.

C. Install fabricated fittings for changes in directions, size, and shape and for connections.

D. Install couplings tight to duct wall surface with a minimum of projections into duct. Secure couplings with sheet metal screws. Install screws at intervals of 12 inches, with a minimum of 3 screws in each coupling.

E. Install ducts, unless otherwise indicated, vertically and horizontally and parallel and perpendicular to building lines; avoid diagonal runs.

F. Install ducts close to walls, overhead construction, columns, and other structural and permanent enclosure elements of building.

G. Install ducts with a clearance of 1 inch, plus allowance for insulation thickness.

H. Conceal ducts from view in finished spaces. Do not encase horizontal runs in solid partitions unless specifically indicated.

I. Coordinate layout with suspended ceiling, fire- and smoke-control dampers, lighting layouts, and similar finished work.

J. Seal all joints and seams. Apply sealant to male end connectors before insertion, and afterward to cover entire joint and sheet metal screws.

K. Electrical Equipment Spaces: Route ducts to avoid passing through transformer vaults and electrical equipment spaces and enclosures.

L. Non-Fire-Rated Partition Penetrations: Where ducts pass through interior partitions and exterior walls and are exposed to view, conceal spaces between construction openings and ducts or duct insulation with sheet metal flanges of same metal thickness as ducts. Overlap openings on 4 sides by at least 1-1/2 inches.

M. Fire-Rated Partition Penetrations: Where ducts pass through interior partitions and exterior walls, install appropriately rated fire dampers, sleeves, and firestopping sealant. Fire and smoke dampers are specified in Division 15 Section "Duct Accessories." Firestopping materials and installation methods are specified in Division 7 Section "Through-Penetration Firestop Systems."

N. Protect duct interiors from the elements and foreign materials until building is enclosed. Follow SMACNA's "Duct Cleanliness for New Construction."

3.3 SEAM AND JOINT SEALING

A. Seal duct seams and joints according to SMACNA's "HVAC Duct Construction Standards--Metal and Flexible" for duct pressure class indicated.
   1. For pressure classes lower than 2-inch wg, seal all joints and seams.

B. Seal ducts before external insulation is applied.

3.4 HANGING AND SUPPORTING

A. Support horizontal ducts within 24 inches of each elbow and within 48 inches of each branch intersection.

B. Support vertical ducts at maximum intervals of 16 feet and at each floor.

C. Install upper attachments to structures with an allowable load not exceeding one-fourth of failure (proof-test) load.

D. Install concrete inserts before placing concrete.

E. Install powder-actuated concrete fasteners after concrete is placed and completely cured.
   1. Do not use powder-actuated concrete fasteners for lightweight-aggregate concretes or for slabs less than 4 inches thick.

3.5 FIELD QUALITY CONTROL

A. Perform the following field tests and inspections according to SMACNA's "HVAC Air Duct Leakage Test Manual" and prepare test reports:
   1. Disassemble, reassemble, and seal segments of systems to accommodate leakage testing and for compliance with test requirements.
   2. Conduct tests at static pressures equal to maximum design pressure of system or section being tested. If pressure classes are not indicated, test entire system at maximum system design pressure. Do not pressurize systems above maximum design operating pressure. Give seven days' advance notice for testing.
   3. Maximum Allowable Leakage: Comply with requirements for Leakage Class 3 for round and flat-oval ducts, Leakage Class 12 for rectangular ducts in pressure classes lower than and equal to 2-inch wg (both positive and negative pressures), and Leakage Class 6 for pressure classes from 2- to 10-inch wg.
   4. Remake leaking joints and retest until leakage is equal to or less than maximum allowable.

3.6 CONNECTIONS

A. Make connections to equipment with flexible connectors according to Division 15 Section "Duct Accessories."

B. Comply with SMACNA's "HVAC Duct Construction Standards--Metal and Flexible" for branch, outlet and inlet, and terminal unit connections.

C. Air terminal unit flexible duct connections shall be a maximum 3'-0" in length and shall not exceed 15 degrees in change of direction.

END OF SECTION 15815

SECTION 15829 - DUCT ACCESSIRIES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Backdraft dampers.
   2. Volume dampers.
   3. Fire dampers.
   4. Turning vanes.
   5. Duct-mounting access doors.
   6. Flexible connectors.
   7. Flexible ducts.
   8. Duct accessory hardware.

B. See Division 26 Section "Fire Alarm" for duct-mounting fire and smoke detectors.

C. See Division 23 Section "HVAC Instrumentation and Controls" for electric and pneumatic damper actuators.

1.2 SUBMITTALS

A. Product Data: For the following:
   1. Backdraft dampers.
   2. Volume dampers.
   3. Fire dampers.
   4. Turning vanes.
   5. Duct-mounting access doors.
   6. Flexible connectors.
   7. Flexible ducts.

B. Shop Drawings: Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
   1. Special fittings.
   2. Manual-volume damper installations.
   3. Fire-damper, smoke-damper, and combination fire- and smoke-damper installations, including sleeves and duct-mounting access doors.
   4. Wiring Diagrams: Power, signal, and control wiring.

1.3 QUALITY ASSURANCE

A. Comply with NFPA 90A, "Installation of Air Conditioning and Ventilating Systems," and NFPA 90B, "Installation of Warm Air Heating and Air Conditioning Systems."

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
   1. Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers specified.
   2. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

2.2 SHEET METAL MATERIALS

A. Comply with SMACNA's "HVAC Duct Construction Standards--Metal and Flexible" for acceptable materials, material thicknesses, and duct construction methods, unless otherwise indicated.

B. Galvanized Sheet Steel: Lock-forming quality; complying with ASTM A 653/A 653M and having G60 coating designation; ducts shall have mill-phosphatized finish for surfaces exposed to view.

C. Stainless Steel: ASTM A 480/A 480M.

D. Aluminum Sheets: ASTM B 209, alloy 3003, temper H14; with mill finish for concealed ducts and standard, 1-side bright finish for exposed ducts.

E. Extruded Aluminum: ASTM B 221, alloy 6063, temper T6.

F. Reinforcement Shapes and Plates: Galvanized-steel reinforcement where installed on galvanized sheet metal ducts; compatible materials for aluminum and stainless-steel ducts.

G. Tie Rods: Galvanized steel, 1/4-inch minimum diameter for lengths 36 inches or less; 3/8-inch minimum diameter for lengths longer than 36 inches.

2.3 BACKDRAFT DAMPERS

A. Manufacturers:
   1. Air Balance, Inc.
   2. American Warming and Ventilating.
   3. CESCO Products.
   4. Duro Dyne Corp.
   5. Greenheck.
   6. Penn Ventilation Company, Inc.
   7. Prefco Products, Inc.
   8. Ruskin Company.
   9. Vent Products Company, Inc.

B. Description: Multiple-blade, parallel action gravity balanced, with center-pivoted blades of maximum 6-inch width, with sealed edges, assembled in rattle-free manner with 90-degree stop, steel ball bearings, and axles; adjustment device to permit setting for varying differential static pressure.

C. Frame: 0.052-inch-thick, galvanized sheet steel, with welded corners and mounting flange.

D. Blades: 0.050-inch-thick aluminum sheet.

E. Blade Seals: [Felt] [Vinyl] [Neoprene].

F. Blade Axles: Galvanized steel.

G. Tie Bars and Brackets: Galvanized steel.

H. Return Spring: Adjustable tension.

2.4 VOLUME DAMPERS

A. Manufacturers:
1. Air Balance, Inc.
2. American Warming and Ventilating.
3. Flexmaster U.S.A., Inc.
4. McGill AirFlow Corporation.
5. METALAIRE, Inc.
6. Nailor Industries Inc.
7. Penn Ventilation Company, Inc.
8. Ruskin Company.
9. Vent Products Company, Inc.

B. General Description: Factory fabricated, with required hardware and accessories. Stiffen damper blades for stability. Include locking device to hold single-blade dampers in a fixed position without vibration. Close duct penetrations for damper components to seal duct consistent with pressure class.

C. Standard Volume Dampers: Multiple- or single-blade, parallel- or opposed-blade design as indicated, standard leakage rating, with linkage outside airstream, and suitable for horizontal or vertical applications.
1. Steel Frames: Hat-shaped, galvanized sheet steel channels, minimum of 0.064 inch thick, with mitered and welded corners; frames with flanges where indicated for attaching to walls and flangeless frames where indicated for installing in ducts.
2. Roll-Formed Steel Blades: 0.064-inch-thick, galvanized sheet steel.
3. Blade Axles: Galvanized steel.
4. Bearings: Oil-impregnated bronze.
5. Tie Bars and Brackets: Galvanized steel.

D. Jackshaft: 1-inch-diameter, galvanized-steel pipe rotating within pipe-bearing assembly mounted on supports at each mullion and at each end of multiple-damper assemblies.
   1. Length and Number of Mountings: Appropriate to connect linkage of each damper in multiple-damper assembly.

E. Damper Hardware: Zinc-plated, die-cast core with dial and handle made of 3/32-inch-thick zinc-plated steel, and a 3/4-inch hexagon locking nut. Include center hole to suit damper operating-rod size. Include elevated platform for insulated duct mounting.

2.5 FIRE DAMPERS

A. Manufacturers:
   1. Air Balance, Inc.
   2. CESCO Products.
   3. Greenheck.
   4. McGill AirFlow Corporation.
   5. METALAIRE, Inc.
   6. Nailor Industries Inc.
   7. Penn Ventilation Company, Inc.
   8. Prefco Products, Inc.
   9. Ruskin Company.
   10. Vent Products Company, Inc.
   11. Ward Industries, Inc.

B. Fire dampers shall be labeled according to UL 555.

C. Fire Rating: 1-1/2 hours.

D. Frame: Curtain type with blades inside airstream; fabricated with roll-formed, 0.034-inch-thick galvanized steel; with mitered and interlocking corners.

E. Mounting Sleeve: Factory- or field-installed, galvanized sheet steel.
   1. Minimum Thickness: 0.052 or 0.138 inch thick as indicated and of length to suit application.
   2. Exceptions: Omit sleeve where damper frame width permits direct attachment of perimeter mounting angles on each side of wall or floor, and thickness of damper frame complies with sleeve requirements.

F. Mounting Orientation: Vertical or horizontal as indicated.

G. Blades: Roll-formed, interlocking, 0.034-inch-thick, galvanized sheet steel. In place of interlocking blades, use full-length, 0.034-inch-thick, galvanized-steel blade connectors.

H. Horizontal Dampers: Include blade lock and stainless-steel closure spring.

I. Fusible Links: Replaceable, 165 deg F rated.

2.6 TURNING VANES

A. Fabricate to comply with SMACNA's "HVAC Duct Construction Standards--Metal and Flexible" for vanes and vane runners. Vane runners shall automatically align vanes.

B. Manufactured Turning Vanes: Fabricate 1-1/2-inch-wide, single-vane, curved blades of galvanized sheet steel set 3/4 inch o.c.; support with bars perpendicular to blades set into vane runners suitable for duct mounting.
   1. Manufacturers:
      a. Ductmate Industries, Inc.
      b. Duro Dyne Corp.
      c. METALAIRE, Inc.
      d. Ward Industries, Inc.

C. Acoustic Turning Vanes: Fabricate airfoil-shaped aluminum extrusions with perforated faces and fibrous-glass fill.

2.7 DUCT-MOUNTING ACCESS DOORS

A. General Description: Fabricate doors airtight and suitable for duct pressure class.

B. Door: Double wall, duct mounting, and rectangular; fabricated of galvanized sheet metal with insulation fill and thickness as indicated for duct pressure class. Include vision panel where indicated. Include 1-by-1-inch butt or piano hinge and cam latches.
   1. Manufacturers:
      a. American Warming and Ventilating.
      b. CESCO Products.
      c. Ductmate Industries, Inc.
      d. Flexmaster U.S.A., Inc.
      e. Greenheck.
      f. McGill AirFlow Corporation.
      g. Nailor Industries Inc.
      h. Ventfabrics, Inc.
      i. Ward Industries, Inc.
   2. Frame: Galvanized sheet steel, with bend-over tabs and foam gaskets.
   3. Provide number of hinges and locks as follows:
      a. Less Than 12 Inches Square: Secure with two sash locks.
      b. Up to 18 Inches Square: Two hinges and two sash locks.
      c. Up to 24 by 48 Inches: Three hinges and two compression latches with outside and inside handles.
      d. Sizes 24 by 48 Inches and Larger: One additional hinge.

C. Door: Double wall, duct mounting, and round; fabricated of galvanized sheet metal with insulation fill and 1-inch thickness. Include cam latches.
   1. Manufacturers:
      a. Flexmaster U.S.A., Inc.
   2. Frame: Galvanized sheet steel, with spin-in notched frame.

D. Seal around frame attachment to duct and door to frame with neoprene or foam rubber.

E. Insulation: 1-inch-thick, fibrous-glass or polystyrene-foam board.

2.8 FLEXIBLE CONNECTORS

A. Manufacturers:
   1. Duro Dyne Corp.
   2. Ventfabrics, Inc.
   3. Ward Industries, Inc.

B. General Description: Flame-retardant or noncombustible fabrics, coatings, and adhesives complying with UL 181, Class 1.

C. Flexible Connector Fabric: Glass fabric double coated with neoprene.
   1. Minimum Weight: 26 oz./sq. yd..
   2. Tensile Strength: 480 lbf/inch in the warp and 360 lbf/inch in the filling.
   3. Service Temperature: Minus 40 to plus 200 deg F.

2.9 FLEXIBLE DUCTS

A. Manufacturers:
   1. Ductmate Industries, Inc.
   2. Flexmaster U.S.A., Inc.
   3. Hart & Cooley, Inc.
   4. McGill AirFlow Corporation.

B. Noninsulated-Duct Connectors: UL 181, Class 1, multiple layers of aluminum laminate supported by helically wound, spring-steel wire.
   1. Pressure Rating: 10-inch wg positive and 1.0-inch wg negative.
   2. Maximum Air Velocity: 4000 fpm.
   3. Temperature Range: Minus 20 to plus 210 deg F.

C. Insulated-Duct Connectors: UL 181, Class 1, 2-ply vinyl film supported by helically wound, spring-steel wire; fibrous-glass insulation; polyethylene vapor barrier film.
   1. Pressure Rating: 10-inch wg positive and 1.0-inch wg negative.
   2. Maximum Air Velocity: 4000 fpm.
   3. Temperature Range: Minus 10 to plus 160 deg F.

D. Flexible Duct Clamps: Stainless-steel band with cadmium-plated hex screw to tighten band with a worm-gear action, in sizes 3 through 18 inches to suit duct size.

2.10 DUCT ACCESSORY HARDWARE

A. Instrument Test Holes: Cast iron or cast aluminum to suit duct material, including screw cap and gasket. Size to allow insertion of pitot tube and other testing instruments and of length to suit duct insulation thickness.

B. Adhesives: High strength, quick setting, neoprene based, waterproof, and resistant to gasoline and grease.

PART 3 - EXECUTION

3.1 APPLICATION AND INSTALLATION

A. Install duct accessories according to applicable details in SMACNA's "HVAC Duct Construction Standards--Metal and Flexible" for metal ducts and in NAIMA AH116, "Fibrous Glass Duct Construction Standards," for fibrous-glass ducts.

B. Provide duct accessories of materials suited to duct materials; use galvanized-steel accessories in galvanized-steel and fibrous-glass ducts, stainless-steel accessories in stainless-steel ducts, and aluminum accessories in aluminum ducts.

C. Install backdraft dampers on exhaust fans or exhaust ducts nearest to outside and where indicated.

D. Install volume dampers in ducts with liner; avoid damage to and erosion of duct liner.

E. Provide balancing dampers at points on supply, return, and exhaust systems where branches lead from larger ducts as required for air balancing. Install at a minimum of two duct widths from branch takeoff.

F. Provide test holes at fan inlets and outlets and elsewhere as indicated.

G. Install duct access doors to allow for inspecting, adjusting, and maintaining accessories and terminal units as follows:
   1. On both sides of duct coils.
   2. Downstream from volume dampers, turning vanes and equipment.
   3. Adjacent to fire or smoke dampers, providing access to reset or reinstall fusible links.
   4. To interior of ducts for cleaning; before and after each change in direction, at maximum 50-foot spacing.
   5. On sides of ducts where adequate clearance is available.

H. Install the following sizes for duct-mounting, rectangular access doors:
   1. One-Hand or Inspection Access: 8 by 5 inches.
   2. Two-Hand Access: 12 by 6 inches.
   3. Head and Hand Access: 18 by 10 inches.
   4. Head and Shoulders Access: 21 by 14 inches.
   5. Body Access: 25 by 14 inches.
   6. Body Plus Ladder Access: 25 by 17 inches.

I. Install the following sizes for duct-mounting, round access doors:
   1. One-Hand or Inspection Access: 8 inches in diameter.
   2. Two-Hand Access: 10 inches in diameter.
   3. Head and Hand Access: 12 inches in diameter.
   4. Head and Shoulders Access: 18 inches in diameter.
   5. Body Access: 24 inches in diameter.

J. Label access doors according to Division 15 Section "Mechanical Identification."

K. Install flexible connectors immediately adjacent to equipment in ducts associated with fans and motorized equipment supported by vibration isolators.

L. For fans developing static pressures of 5-inch wg and higher, cover flexible connectors with loaded vinyl sheet held in place with metal straps.

M. Connect diffusers or light troffer boots to low pressure ducts with maximum 60-inch lengths of flexible duct clamped or strapped in place.

N. Connect flexible ducts to metal ducts with draw bands.

O. Install duct test holes where indicated and required for testing and balancing purposes.

3.2 ADJUSTING

A. Adjust duct accessories for proper settings.

B. Final positioning of manual-volume dampers is specified in Division 15 Section "Testing, Adjusting, and Balancing."

END OF SECTION 15829

SECTION 15830 - DUCT INSULATION

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes semirigid and flexible duct, insulating cements, field-applied jackets, AND accessories and attachments.

1.2 SUBMITTALS

A. Product Data: Thermal conductivity, thickness, and jackets (both factory and field applied, if any), for each type of product indicated.

B. Shop Drawings: Shop fabrication and installation details for the following:
   1. Removable insulation sections at access panels.
   2. Application of field-applied jackets.
   3. Applications at linkages for control devices.

1.3 QUALITY ASSURANCE

A. Fire-Test-Response Characteristics: Provide products with flame-spread and smoke-developed indices of 25 and 50, respectively, according to ASTM E 84 by a testing agency acceptable to authorities having jurisdiction.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Mineral-Fiber Insulation:
      a. CertainTeed Manson.
      b. Knauf FiberGlass GmbH.
      c. Owens-Corning Fiberglas Corp.
      d. Schuller International, Inc.
   2. Flexible Elastomeric Thermal Insulation:
      a. Armstrong World Industries, Inc.
      b. Rubatex Corp.

2.2 INSULATION MATERIALS

A. Mineral-Fiber Board Thermal Insulation: Glass fibers bonded with a thermosetting resin. Comply with ASTM C 612, Type IB, without facing and with all-service jacket manufactured from kraft paper, reinforcing scrim, aluminum foil, and vinyl film.

B. Mineral-Fiber Blanket Thermal Insulation: Glass fibers bonded with a thermosetting resin. Comply with ASTM C 553, Type II, without facing and with all-service jacket manufactured from kraft paper, reinforcing scrim, aluminum foil, and vinyl film.

C. Flexible Elastomeric Thermal Insulation: Closed-cell, sponge- or expanded-rubber materials. Comply with ASTM C 534, Type II for sheet materials.
   1. Adhesive: As recommended by insulation material manufacturer.
   2. Ultraviolet-Protective Coating: As recommended by insulation manufacturer.

D. Field-Applied Jackets: ASTM C 921, Type 1, unless otherwise indicated.
   1. Foil and Paper Jacket: Laminated, glass-fiber-reinforced, flame-retardant kraft paper and aluminum foil.
   2. PVC Jacket: High-impact, ultraviolet-resistant PVC; 20 mils thick; roll stock ready for shop or field cutting and forming.

E. Accessories and Attachments:
   1. Glass Cloth and Tape: Comply with MIL-C-20079H, Type I for cloth and Type II for tape. Woven glass-fiber fabrics, plain weave, presized a minimum of 8 oz./sq. yd..
   2. Bands: Aluminum 3/4 inch wide.
   3. Wire: 0.080-inch, nickel-copper alloy; 0.062-inch, soft-annealed, stainless steel; or 0.062-inch, soft-annealed, galvanized steel.
   4. Weld-Attached Anchor Pins and Washers: Copper-coated steel pin for capacitor-discharge welding and galvanized speed washer. Pin length sufficient for insulation thickness indicated.
   5. Adhesive-Attached Anchor Pins and Speed Washers: Galvanized steel plate, pin, and washer manufactured for attachment to duct and plenum with adhesive. Pin length sufficient for insulation thickness indicated.

PART 3 - EXECUTION

3.1 GENERAL APPLICATION REQUIREMENTS

A. Surface Preparation: Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application including all dust, dirt and particulates.

B. Site Preparation: The installation area shall be enclosed and weather proof during and after installation to prevent moisture intrusion. If insulation is water damaged, all affected insulation shall be removed and replaced with new materials. The contractor shall report in writing any incident of water damage to the design professional.

C. Apply insulation materials, accessories, and finishes according to the manufacturer's written instructions; with smooth, straight, and even surfaces; and free of voids throughout the length of ducts and fittings.

D. Use accessories compatible with insulation materials and suitable for the service. Use accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.

E. Seal joints and seams with vapor-retarder mastic on insulation indicated to receive a vapor retarder.

F. Apply insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by the insulation material manufacturer.

G. Apply insulation with the least number of joints practical.

H. Apply insulation over fittings and specialties, with continuous thermal and vapor-retarder integrity, unless otherwise indicated.

I. Hangers and Anchors: Where vapor retarder is indicated, seal penetrations in insulation at hangers, supports, anchors, and other projections with vapor-retarder mastic. Apply insulation continuously through hangers and around anchor attachments.

J. Insulation Terminations: For insulation application where vapor retarders are indicated, seal ends with a compound recommended by the insulation material manufacturer to maintain vapor retarder.

K. Roof Penetrations: Apply insulation for interior applications to a point even with top of roof flashing.

L. Interior Wall and Partition Penetrations: Apply insulation continuously through walls and partitions, except fire-rated walls and partitions.

M. Fire-Rated Wall and Partition Penetrations: Terminate insulation at fire/smoke damper sleeves for fire-rated wall and partition penetrations.

N. Floor Penetrations: Terminate insulation at underside of floor assembly and at floor support at top of floor.

3.2 DUCT AND PLENUM APPLICATION SCHEDULE

A. Service: supply-air, return-air and exhaust-air ducts, concealed.
   1. Material: Externally wrapped Mineral-fiber board or Mineral-fiber blanket.
   2. Thickness: 2 inches.
   3. Number of Layers: One.
   4. Field-Applied Jacket: Foil and paper.
   5. Vapor Retarder Required: Yes.

B. Service: supply-air, return-air and exhaust-air ducts, exposed.

1. Material: Externally wrapped Mineral-fiber board.
2. Thickness: 2 inches.
3. Number of Layers: One.
4. Field-Applied Jacket: Foil and paper.
5. Vapor Retarder Required: Yes.

END OF SECTION 15830

SECTION 15855 - DIFFUSERS, REGISTERS AND GRILLES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes: General air device requirements. Refer to schedule for air device applications.

B. Related Sections:

1. Division 08 Section "Louvers and Vents" for fixed and adjustable louvers and wall vents, whether or not they are connected to ducts.
2. Division 23 Section "Air Duct Accessories" for fire and smoke dampers and volume-control dampers not integral to diffusers, registers, and grilles.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product indicated, include the following:

1. Data Sheet: Indicate materials of construction, finish, and mounting details; and performance data including throw and drop, static-pressure drop, and noise ratings.
2. Diffuser, Register, and Grille Schedule: Indicate drawing designation, room location, quantity, model number, size, and accessories furnished.

B. Samples: For each exposed product and for each color and texture specified.

PART 2 - PRODUCTS

2.1 AIR DEVICES

A. Insert number to complete drawing designation for each product required. Use these designations on Drawings to identify each product.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. Anemostat Products; a Mestek company.
b. Carnes.
c. Hart & Cooley Inc.
d. METALAIRE, Inc.
e. Nailor Industries Inc.
f. Price Industries.
g. Titus.

h. Tuttle & Bailey.

2.2 SOURCE QUALITY CONTROL

A. Verification of Performance: Rate diffusers, registers, and grilles according to ASHRAE 70, "Method of Testing for Rating the Performance of Air Outlets and Inlets."

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install diffusers, registers, and grilles level and plumb.

B. Ceiling-Mounted Outlets and Inlets: Drawings indicate general arrangement of ducts, fittings, and accessories. Air outlet and inlet locations have been indicated to achieve design requirements for air volume, noise criteria, airflow pattern, throw, and pressure drop. Make final locations where indicated, as much as practical. For units installed in lay-in ceiling panels, locate units in the center of panel. Where architectural features or other items conflict with installation, notify Architect for a determination of final location.

C. Install diffusers, registers, and grilles with airtight connections to ducts and to allow service and maintenance of dampers, air extractors, and fire dampers.

D. Refer to Division 15 “HVAC General Requirements” for HVAC system protection requirements during construction.

3.2 ADJUSTING

A. After installation, adjust diffusers, registers, and grilles to air patterns indicated, or as directed, before starting air balancing.

END OF SECTION 15855

SECTION 15870 - COMMERCIAL KITCHEN HOODS

1PART - GENERAL

1.1 SUMMARY

A. This Section includes Types I commercial kitchen hood(s) and dishwasher hood(s).

B. See Division 15 Section "Power Ventilators" for exhaust and make up air fans.

1.2 DEFINITIONS

A. Listed Hood: A hood tested according to UL 710 by a testing agency acceptable to authorities having jurisdiction.

B. Standard Hood: A hood that complies with design, construction, and performance criteria of applicable national and local codes.

C. Type I Hood: A hood designed for grease exhaust applications.

D. Dishwasher Hood.

1.3 SUBMITTALS

A. Product Data: For the following:

1. Hoods.
2. Grease removal devices.
3. Fire-suppression systems.
4. Lighting fixtures.

B. Shop Drawings: For the following:

1. Show plan view, elevation view, sections, roughing-in dimensions, service requirements, duct connection sizes, and attachments to other work.
2. Show cooking equipment plan and elevation to confirm minimum code-required overhang.
3. Indicate performance, exhaust and makeup air airflow and pressure loss, at actual Project-site elevation.
4. Indicate method of attaching hangers to building structure.
5. Show exhaust and makeup air ducts, and fittings connecting to hoods.
6. Show water-supply and drain piping.
7. Show control cabinets.
8. Show fire-protection piping, actuation devices, and manual control devices.
9. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
10. Wiring Diagrams: Power, signal, and control wiring.

C. Piping Diagrams: Detail fire-suppression piping and components and differentiate between manufacturer-installed and field-installed piping. Include roughing-in requirements for drain

connections. Show cooking equipment plan and elevation to illustrate fire-suppression nozzle locations.

D. Welding certificates.

E. Field quality-control test reports.

1.4 QUALITY ASSURANCE

A. Welding Standards: Qualify procedures and personnel according to AWS D1.1, "Structural Welding Code--Steel," for hangers and supports; and AWS D9.1, "Sheet Metal Welding Code," for joint and seam welding.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

C. NSF Compliance: Fabricate hood according to NSF 2, "Food Equipment."

1.5 EXTRA MATERIALS

A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Furnish one complete set of grease removal devices.

2PART - PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Hoods:

a. Captive-Aire Systems.
b. Duo-Aire, Inc.
c. Grease Master; Div. of Custom Industries Inc.
d. Greenheck.

2. Wet-Chemical Fire-Suppression Systems:

a. Ansul Incorporated; a Tyco International Ltd. Company.
b. Badger Fire Protection, Inc.
c. Fenwall Safety Systems, Inc.; Div. of Kidde Technologies, Inc.
d. Pyro Chem, Inc.

2.2 HOOD MATERIALS

A. Stainless-Steel Sheet: Type 430, #3 or #4 polish on all exposed surfaces.

1. Minimum Thickness: 0.03 inch.
2. General: Comply with SSINA's "Finishes for Stainless Steel" for recommendations for applying and designating finishes.
3. Remove tool and die marks and stretch lines or blend into finish. Grind and polish surfaces to produce uniform, directionally textured, polished finish indicated, free of cross scratches. Run grain with long dimension of each piece.
4. Concealed Stainless-Steel Surfaces: ASTM A 480/A 480M, No. 2B finish (bright, cold-rolled, unpolished finish).
5. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.

B. Sound Dampening: NSF-certified, nonabsorbent, hard-drying, sound-deadening compound for permanent adhesion to metal in minimum 1/8-inch thickness that does not chip, flake, or blister.

C. Gaskets: NSF certified for end-use application indicated; of resilient rubber, neoprene, or PVC that is nontoxic, stable, odorless, nonabsorbent, and unaffected by exposure to foods and cleaning compounds, and passes testing according to UL 710.

2.3 GENERAL HOOD FABRICATION

A. Welding: Use welding rod of same composition as metal being welded. Use methods that minimize distortion and develop strength and corrosion resistance of base metal. Make ductile welds free of mechanical imperfections such as gas holes, pits, or cracks.

1. Welded Butt Joints: Full-penetration welds for full-joint length. Make joints flat, continuous, and homogenous with sheet metal without relying on straps under seams, filling in with solder, or spot welding.
2. Grind exposed welded joints flush with adjoining material and polish to match adjoining surfaces.
3. Where fasteners are welded to underside of equipment, finish reverse side of weld smooth and flush.
4. Coat concealed stainless-steel welded joints with metallic-based paint to prevent corrosion.
5. After zinc-coated steel is welded, clean welds and abraded areas and apply SSPC-Paint 20, high-zinc-dust-content, galvanizing repair paint to comply with ASTM A 780/A 780M.

B. For metal butt joints, comply with SMACNA's "Kitchen Equipment Fabrication Guidelines."

C. Where stainless steel is joined to a dissimilar metal, use stainless-steel welding material or fastening devices.

D. Form metal with break bends that are not flaky, scaly, or cracked in appearance; where breaks mar uniform surface appearance of material, remove marks by grinding, polishing, and finishing.

E. Sheared Metal Edges: Finish free of burrs, fins, and irregular projections.

F. In food zones, as defined in NSF, fabricate surfaces free from exposed fasteners.

G. Cap exposed fastener threads, including those inside cabinets, with stainless-steel lock washers and stainless-steel cap (acorn) nuts.

H. Fabricate pipe slots on equipment with turned-up edges sized to accommodate service and utility lines and mechanical connections.

I. Fabricate enclosures, including panels, housings, and skirts, to conceal service lines, operating components, and mechanical and electrical devices including those inside cabinets, unless otherwise indicated.

J. Fabricate equipment edges and backsplashes according to SMACNA's "Kitchen Equipment Fabrication Guidelines."

2.4 TYPE I EXHAUST HOOD FABRICATION

A. Weld all joints exposed to grease with continuous welds and make grease removal devices and makeup air diffusers easily accessible for cleaning.

1. Hood(s) shall be listed and labeled, according to UL 710, by a testing agency acceptable to authorities having jurisdiction.
2. Include access panels as required for access to fire dampers and fusible links.
3. Fire Dampers: Labeled, according to UL 555, by a testing agency acceptable to authorities having jurisdiction.

a. Fire Rating: One and one-half hours.
b. Frame: SMACNA Type A, with blades in airstream; fabricated with roll-formed, 0.034-inch- thick galvanized steel; with mitered and interlocking corners.
c. Mounting Sleeve: Galvanized steel sheet, with a minimum thickness of 0.052 or 0.138 inch and length to suit application.
d. Mounting Orientation: horizontal as indicated.
e. Blades: Roll-formed, interlocking, 0.034-inch- thick, galvanized steel sheet. In place of interlocking blades, use full-length, 0.034-inch- thick, galvanized steel blade connectors.
f. Horizontal Dampers: Include a blade lock and stainless-steel negator closure spring.
g. Fusible Link: Replaceable, 165 or 212 deg F rated as indicated.

4. Exhaust-Duct Collars: Minimum 0.0625-inch- thick stainless steel at least 3 inches long, continuously welded to top of hood and at corners. At contractors option, provide welded flange for mechanical joint at duct connection to hood.

B. Hood Configuration: Exhaust and makeup air.

1. Makeup air shall be introduced through laminar-flow-type perforated metal panels on front of hood canopy.

C. Hood Style:

1. Back to back island, self compensating. Back to back canopy hoods shall include stainless finishing strip to conceal joint between hoods.
2. Wall mounted, self compensating. Single hood with stainless backer from floor to hood for full width of hood. Roll backer at top to cover 3" standoff.

D. Grease Removal Devices: Removable, stainless-steel, filter/baffle grease filters. Fabricate with a minimum of 0.0781-inch- thick stainless steel for filter frame and removable collection cup and

trough. Exposed surfaces shall be pitched to drain to collection cup. Filters/baffles shall comply with UL 1046, "Grease Filters for Exhaust Ducts."

E. Light Fixtures: UL-listed, surface-mounted, incandescent fixtures and lamps with lenses sealed vapor-tight. Wiring shall be installed in stainless-steel conduit on hood exterior. Number and location of fixtures shall provide a minimum of 70 fc on cooking surface below hood.

1. Switches shall be mounted on hood control panel..
2. Incandescent Lighting Fixtures: Comply with UL 1571.

F. Fire Extinguishing System

1. The fire extinguishing system shall be a pre-engineered distribution network engineered and provided by the hood manufacturer. The extinguishing agent shall be a low ph liquid non-corrosive type. The system shall be capable of automatic detection and activation or manual activation through a remote manual pull station. It is listed with underwriter laboratories, inc. The tank(s) shall be contained in a ul listed utility cabinet with a full-length removable door and center handle. The system shall be completely factory pre-piped by the trained personnel in accordance with UL 300, NFPA #96, #17, and #17A. All exposed fittings shall be chrome plated and exposed piping shall be covered with a heavy gauge stainless steel sleeving. System shall be capable of fuel shut down upon discharge. A mechanical or electrical gas valve shall be provided. A micro-switch shall be provided for the automatic start up of exhaust fans and shut down of supply air fans and shunt trip breakers serving equipment under the hood in the event of system discharge. Provide interface with existing fire alarm system to trigger alarm when discharge occurs. Field hookup and testing will be subcontracted to a qualified and insured fire system distributor and will be performed after hood installation.

2. The manufacturer shall provide suppression system calculations, engineered shop drawings, product information, installation manual, and sequence of operation for submittal to the state fire marshal. Include all associated fees and forms. Shop drawings shall include the actual hood layout including hood, cooking equipment, supply cylinders, nozzles, fusible links, etc. A cad generated drawing will be custom produced for each installation, indicating all drop locations and piping schematic in accordance with local requirements.

G. Steel Pipe, NPS 2 and Smaller: ASTM A 53/A 53M, Type S, Grade A, Schedule 40, plain ends.

1. Malleable-Iron Threaded Fittings: ASME B16.3, Classes 150 and 300.
2. Pipe Covers: Chrome-plated aluminum tubing.
3. Piping, fusible links and release mechanism, tank containing the suppression agent, and controls shall be factory installed. Controls shall be in stainless-steel control cabinet mounted on hood or wall. Furnish manual pull station for wall mounting adjacent to hood. Exposed piping shall be covered with stainless-steel sleeves. Exposed fittings shall be chrome plated.
4. Liquid Extinguishing Agent: Noncorrosive, low-pH liquid.
5. Furnish an electric-operated, gas shutoff valve with clearly marked open and closed indicator for field installation.
6. Fire-suppression system controls shall be integrated with controls for fans, lights, and fuel supply and located in a single cabinet for each group of hoods immediately adjacent.
7. Wiring shall have color-coded, numbered terminal blocks and grounding bar. Spare terminals for fire alarm, optional wiring to start fan with fire alarm, red pilot light to indicate fan operation, and control switches shall all be factory wired in control cabinet with relays or starters.

H. Hood Controls: Single, hood-mounted control cabinet shall control groups of adjacent hoods and shall be fabricated of stainless steel.

1. The electrical control package shall house the starters and overloads to control the exhaust and supply fans and be designed as a single point connection for the fans pre-wired where hood mounted, the electrical control package shall be mounted inside of UL listed 12" utility cabinet mounted as shown on plans.

2. Utility cabinets and electrical control packages shall be provided by the hood manufacturer.

3. Exhaust Hood: Single On-off switch shall start and stop the exhaust and supply fans. Interlock exhaust fan with makeup air supply fan to operate simultaneously. Interlock exhaust fan with fire-suppression system to operate fan(s) during fire-suppression-agent release and to remain in operation until manually stopped.

4. High-Temperature Control: Alarm shall sound and cooking equipment shall shut down before hood discharge temperature rises to actuation temperature of fire-suppression system.

5. Control cabinet shall include separate binary contacts for shunt trip output and automatic gas valve shut off.

2.5 DISHWASHER HOOD FABRICATION

A. Fabricate hood with 304 stainless steel.

B. Hood Configuration: dishwasher enclosure. Provide as dishwasher accessory or fabricate.

C. Hood Type: Heat and vapor removal.

D. Condensate Hood Baffles: Removable stainless-steel baffles to drain into a hood drain trough, and stainless-steel drain piping.

E. Dishwasher hood shall comply with dishwasher manufacturer requirements and recommendations.

F. Provide hood mounted fan switch.

3PART - EXECUTION

3.1 INSTALLATION

A. Complete field assembly of hoods, where required.

1. Make closed butt and contact joints that do not require filler.
2. Grind field welds on stainless-steel equipment smooth, and polish to match adjacent finish. Comply with welding requirements in Part 2 "General Hood Fabrication" Article.

B. Install hoods and associated services with clearances and access for maintaining, cleaning, and servicing hoods, grease removal devices, and fire-suppression systems according to manufacturer's written instructions and requirements of authorities having jurisdiction.

C. Make cutouts in hoods where required to run service lines and to make final connections.

D. Securely anchor and attach items and accessories to walls, floors, or bases with stainless-steel fasteners, unless otherwise indicated.

E. Install hoods to operate free from vibration.

F. Install trim strips and similar items requiring fasteners in a bed of sealant. Fasten with stainless-steel fasteners at 48 inches o.c. maximum.

G. Install sealant in joints between equipment and abutting surfaces with continuous joint backing, unless otherwise indicated. Provide airtight, watertight, vermin-proof, sanitary joints.

H. Install lamps, with maximum recommended wattage, in equipment with integral lighting.

3.2 CONNECTIONS

A. Install piping adjacent to machine with clearance to allow service and maintenance.

B. Duct Connections: Comply with applicable requirements in Division 15 Section "Duct Accessories" for flexible connectors on makeup air supply duct. Weld exhaust-duct connections.

C. Fire-Suppression Piping: Install piping connections for remote-mounted suppression systems per NFPA 17, "Wet Chemical Extinguishing Systems."

3.3 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including piping and electrical connections. Report results in writing.

1. Test each equipment item for proper operation. Repair or replace equipment that is defective, including units that operate below required capacity or that operate with excessive noise or vibration.
2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
3. Test motors and rotating equipment for proper rotation and lubricate moving parts according to manufacturer's written instructions.
4. Test liquid-carrying and water, drain, and gas components for leaks. Repair or replace leaking components.

B. Remove malfunctioning units, replace with new units, and retest.

3.4 ADJUSTING

A. Set initial temperatures, and calibrate sensors.

B. Set field-adjustable switches.

END OF SECTION 15870

SECTION 15923 - DIRECT DIGITAL CONTROLS

PART 1 - GENERAL

1.1 SCOPE

A. Facility Management System (FMS) Subcontractor shall provide:

1. A fully integrated Facility Management System (FMS), incorporating direct digital control (DDC) for control of all HVAC systems and other systems outlined herein.
2. All tubing, wiring, conduit, and panels for the Facility Management System and temperature controls equipment shall be by the this subcontractor. Line voltage wiring and control transformers for control power will be by this subcontractor from the control power disconnect provided by Division 26 or air terminal device manufacturer. Coordinate the control transformer voltage with the available power source provided by Division 26 or air terminal device.
3. All temperature control wiring and conduit and final electrical terminations to each sensor, transducer, application specific controller and main control panel shall be by the FMS subcontractor.
4. All software and hardware accessories required by balancing contractor for commissioning all air and water systems. Software and hardware may be provided on a temporary basis until job is completed. The balancing contractor is responsible for providing a laptop computer with modem port.
5. All isolation relays and wiring necessary to monitor and/or interlock systems provided by others, including but not limited to duct mounted smoke detectors, lighting control panels, utility meters, and mechanical equipment.

1.2 GENERAL PRODUCT DESCRIPTION

A. The Facility Management System shall provide HVAC equipment monitoring and control.

B. Furnish a totally native BACnet-based system. The operator's workstation, all building controllers, application controllers, and all input/output devices shall communicate using the protocols and network standards as defined by ANSI/ASHRAE Standard 135-2008, BACnet.

C. For this project, the Facility Management System shall consist of the following:

1. Standalone Control Panels.
2. Standalone application specific controllers (ASCs).
3. Graphical based PC operator control station.
4. Communication Network.

D. Provide a portable operator interface unit (handheld or laptop) which enables the operator to access all Network and application specific controllers via the local communications port. The portable unit shall enable the operator to interface to any ASC point data or programs.

E. The system shall be modular in nature and shall permit expansion of both capacity and functionality through the addition of sensors, actuators, controllers, application specific controllers and operator devices.

F. System architectural design shall eliminate dependence upon any single device for control execution. Each DDC controller and application specific controller shall operate independently. The failure of any single component or network connection shall not interrupt the execution of control strategies at other operational devices.

G. DDC controllers shall be able to access any data from, or send control commands to other controllers on the network without dependence upon a central processing device.

H. All panels, devices, controllers and other FMS equipment shall be installed in accordance with Division 26.

I. All hardware and controllers shall be mounted in fully closed panels in accordance with Division 26. Plastic covers are not allowed.

1.3 RELATED WORK:

A. Work of Other Sections: The following work related to this section shall be performed as follows:

B. Control valves, separable wells for immersion elements, and couplings for flow and pressure switches furnished by the FMS subcontractor shall be marked by the FMS subcontractor and installed by the mechanical subcontractor.

C. Automatic dampers furnished by FMS subcontractor shall be installed by the sheet metal subcontractor. Air Handling Unit mixing box dampers shall be furnished by the unit manufacture.

D. Power shall be provided to the point of disconnect by Division 16 as shown on the electrical drawings. Connection to and all work beyond this point is the responsibility of the FMS subcontractor.

E. Refer to Section “Testing and Balancing” for control requirements and coordination with Test and Balance contractor.

1.4 APPLICABLE PUBLICATIONS

A. The following publications of the issues listed below, but referred to thereafter by basic designation only, form a part of this specification to the extent indicated by the references thereto:

1. National Electrical Manufacturers Association
   a. NEMA 3R, Weather proof enclosures

2. National Fire Protection Association
   a. NFPA 70: National Electric Code (NEC), ‘96 Edition

3. Underwriters Laboratory (UL), Latest Edition
   a. UL 873: Temperature indicating and regulating equipment
   b. UL 916: Energy management equipment

1.5 QUALIFICATION CRITERIA:

A. The FMS subcontractor shall have been in the business of furnishing, installing and servicing the same product line for a minimum of five (5) years.

1.6 QUALITY ASSURANCE:

A. Materials and equipment shall be cataloged products of manufacturers regularly engaged in production and installation of Facility Management systems and shall be of the manufacturer's latest standard design. Single source responsibility of the supplier shall be the proper operation of the FMS. This shall include software debugging and proper calibration of each component. The FMS contractor shall coordinate with the mechanical equipment supplier to ensure that the all equipment is compatible with the controls to provide a complete and operable system. The FMS contractor is responsible for any ancillary items necessary for an operable system.

B. The FMS manufacturer shall have an in-place support facility within 75 miles of the site with technical staff, spare parts inventory and all necessary test and diagnostic equipment.

C. All FMS equipment shall conform to the requirements of FCC regulation, Part 15, Section 15 governing radio frequency electromagnetic interference.

D. The FMS shall comply with UL 916 and be so listed at the time of bid.

E. Design and build all system components to be fault-tolerant.

F. Satisfactory operation without damage at 110% and 85% of rated voltage.

G. Static, transient and short-circuit protection on all inputs and outputs.

H. Network-connected devices shall be A.C. coupled, or equivalent such that any single device failure does not disrupt network communication.

I. All real time clocks and data file RAM shall be battery-backed for a minimum seventy-two (72) hours.

1.7 DOCUMENTATION:

A. Submittal and FMS shop drawings: submit eight (8) sets of manufacturer's data on Facility Management system and components, and shop drawings.

B. Wiring diagrams: submit flow, signal, point to point and control wiring diagrams for Facility Management system using CAD generated drawings. Supply diskettes upon request.

C. Equipment operation instruction and maintenance manuals: furnish four (4) copies of written instructions on the proper operation and maintenance of all equipment and apparatus furnished under this section.

D. The FMS subcontractor shall furnish all of the foregoing to the Owner or his representative for his review as to the fulfillment of the specified requirements.

1.8 TRAINING:

A. The subcontractor shall provide competent instructors to give instructions to designated personnel in the operation and maintenance of the system as installed rather than a general training course. Instructors shall be thoroughly familiar with all aspects of the subject matter. All training shall be held during normal working hours of 8:00 A.M. to 5:00 P.M. weekdays.

B. Provide eight (8) hours of instructional training for Owner's operating personnel of up to four (4) operators per class. Training shall be provided in a minimum of two sessions coordinated with the owner’s schedule and addressing as a minimum:

C. Explanation of drawings, operations and maintenance manuals.

D. Walk-through of the job to locate control components.

E. Operator workstation and peripherals.

F. DDC controller and ASC operation/function.

G. Operator control functions, trends, alarm responses and data archiving.

H. Remote Web based access.

I. It is the contractor’s sole responsibility to document all training sessions in full. It is the contractor’s sole responsibility to initiate and schedule the formal training sessions. In order to qualify as a formal training session the contractor shall release written notification of the scheduled training session, obtain written acceptance from the authorized owner’s representative. The contractor shall document the training session including a list of attendees via sign in sheet and documenting the covered tasks. That documentation shall be distributed to the architect and owner.

1.9 WARRANTY:

A. Warranty shall include the adjustment and repair of the system including all personal computer equipment, printers, controllers, transmission equipment and all sensors and control devices. Warranty period shall be for a twelve (12) month period commencing on date of final acceptance or of beneficial use.

PART 2 - PRODUCTS

1.1 ACCEPTABLE MANUFACTURERS/INSTALLERS:

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering Facility Management Systems which may be incorporated in the work include, but are not limited to, the following:

1. Johnson Controls, Inc.
2. Invensys
3. Siemens Building Technologies
4. Trane

1.2 NETWORKING COMMUNICATIONS:

A. Inherent in the system's design shall be the ability to expand the system without the requirement of additional software or programming support.

B. The system shall be a completely native BACnet based system. The operator workstations, all building controllers, application controllers, and all input/output devices shall communicate using the protocols and network standards as defined by ANSI/ASHRAE Standard 135-2008, BACnet.

C. Building controller MS/TP module communications shall be though BACnet MS/TP LAN to all advanced application and application-specific controllers. MS/TP module shall also route messages to Ethernet - MS/TP module for communication over WAN. All communication with operator's workstation and all application controllers shall be through BACnet. Building controller Ethernet - MS/TP module shall incorporate as a minimum, the functions of a 2-way BACnet router. Controller shall route BACnet messages between the high-speed LAN (Ethernet 10/100MHz) and MS/TP LAN. Ethernet - MS/TP module shall also route messages from all other building controller modules onto the BACnet Ethernet network.

D. BACnet Conformance:

1. MS/TP module shall be approved by the BTL (BACnet Testing Laboratory) as meeting the BACnet Building Controller requirements. MS/TP module shall as a minimum support MS/TP BACnet LAN type. It shall communicate directly using this BACnet LAN as a native BACnet device and shall support simultaneous routing functions between all supported LAN types.
2. Standard BACnet object types supported shall include, as a minimum, Analog Value, Binary Value, Calendar, Device, File, Group, Notification Class, Program, and Schedule object types. All proprietary object types, if used in the system, shall be thoroughly documented and provided as part of the submittal data. All necessary tools shall be supplied for working with proprietary information.
3. For all system elements-operator's workstation(s), building controller(s), application controllers, routers, and repeaters-provide BACnet Protocol

Implementation Conformance Statements (PICS) as per ANSI/ASHRAE Standard 135-2001.

4. The system shall provide a means to scan, detect, interrogate, and edit 3rd party BACnet devices and BACnet objects within those devices.
5. DDC panel support: DDC panels shall directly reside on an industry standard high speed communications bus (Local Area Network) such that communications may be executed directly from DDC panel to DDC panel.
6. Access to system data shall not be restricted by the hardware configuration. The hardware configuration of the FMS network shall be totally transparent to the user. Application specific controllers shall be arranged on the bus(es) in a functional relationship manner with DDC controllers.

1.3 FACILITY MANAGEMENT SYSTEM HARDWARE:

A. The Facility Management System (FMS) shall be comprised of a network of various independent Mechanical System Digital Controllers and a Centralized Head End Station as specified, to provide centralized access and facility wide control functions. The DDC Controllers shall be interconnected in a communicating network to provide facility wide access and sharing of information.

B. The distributed communication network system shall consist of a multi-drop RS-485 bus architecture connecting DDC Controllers. The trunk shall consist of:

1. A twisted pair of wires (18 awg) run in metallic conduit if subject to physical damage, or a twisted shielded pair of wires (18awg) with the shield grounded in accordance with the manufacturer's wiring practices.
2. There shall be no power wiring, in excess of 30 Vacrmsvoltage, run in conduit with communications trunk wiring. In cases where power or signal wiring is run in conduit with trunk wiring, all communications trunk wiring and power wiring shall be run using separate twisted shielded pairs (18awg) with the shields grounded in accordance with the manufacturer's wiring practices.

C. The central head station shall consist of a PC operator workstation with 1.6 Ghz dual core Intel processor, 1GB RAM, 80 Gig Hard Drive, 48x CD ROM, 512MB graphics card, owner specified modem, owner specified network card, roll feed printer with continuos paper, 19 inch LCD monitor and the latest available windows operating system.

1.4 SYSTEM SOFTWARE FEATURES:

A. General

1. All necessary software to form a complete operating system, as described in this specification, shall be provided.
2. The software programs specified in this section shall be provided as an integral part of the Direct Digital Control Panels or Application Specific Controllers, and shall not be dependent upon any higher level mainframe or personal computer for execution.

3. Color graphics shall be developed for operator access to the system point data, schedules, alarm management, setpoint adjustments and written sequences of operation.

B. The FMS system shall permit an operator to create, modify and document all process control sequences including all DDC application software, energy management software, alarm processes, color graphics and links, and facilities maintenance programs provided in the DDC controllers including:

1. Time of Day Scheduling
2. Calendar based Scheduling
3. Holiday Scheduling
4. Optimal Start
5. Optimal Stop
6. Custom Application Programs
7. Trend Logs

C. Digital Panels shall be able to execute custom application programs defined by the user to automatically perform calculations and control routines.

D. Process Inputs and Variables: It shall be possible to use any of the following in a configured process:

1. Any system-measured point data or status
2. Any calculated data
3. Any results from other processes
4. Boolean logic operators (and, or, greater than, less than, etc.)

E. Data Access: A single process shall be able to incorporate measured or calculated data from any and all other ASCs or networked systems. In addition, a single process shall be able to issue commands to points in any and all other ASCs on the network.

F. All programs shall be executed automatically without the need for operator intervention, and shall be flexible enough to allow user customization. Programs shall be applied to building equipment described in Part III of this specification.

G. The DDC panel shall include a provision for limiting the number of times each piece of equipment may be cycled within any one-hour period.

H. The DDC panel shall provide powerfail motor restart. Upon the resumption of normal power, the DDC panel shall analyze the status of all controlled equipment, compare it with normal occupancy scheduling, and turn equipment on or off as necessary to resume normal operation.

I. Alarm reporting. The operator shall be able to determine the action to be taken in the event of an alarm (i.e. route alarm to the appropriate workstation, start programs, printed or display custom messages). The system shall dial out in the event of an alarm. Receivers shall include remote service PC workstations and alpha-numeric pagers. The alarm message shall include the name of the calling location, the device that generated the alarm and the alarm message itself.

J. Scheduling. The operator shall be able to schedule each piece of equipment independently including start/stop and occupied/unoccupied control.

1.5 WEB BROWSER CAPABILITIES

A. The system shall be capable of supporting an unlimited number of clients using a standard Web Browser such as Internet Explorer™ or Netscape Navigator™. Systems requiring additional software resident on the client machine or manufacture-specific browsers shall not be acceptable.

B. The Web Browser client shall support at a minimum, the following functions:

1. User log-on identification and password shall be required. If an unauthorized user attempts access, a blank web page shall be displayed. Security using Java authentication techniques to prevent unauthorized access shall be implemented.
2. Graphical screens developed for the GUI shall be the same screens used for the Web Browser client. Storage of the graphical screens shall be in the system, without requiring any graphics to be stored on the client machine. Systems that require graphics storage on each client are not acceptable.
3. Depending on user access privileges, the user shall be able to view data, modify and command objects such as start/stop, and adjust set points. In addition, users can be provided with the ability to view logs and view and acknowledge alarms.

C. The system shall provide the capability to specify a user's (as determined by the log-on user identification) home page. The capability to limit the user to just their home page shall be provided. From the home page, links to other views, or pages in the system shall be possible.

D. Graphic screens on the Web Browser client shall support hypertext links to other Web pages on other Internet or Intranet sites.

1.6 DIGITAL CONTROL PANEL(S):

A. General: Digital Control Panels shall be 16 bit microprocessor-based, multi-tasking, multi-user, dedicated digital control processors.

B. Memory: Each Digital Panel shall have sufficient memory (minimum 2 MB RAM, expandable via SIMM's) to support its own operating system and data FMS including, but not limited to:

1. Custom control processes
2. Energy Management Applications
3. Alarm Management
4. Trend Data
5. Maintenance Support Applications
6. Operator I/O

C. Expandability: The system shall be modular in nature, and shall permit easy expansion through the addition of field controllers, sensors, and actuators. Each digital panel shall be installed with a 10% expansion capacity for all point types (AO, DO, DI, AI) without the addition of expansion modules.

D. Serial Communication Ports: Digital Panels shall provide at least two RS-232C serial data communication ports for simultaneous operating of multiple operator I/O devices, such as laptop computers, Personal Computers, and alarm printers.

E. Integrated On-line Diagnostics: Each Digital Panel shall continuously perform self-diagnostics, communication diagnosis and diagnosis of all subsidiary equipment. Digital Panels shall provide both local and remote annunciation of any detected component failures, or repeated failure to establish communication. Indication of the diagnostic results shall be provided at each Digital Panel.

F. Surge and Transient Protection: Isolation shall be provided at all network terminations, as well as all field point terminations, to suppress induced voltage transients. Isolation levels shall be sufficiently high as to allow all signal wiring to be run in the same conduit as high voltage wiring where acceptable by electrical code.

G. Powerfail Restart: In the event of the loss of normal power, there shall be an orderly shutdown of the Digital Panel to prevent the loss of data FMS or operating system software. Non-volatile memory shall be incorporated for all critical controller configuration data, and battery backup shall be provided to support the real-time clock and all volatile memory for a minimum of 72 hours. Upon restoration of normal power, the Digital Panel shall automatically resume full operation without manual intervention. Should Digital Panel memory be lost for any reason, the user shall have the capability of reloading the Digital Panel via the local RS-232C port, Operator Workstation or telephone line dial-in. Provide modem at DDC panel to allow for dial-in from remote operator workstation(s). Phone line will be provided by the OWNER.

1.7 APPLICATION SPECIFIC CONTROLLERS:

A. Each standalone Digital Control Panel shall be able to extend its performance and capacity through the use of remote Application Specific Controllers (ASCs). An ASC shall be provided for each mechanical system (i.e. air handling unit, VAV box, etc.) Grouping multiple systems on one ASC is allowed povided that a minimum of 2 points of each type (i.e. binary input, digital output, etc...) remain unused for future expansion.

B. Each ASC shall operate as a standalone controller capable of performing its specified control responsibilities independently of other controllers in the network. Each ASC shall be a microprocessor-FMSed, multi-tasking, real-time digital control processor.

C. Each ASC shall have sufficient memory to support its own operating system and data FMS including:

1. Control Processes
2. Energy Management Applications
3. Time Programmed Start/Stop Software

D. All system setpoints, proportional bands, control algorithms, and any other programmable parameters shall be stored such that a power failure of any duration does not necessitate reprogramming the ASC. Any version of an ASC using RAM memory shall be provided with a battery and battery charger capable of holding all programs in memory during a power failure of seventy-two (72) hours duration. Install a label on each VAV box placed near the ASC that lists the design minimum and maximum airflows.

E. All control outputs for air handling unit control valves and mixing dampers shall be analog type O-10VDC or 4-20mA.

1.8 DDC FIELD DEVICES:

A. Provide the following instrumentation as required by the monitoring, control and optimization functions:

1. Temperature Sensors:

a. Liquid immersion temperature RTD: Temperature monitoring range 0/200 F, minimum, Output signal- Changing resistance, Factory calibration point+70 F @ 1000 Ù, Accuracy at calibration point 0.34 F.

b. Space/Duct temperature RTD: Temperature monitoring range 0/150 F minimum, Output signal - Changing resistance, Factory calibration point 70 F (21 C), Accuracy at calibration point±0.34 F. Duct sensors located in the mixed air and coil discharge sections shall be the averaging type with a minimum 5'-0" length.

c. Outside air temperature RTD: Temperature monitoring range-20/+120 minimum, Factory calibration point 70 F @ 1000 Ù, Accuracy at calibration point 0.34 degrees F,

2. Space Temperature Sensor/Controller: Each temperature sensor/controller shall be capable of adjusting the temperature ± 3 deg F from the programmed set points during occupied periods. The controller shall be capable of providing temporary override during normally unoccupied periods.
3. Differential Pressure Switch: Unit for fluid flow proof, Minimum differential pressure 0 psi, Maximum differential pressure 50 psi, Maximum pressure 325 psi.
4. Relays: Control relays shall be dust tight with minimum DPDT contacts and shall be rated for 125% of anticipated load. Relays shall consist of relay and separable FMS with screw terminals. Relays shall be UL listed for the application.
5. Current Sensing Relays: Current sensing relays shall be fully solid state and shall feature adjustable trip point, power LED and trip LED. Units shall be UL listed. Utilize current sensing relays for all FMS fan and pump status indication.
6. Pressure Transducers: Furnish and install pressure and differential pressure transducers as shown on the plans. Each unit shall be furnished with a lever operated gauge cocks and shall have snubbers installed between the gauge cocks and the transducer to eliminate pulsations. The range on the pressure transducers shall be 0-150 psig with a maximum pressure of 250 psig. The

range on the differential pressure transducers shall be 0-25 dpsig with a maximum operating pressure of 250 psig. Transducers shall have a minimum accuracy of 1% of the operating range.

a. Transducers installed outdoors shall be encased in NEMA 3R enclosures. Transducers and static piping installed outdoors shall be charged with non-toxic antifreeze.
b. Acceptable Manufacturers: Triad Technologies, Veris Industries, Foxboro.

7. Air Flow Measuring Station: Air flow stations shall utilize thermal based air measurement. The sensor accuracy shall read airflow rates within ±2% of reading with ±2% repeatability and temperature within ±0.15 deg F. Ebtron Gold series or approved equal.

1.9 TEMPERATURE CONTROL EQUIPMENT:

A. Control Dampers

1. Automatic control and smoke dampers shall be of sizes as indicated on Plans. Damper frames shall not be less than 13 gauge galvanized steel formed for extra strength with mounting holes for flange and enclosed duct mounting.

2. All damper blades shall not be less than 16 gauge galvanized steel roll formed for high velocity performance. Blades on all dampers shall be 6" wide or less. Blade bearings shall be nylon standard with ½" zinc plated steel shafts. All blade linkage hardware shall be of corrosion-resistant finish and readily accessible for maintenance after installation.

3. Neoprene reinforced blade edge seals and spring loaded stainless steel side seals shall be provided to insure leakage of not more than 1% at 1500 fpm approach velocity at 4" static closing to torque. Dampers and seals shall be suitable for temperature ranges of -40 to 200 degrees F.

4. Dampers shall be minimum leakage type for all applications. Temperature control contractor shall submit leakage and flow characteristics for all control dampers. Dampers shall be rated for dynamic conditions.

B. Damper Actuators

1. Units shall be electronic and shall be smooth and quiet in operation. If specified in the sequence of operation in the event of power failure, actuators shall be provided with spring return so that they will "fail safe" in either normally open or normally closed position. Size all actuators to operate control items to which they are connected with 20% spare capacity. Actuators shall be housed in NEMA 3R enclosures and shall be listed under UL 916 and UL 873. Actuators mounted outdoors shall have a NEMA 4X enclosure.

C. Low Limit Thermostats

1. Low limit thermostats shall be automatic reset type with bellows actuated switch. The sensing element shall have a minimum length of 20 feet and shall be such that if any point on the element senses the set point it will react.

D. High Limit Thermostats (Firestats)

1. Safety high limit thermostats shall be furnished and installed where shown. High limits shall be interlocked to stop fan when temperature in excess of 125°F is sensed.

E. Networked Thermostat/Humidistat

1. The Networked Thermostat shall be capable of controlling a two pipe fan coil, cabinet unit heater or other similar equipment with single-speed or modulating-speed fan control.
2. The TEC shall communicate over the Field Controller Bus using BACnet Standard MS/TP Bus Protocol ASHRAE SSPC-135, Clause 9.
3. The TEC shall be BACnet Testing Labs (BTL) certified and carry the BTL Label.
4. The Networked Thermostat shall communicate over the FC Bus using BACnet Standard protocol SSPC-135, Clause 9.
5. The Networked Thermostat shall be capable of remote read/write and parameter adjustment from the web based User Interface (UI) through an NAE.
6. The Networked Thermostat shall include an intuitive UI providing plain text messages.
7. The Networked Thermostat shall employ nonvolatile electrically erasable programmable read-only memory (EEPROM) for all adjustable parameters.

1.10 SEQUENCES OF OPERATION AND POINTS LIST:

A. This summary is provided to establish a minimum guide for FMS configuration. The FMS subcontractor shall be required to provide and install any additional points required to meet the FMS system and Sequences of Operation specified herein. The contractor shall provide all supplemental control devices and sequences recommended by the manufacturer for all equipment controlled by the FMS.

B. The sequences of operation and points list shall be provided according to the following unless noted otherwise. Refer to drawings for counts of items listed as “Varies.”

C. The listed sequences of operation are for comfort control only and do not list required safety controls. All required safety controls, including but not limited to, smoke detectors, firestats, smoke dampers and fire alarm interlock shall be installed in accordance to NFPA 96 and applicable codes. Manual or automatic cycling off of any electrical heating device shall disconnect all legs.

D. Refer to the equipment specifications including, but not limited to, chillers, boilers, air handling units, vfd’s and fire alarm for required integration to factory mounted panels. Where integrated controls are specified, the contractor is solely responsible for

providing all FMS integration panels and programming required to communicate with factory mounted integrators provided by others.

E. System Control Summary - Single Zone, DX split, electric heat.

1. Description: Constant Volume, DX cooling, Electric reheat.

2. AHU Control: All of the typical sensors are required including start/stop, status, temporary override, space temp, space relative humidity and discharge air temp. The fan shall run continuously when unit is enabled via temperature sensor in space providing an adjustable offset temperature control. Controls shall be configured such that separate cooling and heating setpoints can be programmed. Provide factory recommended dead bands, proportional bands, and integration time and adjust to suit application. Upon calling for cooling the unit shall enable the staged cooling to maintain space setpoint (adjustable). Upon calling for heating unit air handler and electric heating coil will energize to maintain thermostat setpoint (adjustable). During unoccupied periods the unit shall control unoccupied heating and cooling set points, which shall be independent of one another. Provide local override capability which returns the unit to occupied mode for a period of 2 hours (adjustable). Unit shall be automatically enabled if space temperature falls below 45 deg F (adjustable) to provide freeze protection.

3. Point List:

Qty.	Description	Type	Field Device
1	Start/Stop	BO	Relay
1	Status	BI	Current Sensing Relay
1/stage	Cooling stage	BO/AO	Relay or Direct Analog
1/stage	Heating stage	BO/AO	Relay or Direct Analog
1	Supply Air Temp	AI	RTD Sensor
1	Space Temp	AI	RTD Sensor/Thermostat
1	Space RH	AI	RH Sensor

Note: Coordinate binary versus analog output to equipment staging with equipment manufacturer.

F. System Control Summary - Electric Heaters

1. Description: Electric Heat

2. Electric Unit Heater Control: All of the typical sensors are required including start/stop, status, temporary override, space temperature. The fan and electric strip heat will energize when unit is enabled based on adjustable setpoint. Unit shall be automatically enabled if space temperature falls below 35 deg F (adjustable) to provide freeze protection and shall remain operable in unoccupied mode until the space temperature reaches 10 deg F above the freeze protection set point. A single space temperature sensor is acceptable for multiple heaters where serving a common space. Provide single outside air temperature lockout (adjustable) to disable all electric heaters.

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3. Point List:

Quantity	Description	Type	Field Device
1	Start/Stop	BO	Relay
1	Status	BI	Current Sensing Relay
1	Space Temp	AI	RTD Sensor
1	OA Temp	AI	RTD Sensor

G. System Control Summary - 100% Outside Air Unit

1. Description: packaged rooftop unit with d/x cooling and electric reheat.
2. Control: EMS control shall be limited to start/stop control, and discharge air sensors and alarm. All equipment control shall be provided by factory mounted controls as specified with the equipment and interfaced to the DDC system via a Lon communication card. The DDC system shall map available points selected by engineer for monitoring via DDC. Provide a discharge condition alarm at operator workstation if temperature or humidity fall outside of acceptable range. Acceptable range is defined as within 5 deg F of temperature control set point range and lower than 65% RH.

3. Point List:

Quantity	Description	Type	Field Device
1	Start/Stop	BO	Relay
1	Alarm	BI	Current Sensing Relay
1	Discharge Air Temp.	AI	RTD Sensor
1	Discharge RH	AI	RH Sensor
1	Alarm	BO	Relan

H. System Control Summary – Rooftop Air Unit

1. Description: packaged 100% outside air unit with d/x cooling, modulating hot gas reheat on all cooling stages to achieve full humidity control, and electric reheat. RTU is equipped with ERV and exhaust fan.
2. RTU Control: All of the typical sensors are required including start/stop, status, temporary override, space temp, space relative humidity and discharge air temp. The fan shall run continuously when unit is enabled via temperature sensor in space providing an adjustable offset temperature control. Controls shall be configured such that separate cooling and heating setpoints can be programmed. Provide factory recommended dead bands, proportional bands, and integration time and adjust to suit application. Upon calling for cooling the unit shall enable

the staged cooling to maintain space setpoint (adjustable). Upon calling for heating unit air handler and electric heating coil will energize to maintain thermostat setpoint (adjustable). During unoccupied periods the unit shall control unoccupied heating and cooling set points, which shall be independent of one another. Provide local override capability which returns the unit to occupied mode for a period of 2 hours (adjustable). Unit shall be automatically enabled if space temperature falls below 45 deg F (adjustable) to provide freeze protection.

3. Point List:

Quantity	Description	Type	Field Device
1	Start/Stop	BO	Relay
1	Status	BI	Current Sensing Relay
1/stage	Cooling stage	BO/AO	Relay or Direct Analog
1/stage	Heating stage	BO/AO	Relay or Direct Analog
1	Supply Air Temp	AI	RTD Sensor
1	Space Temp	AI	RTD Sensor/Thermostat
1	Space RH	AI	RH Sensor

PART 3 - EXECUTION

A. Electrical work shall include furnishing and installing conduit and wire, mounting electric/electronic system components, and final connections at pneumatic-electric control system components, contactors, motor starters and numbered terminals on packaged air conditioning units, and electric heating coils. Connection to the control power circuits shall be work of this division.

B. The controls contractor is responsible for control voltage wiring between fire alarm devices and HVAC equipment.

C. The wiring of the temperature controls and interlocks shall be in strict accordance with all governing codes and with the requirements of Division 16. All control wiring exposed in equipment rooms, outdoors or located where mechanical damage to the wire could occur shall be run in conduit. Conduit shall be as specified in the electrical section of these Specification. All indication wire shall be No. 18 minimum size and all interlock wire shall be No. 12 minimum size. All wire shall have type THHN insulation. Wiring within the ceiling space shall be plenum rated.

D. Maximum voltage for the temperature control and interlock wiring shall be 120V. All starters shall be supplied with 120V holding coils, integral control transformers, hand-off-automatic switches and two extra auxiliary contacts.

E. The electrical contractor shall provide all power wiring to the starters and from the starters to the motors.

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F. Thermostats or sensors mounted on outside walls shall be mounted on 1" minimum thickness rigid fiberglass (or equal) insulating bases with solar guards. Thermostats or sensors with set point adjustments shall be mounted in compliance with ADA requirements (48” above finished floor).

G. All controllers and devices shall be fully commissioned prior to testing and balancing.

END OF SECTION 15923

SECTION 15990 - TESTING, ADJUSTING & BALANCING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes testing, adjusting, and balancing HVAC systems to produce design objectives, including the following:
   1. Balancing airflow within distribution systems, including submains, branches, and terminals, to indicated quantities according to specified tolerances.
   2. Adjusting total HVAC systems to provide indicated quantities.
   3. Measuring electrical performance of HVAC equipment.
   4. Setting quantitative performance of HVAC equipment.
   5. Verifying that automatic control devices are functioning properly.
   6. Measuring sound and vibration.
   7. Reporting results of activities and procedures specified in this Section.

1.2 DEFINITIONS

A. AABC: Associated Air Balance Council.

B. AMCA: Air Movement and Control Association.

C. NEBB: National Environmental Balancing Bureau.

D. SMACNA: Sheet Metal and Air Conditioning Contractors' National Association.

1.3 SUBMITTALS

A. Strategies and Procedures Plan: Testing, adjusting, and balancing strategies and step-by-step procedures. Include a complete set of report forms intended for use on this Project.

B. Certified Testing, Adjusting, and Balancing Reports: Prepared on approved forms certified by the testing, adjusting, and balancing Agent.

1.4 QUALITY ASSURANCE

A. Agent Qualifications: Engage a testing, adjusting, and balancing agent certified by AABC or NEBB.

B. Certification of Testing, Adjusting, and Balancing Reports: Certify testing, adjusting, and balancing field data reports. This certification includes the following:
   1. Review field data reports to validate accuracy of data and to prepare certified testing, adjusting, and balancing reports.

2. Certify that testing, adjusting, and balancing team complied with approved testing, adjusting, and balancing plan and procedures specified and referenced in this Specification.
3. Testing, Adjusting, and Balancing Reports: Use standard forms from AABC's "National Standards for Testing, Adjusting, and Balancing," or NEBB's "Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems."

C. Instrumentation Type, Quantity, and Accuracy: As described in AABC national standards or NEBB's "Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems," Section II, "Required Instrumentation for NEBB Certification."

D. Instrumentation Calibration: Calibrate instruments at least every six months or more frequently if required by the instrument manufacturer.

1.5 PROJECT CONDITIONS

A. Full Owner Occupancy: The Owner will occupy the site and existing building during the entire testing, adjusting, and balancing period. Cooperate with the Owner during testing, adjusting, and balancing operations to minimize conflicts with the Owner's operations.

B. Partial Owner Occupancy: The Owner may occupy completed areas of the building before Substantial Completion. Cooperate with the Owner during testing, adjusting, and balancing operations to minimize conflicts with the Owner's operations.

1.6 COORDINATION

A. Coordinate efforts of factory-authorized service representatives for systems and equipment, HVAC controls installers, and other mechanics to operate HVAC systems and equipment to support and assist testing, adjusting, and balancing activities.

B. Perform testing, adjusting, and balancing after leakage and pressure tests on air and water distribution systems have been satisfactorily completed.

1.7 WARRANTY

A. National Project Performance Guarantee: Provide a guarantee on AABC'S "National Standards" forms stating that AABC will assist in completing the requirements of the Contract Documents if the testing, adjusting, and balancing Agent fails to comply with the Contract Documents. Guarantee includes the following provisions:

B. Special Guarantee: Provide a guarantee on NEBB forms stating that NEBB will assist in completing the requirements of the Contract Documents if the testing, adjusting, and balancing Agent fails to comply with the Contract Documents. Guarantee includes the following provisions:
1. The certified Agent has tested and balanced systems according to the Contract Documents.

2. Systems are balanced to optimum performance capabilities within design and installation limits.

PART 2 - EXECUTION

2.1 EXAMINATION

A. Examine the Contract Documents to become familiar with project requirements and to discover conditions in systems' designs that may preclude proper testing, adjusting, and balancing of systems and equipment.
   1. Verify that balancing devices, such as test ports, gage cocks, thermometer wells, flow-control devices, balancing valves and fittings, and manual volume dampers, are required by the Contract Documents. Verify that quantities and locations of these balancing devices are accessible and appropriate for effective balancing and for efficient system and equipment operation.

B. Examine approved submittal data of HVAC systems and equipment.

C. Examine Project Record Documents described in Division 1 Section "Project Record Documents."

D. Examine equipment performance data, including fan and pump curves. Relate performance data to Project conditions and requirements, including system effects that can create undesired or unpredicted conditions that cause reduced capacities in all or part of a system. Calculate system effect factors to reduce performance ratings of HVAC equipment when installed under conditions different from those presented when equipment was performance tested at the factory. To calculate system effects for air systems, use tables and charts found in AMCA 201, "Fans and Systems," Sections 7 through 10; or in SMACNA's "HVAC Systems--Duct Design," Sections 5 and 6. Compare this data with design data and installed conditions.

E. Examine system and equipment installations to verify that they are complete and that testing, cleaning, adjusting, and commissioning specified in individual Specification Sections have been performed.

F. Examine system and equipment test reports.

G. Examine HVAC system and equipment installations to verify that indicated balancing devices, such as test ports, gage cocks, thermometer wells, flow-control devices, balancing valves and fittings, and manual volume dampers, are properly installed, and their locations are accessible and appropriate for effective balancing and for efficient system and equipment operation.

H. Examine systems for functional deficiencies that cannot be corrected by adjusting and balancing.

I. Examine air-handling equipment to ensure clean filters have been installed, bearings are greased, belts are aligned and tight, and equipment with functioning controls is ready for operation.

J. Examine strainers for clean screens and proper perforations.

K. Examine heat-transfer coils for correct piping connections and for clean and straight fins.

L. Examine equipment for installation and for properly operating safety interlocks and controls.

M. Examine automatic temperature system components to verify the following:
   1. Dampers and other controlled devices operate by the intended controller.
   2. Dampers are in the position indicated by the controller.
   3. Integrity of dampers for free and full operation and for tightness of fully closed and fully open positions.
   4. Thermostats and humidistats are located to avoid adverse effects of sunlight, drafts, and cold walls.
   5. Sensors are located to sense only intended conditions.
   6. Sequence of operation for control modes is according to the Contract Documents.
   7. Controller set points are set at design values. Observe and record system reactions to changes in conditions. Record default set points if different from design values.
   8. Interlocked systems are operating.
   9. Changeover from heating to cooling mode occurs according to design values.

N. Report deficiencies discovered before and during performance of testing, adjusting, and balancing procedures.

2.2 PREPARATION

A. Prepare a testing, adjusting, and balancing plan that includes strategies and step-by-step procedures.

B. Complete system readiness checks and prepare system readiness reports. Verify the following:
   1. Permanent electrical power wiring is complete.
   2. Automatic temperature-control systems are operational.
   3. Equipment and duct access doors are securely closed.
   4. Balance, smoke, and fire dampers are open.
   5. Ceilings are installed in critical areas where air-pattern adjustments are required and access to balancing devices is provided.
   6. Windows and doors can be closed so design conditions for system operations can be met.

2.3 TESTING AND BALANCING PROCEDURES

A. Perform testing and balancing procedures on each system according to procedures contained in AABC national standards or NEBB's "Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems."

B. Cut insulation, ducts, pipes, and equipment cabinets for installation of test probes to the minimum extent necessary to allow adequate performance of procedures. After testing and balancing, close probe holes and patch insulation with new materials identical to those removed. Restore vapor barrier and finish according to the insulation Specifications for this Project.

C. Mark equipment settings with paint or other suitable, permanent identification material, including damper-control positions, valve indicators, fan-speed-control levers, and similar controls and devices, to show final settings.

D. As a part of the work of this contract, the Contractor shall make any adjustments and/or replacement of the pulleys, belts, and dampers (or the addition of dampers required for correct balance) as recommended by the Air Balance and Testing Agency, at no additional cost to the Owner.
   1. For fan motors 5 HP and above:
      a. At no additional cost to the Owner, install variable pitch pulleys on the fan motors, to facilitate fan speed adjustments, during the balancing period only.
      b. Upon completion of the testing and before final inspection, install fixed drive and driven pulleys and belts of the required size, as determined during the testing period.
   2. For fan motors smaller than 5 HP:
      a. Upon completion of the testing and before final inspection, install variable pitch drive and driven pulleys and belts of the required size, as determined during the testing period.
   3. The pulleys and belts supplied with the fan may or may not be the right size. In no case, reduce the manufacturer required number of belts.
   4. All belt driven fans shall have their speeds adjusted and drives changed where necessary so that the fans deliver design CFM at actual static pressure developed by the installed system.
   5. For fan motors with variable speed drives on constant air flow systems, such as factional horsepower exhaust fans, using the variable speed controller supplied with the fan, adjust the fan speed as required to obtain the design CFM against the actual system static pressure developed by the installed system.
   6. For fans with variable frequency drives (V.F.D.'s), using the V.F.D. adjust the fan speed as required to obtain the maximum design CFM against the actual system static pressure developed by the installed system. If the fan V.F.D. is running at less than 55 hertz, change the fan drive where necessary so that the fan delivers design CFM at the actual static pressure developed by the installed system, with the V.F.D. running at 60 hertz.

2.4 TOLERANCES

A. Set HVAC system airflow and water flow rates within the following tolerances:
   1. Set HVAC system airflow rates within the following tolerances:
   2. Supply and Return Fans: Minus 5 to plus 5 percent.
   3. Exhaust Fans: 0 to minus 5 percent.
   4. Supply and Return Air Outlets and Inlets: Minus 10 to plus 10 percent
   5. Exhaust Air Outlets and Inlets: 0 to minus 10 percent

2.5 REPORTS

A. Status Reports: As Work progresses, prepare reports to describe completed procedures, procedures in progress, and scheduled procedures. Include a list of deficiencies and problems found in systems being tested and balanced. Prepare a separate report for each system and each building floor for systems serving multiple floors.

B. Final Report: Typewritten, or computer printout in letter-quality font, on standard bond paper, bound in three-ring, loose-leaf binder, and tabulated and divided into sections by tested and balanced systems.
   1. Include a certification sheet in front of binder signed and sealed by the certified testing and balancing agent.
   2. Include a list of instruments used for procedures, along with proof of calibration.
   3. Final Report Contents: In addition to certified field report data, include the following:
      a. Fan curves.
      b. Manufacturers' test data.
      c. Field quality-control test reports prepared by system and equipment installers.
      d. Other information relative to equipment performance, but do not include approved Shop Drawings and Product Data.
   4. General Report Data: In addition to form titles and entries, include the following data in the final report, as applicable:
      a. Title page.
      b. Name and address of testing, adjusting, and balancing Agent.
      c. Project name.
      d. Project location.
      e. Architect's name and address.
      f. Engineer's name and address.
      g. Contractor's name and address.
      h. Report date.
      i. Signature of testing, adjusting, and balancing Agent who certifies the report.
      j. Summary of contents, including the following:
         1) Design versus final performance.
         2) Notable characteristics of systems.
         3) Description of system operation sequence if it varies from the Contract Documents.
      k. Nomenclature sheets for each item of equipment.
      l. Data for terminal units, including manufacturer, type size, and fittings.
      m. Notes to explain why certain final data in the body of reports vary from design values.
      n. Test conditions for fans and pump performance forms, including the following:
         1) Settings for outside-, return-, and exhaust-air dampers.
         2) Conditions of filters.
         3) Cooling coil, wet- and dry-bulb conditions.
         4) Fan drive settings, including settings and percentage of maximum pitch diameter.
         5) Settings for supply-air, static-pressure controller.

6) Other system operating conditions that affect performance.

5. System Diagrams: Include schematic layouts of air distribution systems. Present with single-line diagrams and include the following:
   a. Quantities of outside, supply, return, and exhaust airflows.
   b. Duct, outlet, and inlet sizes.
   c. Balancing stations.

END OF SECTION 15990

DIVISION 16

SECTION 16010 - ELECTRICAL GENERAL PROVISIONS

PART 1 - GENERAL

1.1 SCOPE

A. This specification is for electrical and related work particular to Young Women's Christian Association (YWCA) Facility at 601-605 South Jefferson Davis Parkway New Orleans Louisana. Coordinate with other plans and specifications sections.

1.2 RELATED DOCUMENTS

A. The general provisions of the Contract, including Contract Requirements, and other Division 1 Specification sections, apply to this Section. Sections included in DIVISION 16 of the Project Manual are as follows:

SECTION 16010 - ELECTRICAL GENERAL PROVISIONS
SECTION 16051 - ELECTRICAL RELATED WORK
SECTION 16055 - OVERCURRENT PROTECTIVE DEVICE COORDINATION
SECTION 16060 - GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS
SECTION 16075 - IDENTIFICATION FOR ELECTRICAL SYSTEMS
SECTION 16120 - LOW VOLTAGE POWER CONDUCTORS AND CABLES
SECTION 16130 - RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS
SECTION 16140 - WIRING DEVICES
SECTION 16145 - LIGHTING CONTROL DEVICES
SECTION 16410 - ENCLOSED SWITCHES AND CIRCUIT BREAKERS
SECTION 16415 - LOW VOLTAGE TRANSFORMERS
SECTION 16442 - PANELBOARDS
SECTION 16491 - FUSES
SECTION 16511 - INTERIOR LIGHTING
SECTION 16521 - EXTERIOR LIGHTING
SECTION 16571 - RELAY-BASED LIGHTING CONTROLS
SECTION 16721 - DIGITAL, ADDRESSABLE FIRE ALARM SYSTEM

1.3 DESCRIPTION OF WORK

A. This Section specifies several categories of provisions for electrical work, including: (1) Certain adaptive expansions of requirements specified in DIVISION 1, (2) General performance requirements within the electrical systems as a whole, and (3) General work to be performed as electrical work because of its close association.

B. This Project Manual and accompanying Drawings are intended to describe complete workable systems of the various types. Items of materials, work, or equipment not mentioned but normally necessary for the proper execution of this work, shall be provided as if specifically called for, at no additional cost to the Owner.

1.4 SUMMARY OF ELECTRICAL WORK

A. Drawings:

1. Refer to the Electrical Drawings for graphic representations, schedules and notations showing electrical work.
2. The Drawings show approximate locations only of feeders, branch circuits, outlets, etc., except where specific routing or dimensions are indicated. The Architect reserves the right to make reasonable changes in locations indicated before roughing-in without additional cost to the Owner.
3. Because of the small scale of the Drawings, it is not possible to indicate all of the offsets, fittings, and accessories required. The Contractor shall investigate the structural and finish conditions affecting his work and shall arrange such work accordingly, furnishing fittings, bends, junction boxes, pull boxes, access panels, and accessories required to meet such conditions.

B. Project Manual:
1. Refer to the DIVISION 16 Sections for the primary technical Sections of electrical work.
2. General Outline: This section of the Project Manual covers furnishing materials, equipment, constant competent supervision, special tools, test equipment, technicians, and labor necessary for installation of a complete working electrical system, all as indicated on the plans of in this Project Manual.

C. Scope:
1. Under this DIVISION of work, electrical services, distribution, lighting, fire alarm, security rough-ins, and communication rough-ins will be provide for a new 2-story building.
2. The work shall include but not necessarily be limited to the following:
   a. Power distribution systems - feeder & branch circuits, panels, wiring, transformers, devices, etc.
   b. Power wiring and connections of mechanical equipment.
   c. Service systems.
   d. Grounding systems.
   e. Raceway systems.
   f. Lighting systems-fixtures/lamps/auxiliaries wiring/connections/etc.
   g. Emergency lighting systems.
   h. Telephone and data system raceways.
   i. Fire alarm system.
   j. Lighting control systems.
   k. All required sleeves, thimbles, anchors, hangers, bolts, miscellaneous structural steel, cutting, etc., for the complete installation of the electrical systems serving the building.
   l. Temporary electrical services for construction.

1.5 COORDINATION OF ELECTRICAL WORK

A. General: Refer to the DIVISION 1 sections for general coordination requirements applicable to the entire work. It is recognized that the contract documents are diagrammatic in showing certain physical relationships which must be established within the electrical work, and in its interface with other work including utilities and mechanical work, and that such establishment is the exclusive responsibility of the Contractor.

B. Arrange electrical work in a neat, well organized manner with exposed conduit and similar services running parallel with primary lines of the building construction, and with a minimum of 8'-0" overhead clearance or as directed by the Architect.

C. Advise other trades of openings required in their work for the subsequent move-in of large units of electrical work (equipment).

D. Verify final locations for rough-ins with field measurements and with the requirements of the actual equipment to be connected.

E. Verify all dimensions by field measurements.

F. Arrange for chases, slots, and openings in other building components to allow for electrical installations.

G. Coordinate the installation of required supporting devices to be set in poured in place concrete and other structural components, as they are constructed.

H. Sequence, coordinate, and integrate installations of electrical materials and equipment for efficient flow of the work. Give particular attention to large equipment requiring positioning prior to closing-in the building.

I. Coordinate the cutting and patching of building components to accommodate the installation of electrical equipment and materials.

J. Where mounting heights are not detailed or dimensioned, install electrical services and overhead equipment to provide the maximum headroom possible.

K. Install electrical equipment to facilitate maintenance and repair or replacement of equipment components. As much as practical, connect equipment for ease of disconnecting, with minimum of interference with other installations.

L. Coordinate the installation of electrical materials and equipment above ceilings with suspension system, mechanical equipment and systems, and structural components.

M. Coordinate connection of electrical systems with exterior underground utilities and services. Comply with requirements of governing regulations, franchised service companies, and controlling agencies. Provide required connection for each service.

1.6 TEMPORARY ELECTRICITY

A. Furnish and install all necessary temporary power, metering, lighting or wiring that is required to insure quality workmanship everywhere.

B. Furnish and install area distribution boxes with ground fault protection so located that the individual trades may use their own construction-type extension cords to obtain proper power and artificial lighting at all points where required by inspectors and for safety.

1.7 QUALITY ASSURANCE, STANDARDS

A. General: In addition to standards specified in individual work sections, the following standards are imposed, as applicable to the work in each instance:
   1. NFPA 70, National Electrical Code
      a. The electrical installation shall conform to the requirements of the latest edition of the National Electrical Code (NEC-NFPA 70).
   2. NEMA/ANSI/ASTM
      a. Electrical material shall be built and tested in accordance with the applicable standards of the National Electrical Manufacturer's Association (NEMA); the American National Standards Institute (ANSI); and the American Society of Testing and Materials (ASTM).

3. Underwriters' Laboratories (UL)
   a. Electrical materials shall be new and unused and shall be listed, inspected, approved and labeled by Underwriters' Laboratories, Inc., where such labeling service is available.
4. NFPA-101, Life Safety Code
   a. OSHA Code of Federal Regulations (for construction practices)
   b. Applicable state and local codes/ordinances.
5. International Building Code

1.8 ELECTRICAL SUBMITTALS:

A. Refer to the Division 1 Section 01630 for submittal definitions, requirements, and procedures.

B. Submittal of shop drawings, product data, and samples will be accepted only when submitted by the Contractor. Data submitted from subcontractors and material suppliers directly to the Architect will not be processed.

1.9 SUBSTITUTIONS/PRIOR APPROVALS

A. Substitutions/Prior Approvals shall be submitted in accordance with Section 01630 and provisions thereof.

B. Only firms regularly engaged in manufacture of electrical products of types required, whose products have been in satisfactory use in similar service for not less than 3 years, shall be utilized.

C. Any item not specified herein but submitted for approval as a substitute for the specified item shall be accompanied by manufacturer's documentation stating/illustrating the following applicable information in addition to the specific information requested in other sections:
   1. Dimensions/weight.
   2. Electrical ratings-voltage, amperage, short circuit capability, etc.
   3. Construction - gauge of steel/aluminum, paint finish/application method, color, NEMA type, etc.
   4. Warranty.
   5. Local manufacturer's representative or nearest stocking distributor.
   6. Length of time the product has been available to the public.

D. Shop Drawings: Submit complete descriptive and dimensional data on the following materials which Contractor proposes to use:
   1. Panelboards
   2. Lighting Fixtures
   3. Transformers
   4. Poles
   5. Safety Switches
   6. Circuit Breakers
   7. Wiring Devices
   8. Lighting Controls
   9. Conductors
   10. Fire Alarm System

E. Corrections or comments made on shop drawings during the review do not relieve the Contractor from compliance with requirements of the Contract Documents, Plans and Project Manual. Shop Drawings will be checked for general conformance with the design concept of

the project and general compliance with information given in the contract documents. Review of Shop Drawings shall not relieve the Contractor from responsibility for confirming and correlating all quantities and dimensions, coordinating work with that of all other trades, and performing work in a safe and satisfactory manner. Review of shop drawings shall not permit any deviation from Plans and Project Manual. Shop Drawings must be accompanied by signed statement from contractor, stating that he has reviewed the submittal and checked it for compliance.

F. See Section 01330, for number of copies of shop drawings and product data to be submitted.

1.10 DELIVERY, STORAGE AND HANDLING:

A. Deliver products to project properly identified with names, model numbers, types, grades, compliance labels, and similar information needed for distinct identifications, adequately packaged and protected to prevent damage during shipment, storage, and handling.

B. Store equipment and materials at the site, unless off-site storage is authorized in writing. Protect stored equipment and materials from damage.

C. Coordinate deliveries of electrical materials and equipment to minimize construction site congestion.

1.11 RECORD DOCUMENTS:

A. Refer to the Division 1 Section 01781 for requirements.

1.12 OPERATION AND MAINTENANCE DATA:

A. Refer to the Division 1 Section 01782 for procedures and requirements for preparation and submittal of maintenance manuals.

1.13 WARRANTIES:

A. Refer to the Division 1 Section 01770 for procedures and submittal requirements for warranties. Refer to individual equipment Sections for warranty requirements.

1.14 CLEANING

A. Refer to the Division 1 Section 01770 for general requirements for final cleaning.

B. Clean and restore to original finish all equipment prior to final acceptance.

1.15 GUARANTEE:

A. The work installed shall be kept in perfect working order for one year from date of substantial completion Guarantee shall be based upon defective materials and/or workmanship. Furnish free of cost to the Owner materials and labor necessary to comply with this guarantee.

1.16 WIRING FOR EQUIPMENT BY OTHERS:

A. Electrical service for all equipment furnished under this Project manual shall be roughed-in and connected under this Section. It is the responsibility of the Contractor to obtain correct roughing-in dimensions and requirements for this equipment.

B. Under other DIVISIONS, unless otherwise noted, equipment will be furnished such as: motors and magnetic motor starters (except when part of motor control centers). Connection/interconnection of that equipment shall be part of DIVISION 16 and shall comply with other DIVISION 16 Sections.

C. Apparatus required for controls and firestats will be furnished as specified under DIVISION -15 Mechanical Work. Control wiring shall be furnished and installed as work under DIVISION 15 - Mechanical.

1.17 TESTS AND BALANCING

A. The contractor shall conduct operating tests to demonstrate that the electrical systems are installed and will operate properly and in accordance with the requirements of this Project Manual. Tests shall be performed in the presence of the Architect's representative. The Contractor shall furnish instruments and personnel required for such tests.

B. Contractor shall perform tests in the presence of the Architect to show that the power and lighting loads are equally divided among phases of feeders serving each piece of equipment and each panelboard.

C. Any work and materials tested and found varying from the requirements of the Drawings and Project Manual shall be replaced by the Contractor without additional cost to the Owner.

D. This requirement is in addition to specific tests such as high-potential tests, meggar test, phasing tests, generator testing, etc. which may be called for in other sections.

1.18 WORKMANSHIP

A. Install all materials and electrical components of the work in accordance with instructions of manufacturer following the best modern construction practices and conforming with the Contract Documents. Workmanship shall be first class, in both function and appearance, whether finally concealed or exposed and shall be performed by experienced workmen skilled in the type of work. As practicable, the lines of all components of the system shall be perpendicular or parallel. In general, workmanship shall conform to guidelines set forth in N.E.C.A. manuals.

1.19 MOUNTING HEIGHTS:

A. Unless otherwise noted on the Drawings or required by the Architect, the following mounting heights shall apply.

B. Upon approval of the Architect, mounting heights may be adjusted.

C. Heights of Outlets - all heights measured from finish floor to bottom of device.

1.	Wall Switches	44"
2.	Receptacle Outlet	16"
3.	Telephone Outlet	16"
4.	Fire Alarm Station	44"
5.	Fire Alarm Notification Appliance	80"(per ADA Requirements)

6. Wall Mounted PIR Occupancy Sensors 44"

D. Heights of Disconnect Switches, Protective Devices, Controllers, etc.: The mounting height of disconnect switches, circuit breakers, motor controllers, push button stations, and other similar devices and equipment will vary depending upon location and whether individually or group mounted. For convenience and safety operating levers, handles or buttons shall be mounted no more than 78 inches above the finish floor line.

E. Panelboards shall be located so that the highest overcurrent protective device is a maximum of 72" above the floor.

1.20 SAFETY

A. It shall be the Contractor's responsibility to do all things necessary in the pursuit of the installation or testing to provide safe conditions in which to work.

1.21 FIRESTOPPING

A. Firestopping of all openings in fire-rated floors, walls, and ceilings accommodating penetrating items such as cables, bus ducts, wireways, conduits, etc. shall be required as part of DIVISION 16 work. Provide Firestop installation as required to meet ratings equal to the floor or wall being penetrated.

B. Fire stop materials shall be manufactured for that purpose and shall be installed in accordance with the manufacturer's recommendation in order to provide a U.L. listed fire stop at all openings equal to or exceeding the rated floor, wall or ceiling.

C. Plastic sleeves/pipe shall not be used within the building when penetrating a fire-resistant-rated wall, ceiling, partition, or floor.

PART 2 - PRODUCTS

PART 3 - EXECUTION

END OF SECTION 16010

SECTION 16051 - ELECTRICAL RELATED WORK

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specifications sections, apply to work of this section.

1.2 DESCRIPTION OF WORK

A. Extent of electrical related work required by this section is indicated on drawings and/or specified in other Division 16 sections.

B. Types of electrical related work specified in this section include the following:

1. Hangers and supports for electrical equipment and systems.
2. Access to Electrical Work:
    a. Access doors in walls, ceilings, and floors.
    b. Removable cover plates in walls, ceilings, and floors.
3. Excavating, Trenching and Backfill for Electrical Work.
4. Cutting and patching.
5. Painting.
6. Concrete for Electrical Work:
    a. Encasement of electrical work.
    b. Electrical equipment foundations and mounting pads.
    c. Rough grouting in and around electrical work.
    d. Patching concrete which has been cut to accommodate electrical work.
    e. Foundations for light poles.

1.3 PROJECT CONDITIONS

A. Existing Utilities: Locate and protect existing utilities and other underground work in a manner which will ensure that no damage to personnel or property or service interruption will result from excavating and backfilling.

B. Protect property from damage which might result from excavating and backfilling.

C. Protect persons from injury at excavations by barricades, warnings and illumination.

D. Coordinate excavations with weather conditions, to minimize possibility of washouts, settlements and other damages and hazards.

1.4 PERFORMANCE REQUIREMENTS FOR HANGERS AND SUPPORTS

A. Design supports for multiple raceways capable of supporting combined weight of supported systems and its contents.

B. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.

C. Rated Strength: Adequate in tension, shear, and pullout force to resist maximum loads calculated or imposed for this Project, with a minimum structural safety factor of five times the applied force.

PART 2 - PRODUCTS

2.1 SUPPORT, ANCHORAGE, AND ATTACHMENT COMPONENTS

A. Steel Slotted Support Systems: Comply with MFMA-4, factory-fabricated components for field assembly.

1. Metallic Coatings: Hot-dip galvanized after fabrication and applied according to MFMA-4.
2. Painted Coatings: Manufacturer's standard painted coating applied according to MFMA-4.
3. Channel Dimensions: Selected for applicable load criteria.

B. Raceway and Cable Supports: As described in NECA 1 and NECA 101.

C. Conduit and Cable Support Devices: Steel and malleable-iron hangers, clamps, and associated fittings, designed for types and sizes of raceway or cable to be supported.

D. Support for Conductors in Vertical Conduit: Factory-fabricated assembly consisting of threaded body and insulating wedging plug or plugs for non-armored electrical conductors or cables in riser conduits. Plugs shall have number, size, and shape of conductor gripping pieces as required to suit individual conductors or cables supported.

E. Structural Steel for Fabricated Supports and Restraints: ASTM A 36/A 36M, steel plates, shapes, and bars; black and galvanized.

F. Mounting, Anchoring, and Attachment Components: Items for fastening electrical items or their supports to building surfaces include the following:

1. Mechanical-Expansion Anchors: Insert-wedge-type, zinc-coated steel, for use in hardened portland cement concrete with tension, shear, and pullout capacities appropriate for supported loads and building materials in which used.
2. Concrete Inserts: Steel or malleable-iron, slotted support system units similar to MSS Type 18; complying with MFMA-4 or MSS SP-58.
3. Clamps for Attachment to Steel Structural Elements: MSS SP-58, type suitable for attached structural element.
4. Through Bolts: Structural type, hex head, and high strength. Comply with ASTM A 325.
5. Toggle Bolts: All-steel springhead type.
6. Hanger Rods: Threaded steel

2.2 ACCESS TO ELECTRICAL WORK

A. General: Where switches, control devices pull boxes and similar elements of electrical work are located within or behind wall, ceiling or floor construction of finishes, or below grade, provide removable access plates of types and sizes needed for access requirements. Provide manufacturer's complete units with anchorages, fasteners and standard factory-applied finishes. Hinged access doors shall comply with Section 08305.

2.3 EXCAVATING FOR ELECTRICAL WORK

A. Trench Materials:

1. Subbase Material: A graded mixture of gravel, sand, crushed stone or crushed slag.
2. Backfill Material: Soil material suitable for compacting to required densities, and complying with AASHTO Designation M 145. Group A-1, A-2-4, A-2-5, or A-3.
3. Drainage Fill Material: Washed and uniformly graded gravel, crushed stone or crushed slab, with 100% passing a 1-1/2" sieve and not more than 5% passing a No. 4 sieve.

2.4 MATERIALS OF CONCRETE WORK

A. Encasement of conduits, ductbanks, etc. shall utilize 2500 PSI class mix. Red dye shall be mixed with concrete when encasing conduits utilizing conductors with voltage over 150 volts to ground unless the encasement is poured as part of a foundation slab or under a slab. (The dye shall be incorporated as an additive to the mix and shall be utilized for the entire encasement.).

B. Light pole foundations and equipment pads shall utilize 3000 PSI class mix.

PART 3 - EXECUTION

3.1 HANGER AND SUPPORT APPLICATION

A. Comply with NECA 1 and NECA 101 for application of hangers and supports for electrical equipment and systems except if requirements in this Section are stricter.

B. Maximum Support Spacing and Minimum Hanger Rod Size for Raceway: Space supports for EMT and RGS as required by NFPA 70. Minimum rod size shall be 1/4 inch in diameter.

C. Multiple Raceways: Install trapeze-type supports fabricated with steelsupport system, sized so capacity can be increased by at least 25 percent in future without exceeding specified design load limits.

1. Secure raceways to these supports with two-bolt conduit clamps.

3.2 SUPPORT INSTALLATION

A. Comply with NECA 1 and NECA 101 for installation requirements except as specified in this Article.

B. Strength of Support Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static loads within specified loading limits. Minimum static design load used for strength determination shall be weight of supported components plus 200 lb.

C. Mounting and Anchorage of Surface-Mounted Equipment and Components: Anchor and fasten electrical items and their supports to building structural elements by the following methods unless otherwise indicated by code:

1. To New Concrete: Bolt to concrete inserts.

2. To Masonry: Approved toggle-type bolts on hollow masonry units and expansion anchor fasteners on solid masonry units.
3. To Steel: Welded threaded studs complying with AWS D1.1/D1.1M, with lock washers and nuts.
4. To Light Steel: Sheet metal screws.
5. Items Mounted on Hollow Walls and Nonstructural Building Surfaces: Mount cabinets, panelboards, disconnect switches, control enclosures, pull and junction boxes, transformers, and other devices on slotted-channel racks attached to substrate.

D. Drill holes for expansion anchors in concrete at locations and to depths that avoid reinforcing bars.

3.3 EXCAVATION, TRENCHING AND BACKFILLING

A. Perform all excavation of every description and of whatever substances encountered to the depths indicated on the Drawings or as otherwise specified. During excavation, material suitable for backfilling shall be piled in an orderly manner a sufficient distance from the banks of the trench to avoid overloading and to prevent slides or cave-ins. All excavated materials not required or not suitable for backfill shall be removed and wasted or removed from jobsite as indicated on the drawings or as directed by Architect, at no additional cost to Owner.

B. Sheeting and shoring shall be done as necessary for the protection of the work and for the safety of personnel. Provide necessary pumping at all times to maintain a dry working condition in all trenches. Unless otherwise indicated, excavations shall be by open cut except that short sections of a trench may be tunneled if, in the opinion of the Architect, the conduit can be safely and properly installed and backfill can be properly tamped in such tunneled sections.

C. No excavation or trenches shall be cut near or under footings without first consulting Architect.

D. Bottom of trench shall be shaped to give substantially uniform circumferential support to lower third of each pipe. Each pipe shall be laid true to line and grade and in such manner as to form a close concentric joint with adjoining pipe and to prevent sudden offset to flow line. As work progresses, interior of pipe shall be cleared of dirt and superfluous materials of every description.

E. Wherever wet or otherwise unstable soil that is incapable of properly supporting the pipe, as determined by the Architect, is encountered in the bottom of the trench, such soil shall be removed to the depth required and the trench backfilled to the proper grade with coarse sand, fine gravel, or other suitable material, as approved by the Architect.

F. Trenches for utilities shall be of a depth that will provide the following minimum depth of cover from existing grade or from indicated finish grade, whichever is lower, unless otherwise specifically shown:

24-Inch Minimum Cover - Electrical Conduit under 600 volts.

G. Backfill shall be installed in layers 6" deep, adequately wetted (if approved by Architect) and tamped using materials as noted above. The surfaces shall be graded to a reasonable uniformity and the mounting over trenches left in a uniform and neat condition as approved by the Architect.

H. Restore all hard finished surfaces such as roadway, sidewalks, grass, shrubbery, etc., removed for installation of utilities (and not shown on Drawings or specified to be reworked under other sections of the work) to their original condition using the same type as original materials.

I. Carefully plan all work to avoid existing utilities and other interferences. Architect has not attempted to indicate all existing underground utilities. Existing utility lines to be retained that are shown on the Drawings or the locations of which are made known to the Contractor prior to excavation, as well as all utility lines uncovered during excavation operations, shall be protected from damage during excavation and backfilling and, if damaged, shall be repaired by the Contractor at his expense. Prior to doing any excavation with power tools, carefully investigate and locate any existing conduit, pipes, and other lines, so as to avoid them during excavation.

3.4 CUTTING AND PATCHING

A. This Article specifies the cutting and patching of electrical equipment components, and materials to include removal and legal disposal of selected materials, components, and equipment.

B. Do not endanger or damage installed work through procedures and processes of cutting and patching.

C. Arrange for repairs required to restore other work, because of damage caused as a result of electrical installation.

D. No additional compensation will be authorized for cutting and patching work that is necessitated by ill-timed, defective, or non-conforming installations.

E. Perform cutting, fitting, and patching of electrical equipment and materials required to:

1. Uncover work to provide for installation of ill-timed work;
2. Remove and replace defective work not conforming to requirements of the Contract Documents;
3. Install equipment and materials in existing structures;
4. Upon written instructions from the Architect uncover and restore work to provide for Architect's observation of concealed work.

F. Cut, remove and legally dispose of selected electrical equipment, components, and materials as indicated, including, but not limited to removal of electrical items indicated to be removed and items made obsolete by the new work.

G. Protect the structure, furnishings, finishes, and adjacent materials not indicated or scheduled to be removed.

H. Locate, identify, and protect electrical services passing through remodeling or demolition area and serving other areas required to be maintained operational. When service must be interrupted, provide temporary services for the affected areas and notify the Owner prior to changeover.

3.5 CONCRETE BASES

A. Construct concrete bases of dimensions not less than4-inches high and 4 inches larger in both directions than supported unit, and so anchors will be a minimum of 10 bolt diameters from edge of the base.

B. Anchor equipment to concrete base.

1. Place and secure anchorage devices. Use supported equipment manufacturer's setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
2. Install anchor bolts to elevations required for proper attachment to supported equipment.
3. Install anchor bolts according to anchor-bolt manufacturer's written instructions.

3.6 PAINTING

A. Exposed conduits, supports, pull boxes, etc., shall be painted as described under other Divisions of these Specifications. The Contractor shall be responsible for having electrical items painted to the finish called for on the Drawings. Factory painted equipment shall have finish restored to Manufacturer's finish if scratched or damaged before acceptance or use by Owner.

B. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

C. Touchup: Comply with requirements in Division 9 for cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint on miscellaneous metal.

END OF SECTION 16051

SECTION 16055 - OVERCURRENT PROTECTIVE DEVICE COORDINATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes computer-based, fault-current, arc-flash, and overcurrent protective device coordination studies, and the setting of these devices. The work of this section is to be performed by a Louisiana registered professional Electrical Engineer having a minimum of 3 years experience in coordinated power system and arc flash hazard studies. Work of this section also includes gathering of all necessary data for preparation of the studies specified herein.

B. Short Circuit Fault Current Analysis: Perform analysis as specified and verify equipment ratings exceed available fault currents

C. Arc-Flash Hazard Analysis: Perform analysis as specified and provide proper warnings on equipment.

D. Distribution System Coordination Study and Device Settings: Provide study as specified and set protective devices accordingly

1.3 SUBMITTALS

A. Qualification Data: For coordination-study specialist.

B. Other Action Submittals:

1. Coordination-study input data, including completed computer program input data sheets.
2. Coordination-study report.
3. Equipment evaluation report.
4. Setting report.
5. Acr Flash Hazard Report.
6. Arc Flash Hazard Labels.

C. An "as-built" system analysis report shall be submitted concurrently with the closeout documents. This report shall document the system as installed and shall indicate actual device settings.

D. Complete documentation specified herein shall be submitted at the same time as the distribution equipment product data and shop drawings for concurrent approval. Submittal of distribution equipment product data or shop drawings without these reports will be rejected.

E. No time extensions or similar contact modifications will be granted for work arising out of the requirements for these studies. Approval of distribution equipment and protective devices proposed will be based on recommendations of these studies. The Owner shall not be held responsible for any changes to equipment, device ratings, settings, or additional labor for installation of equipment or devices ordered and/or procured prior to approval of these studies.

1.4 QUALITY ASSURANCE

A. Studies shall use computer programs that are distributed nationally and are in wide use. Software algorithms shall comply with requirements of standards and guides specified in this Section. Manual calculations are not acceptable.

B. System Study Engineer Qualifications: A Louisiana licenced professional engineer experienced in the application of computer software used for studies, having performed successful studies of similar magnitude on electrical distribution systems using similar devices.

C. Field Commissioning Technician: A manufacturer trained and authorized service technician, employed by the manufacturer of the equipment to be set, with a minimum of 5 years experience in setting protective devices.

D. Comply with IEEE 399 for general study procedures.

E. Comply with IEEE 242 for short-circuit currents and coordination time intervals.

PART 2 - PRODUCTS

2.1 COMPUTER SOFTWARE DEVELOPERS

A. Available Computer Software Developers: Subject to compliance with requirements, companies offering computer software programs that may be used in the Work include, but are not limited to, the following:

B. Computer Software Developers: Subject to compliance with requirements, provide computer software programs developed by one of the following:

1. CYME International, Inc.
2. EDSA Micro Corporation.
3. Electrical Systems Analysis, Inc.
4. SKM Systems Analysis, Inc.

2.2 COMPUTER SOFTWARE PROGRAM REQUIREMENTS

A. Comply with IEEE 399.

B. Analytical features of fault-current-study computer software program shall include "mandatory," "very desirable," and "desirable" features as listed in IEEE 399, Table 7-4.

C. Computer software program shall be capable of plotting and diagramming time-current-characteristic curves as part of its output. Computer software program shall report device settings and ratings of all overcurrent protective devices.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine Project overcurrent protective device submittals for compliance with electrical distribution system coordination requirements and other conditions affecting performance.

B. Proceed with coordination study only after relevant equipment submittals have been assembled. Overcurrent protective devices not submitted for approval with coordination study may not be used in study.

3.2 STUDY / REPORT REQUIREMENTS

A. Reports shall include a narrative describing the analyses performed; the bases and methods used; and the desired method of coordinated protection of the power system.

B. The reports shall include descriptive and technical data for protective devices proposed. The data shall include manufacturers published data, nameplate data, and definition of the fixed or adjustable features of the existing or new protective devices.

C. The reports shall document utility company data including system voltages, fault MVA, system X/R ratio, and time-current characteristic curves.

D. The reports shall contain fully coordinated composite time-current characteristics curves for each bus in the system, as required to ensure coordinated power system protection between protective devices or equipment.

E. The reports shall include recommended ratings and settings of all protective devices in tabulated form.

F. The reports shall provide the calculation performed for the analyses, including computer analysis programs utilized. The name of the software package, developer, and version number shall be provided.

G. The final as built report documentation shall include an electronic copy of the short circuit computer modeling file.

H. Studies shall address all available power sources that can be connected to the system.

3.3 FAULT-CURRENT STUDY

A. General: Perform a short circuit study to verify equipment ratings and to check the adequacy and correct application of protective devices and system components. Calculate momentary and interrupting duties on the basis of maximum available fault current.

B. Method: The fault current analysis shall be performed in accordance with the methods described in IEEE Std 242, and IEEE Std 399.

C. Assumptions: Assume source impedance as an infinite bus on primary side of utility transformer. For fault contribution from motors, assume that all motors are operating during the maximum demand condition.

D. Provide the following in tabular form:

1. The available fault current at each bus.
2. The momentary and interrupting rating of each protective device.
3. The adequacy of the electrical protective devices to withstand the maximum available fault at the terminals of the equipment.
4. Confirmation that the equipment and each protective device is rated no less than the available fault current.

E. Fault Current Availability: Balanced three-phase fault, bolted line-to-line fault, and line-to-ground fault current values shall be provided at each voltage transformation point and at each power distribution bus. The maximum and minimum values of fault available at each location shall be shown in tabular form on the diagram or in the report.

F. Equipment Evaluation Report: Prepare a report on the adequacy of overcurrent protective devices and conductors by comparing fault-current ratings of these devices with calculated fault-current momentary and interrupting duties. Calculations to verify interrupting ratings of overcurrent protective devices shall comply with the following:

1. Low-Voltage Circuit Breakers: IEEE 1015 and IEEE C37.50.
2. Low-Voltage Fuses: IEEE C37.46.
3. Circuit Breakers: IEEE C37.13.

3.4 ARC-FLASH HAZARD ANALYSIS

A. The System Study Engineer shall analyze the available arc-flash potential and shall provide the appropriate arc flash hazard labels / signs to the Contractor for installation on the equipment. Labels shall be provided for each bus and protecting device.

B. Perform arc flash analysis using the system models of utility source and utility standby generator source and unique settings recommended for each configuration. The arc flash study shall be made in accordance with the latest edition of IEEE Std 1584-2002and referenced in NFPA 70E, 2009.

C. Calculations shall assume maximum available fault current from motors (all motors operating at the time of the fault).

D. Provide software output report listings for each bus, and protecting line side values in tabular form. Report shall include a minimum of the following:

1. Bus ID
2. Bus Voltage.
3. Bolted Fault Current.
4. Arcing Fault Current.
5. Breaker Operating Time.
6. Incident Energy.
7. PPE Category.

3.5 COORDINATION STUDY

A. Perform both preliminary and final as built coordination studies in accordance with ANSI Standards C37.010 and C37. 13 to determine device settings for selective coordination. Selective coordination is considered to be no less than 0.3 sec coordination time interval between devices in series between the source and faulted bus. The study shall address all possible system power sources that can be connected at any single time

B. The study shall demonstrate that the maximum possible degree of selectivity has been obtained between devices specified, consistent with protection of equipment and conductors from damage from overloads and fault conditions. The study shall include a description of the coordination of the protective devices in this project. A written narrative shall be provided describing: which devices may operate in the event of a fault at each bus; the logic used to arrive at device ratings and settings; situations where system coordination is not achievable due

to device limitations (an analysis of any device curves which overlap); coordination between upstream and downstream devices; and device settings. Recommendations to improve or enhance system reliability, and details of where such changes would involve additions or modifications to the contract (addition or reduction) shall be provided. Composite coordination plots shall be provided on log-log graph paper

C. The study shall result in recommended settings of all new, adjustable protective devices

D. Gather and tabulate the following input data to support coordination study:

1. Product Data for overcurrent protective devices. Use equipment designation tags that are consistent with electrical distribution system diagrams, overcurrent protective device submittals, input and output data, and recommended device settings.
2. Impedance of utility service entrance.
3. Electrical distribution system diagram showing the following:

    a. Load current that is the basis for sizing continuous ratings of circuits for cables and equipment.
    b. Circuit-breaker and fuse-current ratings and types.
    c. Transformer kilovolt amperes, primary and secondary voltages, connection type, impedance, and X/R ratios.
    d. Cables. Indicate conduit material, sizes of conductors, conductor insulation, and length.
    e. Motor horsepower and code letter designation according to NEMA MG 1.

4. Data sheets to supplement electrical distribution system diagram, cross-referenced with tag numbers on diagram:

    a. Special load considerations, including starting inrush currents and frequent starting and stopping.
    b. Magnetic inrush current overload capabilities of transformers.
    c. Motor full-load current, locked rotor current, service factor, starting time, type of start, and thermal-damage curve.
    d. Ratings, types, and settings of utility company's overcurrent protective devices.
    e. Special overcurrent protective device settings or types stipulated by utility company.
    f. Time-current-characteristic curves of devices to be coordinated.
    g. Manufacturer, frame size, interrupting rating in amperes rms symmetrical, ampere or current sensor rating, long-time adjustment range, short-time adjustment range, and instantaneous adjustment range for adjustable circuit breakers.
    h. Manufacturer and type, ampere-tap adjustment range, time-delay adjustment range, instantaneous attachment adjustment range, and current transformer ratio for overcurrent relays.
    i. Panelboards, ampacity, and interrupting rating in amperes rms symmetrical.

E. Perform coordination study and prepare a written report using the results of fault-current study and approved computer software program. Comply with IEEE 399.

F. Comply with NFPA 70 for overcurrent protection of circuit elements and devices.

G. Transformer Primary Overcurrent Protective Devices:

1. Device shall not operate in response to the following:

    a. Self-cooled, full-load current or forced-air-cooled, full-load current, whichever is specified for that transformer.

b. Permissible transformer overloads according to IEEE C57.96 if required by unusual loading or emergency conditions.

2. Device shall protect transformer according to IEEE C57.12.00, for fault currents.

H. Conductor Protection: Protect cables against damage from fault currents according to ICEA P-32-382, ICEA P-45-482, and conductor melting curves in IEEE 242. Verify adequacy of phase conductors at maximum three-phase bolted fault currents, equipment grounding conductors, and grounding electrode conductors at maximum ground-fault currents.

I. Coordination-Study Report: Prepare a written report indicating the following results of coordination study:

1. Tabular Format of Settings Selected for Overcurrent Protective Devices:

a. Device tag.
b. Relay-current transformer ratios; and tap, time-dial, and instantaneous-pickup values.
c. Circuit-breaker sensor rating; and long-time, short-time, and instantaneous settings.
d. Fuse-current rating and type.
e. Ground-fault relay-pickup and time-delay settings.

2. Coordination Curves: Prepared to determine settings of overcurrent protective devices to achieve selective coordination. Graphically illustrate that adequate time separation exists between devices. Show the following specific information:

a. Device tag.
b. Voltage and current ratio for curves.
c. Three-phase and single-phase damage points for each transformer.
d. No damage, melting, and clearing curves for fuses.
e. Cable damage curves.
f. Transformer inrush points.
g. Maximum fault-current cutoff point.

3. Completed data sheets for setting of overcurrent protective devices.

3.6 OVERCURRENT PROTECTIVE DEVICE SETTING

A. Manufacturer's Field Service: Engage a factory-authorized service representative, of electrical distribution equipment being set and adjusted, to set overcurrent protective devices within equipment.

D. Testing: Perform the following device setting and prepare reports:

1. After installing overcurrent protective devices and during energizing process of electrical distribution system, perform the following:

a. Verify that overcurrent protective devices meet parameters used in studies.
b. Adjust devices to values listed in study results.

2. Adjust devices according to recommendations in Chapter 7, "Inspection and Test Procedures," and Tables 10.7 and 10.8 in NETA ATS.

END OF SECTION 16055

SECTION 16060- GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes grounding and bonding systems and equipment.

1.3 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

1.4 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Comply with UL 467 for grounding and bonding materials and equipment.

PART 2 - PRODUCTS

2.1 SYSTEM DESCRIPTION

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Comply with UL 467 for grounding and bonding materials and equipment.

2.2 CONDUCTORS

A. Insulated Conductors: Tinned-copper wire or cable insulated for 600 V unless otherwise required by applicable Code or authorities having jurisdiction.

B. Bare Copper Conductors:

1. Solid Conductors: ASTM B 3.
2. Stranded Conductors: ASTM B 8.
3. Tinned Conductors: ASTM B 33.
4. Bonding Cable: 28 kcmil, 14 strands of No. 17 AWG conductor, 1/4 inch in diameter.
5. Bonding Conductor: No. 4 or No. 6 AWG, stranded conductor.

6. Bonding Jumper: Copper tape, braided conductors terminated with copper ferrules; 1-5/8 inches wide and 1/16 inch thick.
7. Tinned Bonding Jumper: Tinned-copper tape, braided conductors terminated with copper ferrules; 1-5/8 inches wide and 1/16 inch thick.

2.3 CONNECTORS

A. Listed and labeled by an NRTL acceptable to authorities having jurisdiction for applications in which used and for specific types, sizes, and combinations of conductors and other items connected.

B. Bolted Connectors for Conductors and Pipes: Copper or copper alloy.

C. Welded Connectors: Exothermic-welding kits of types recommended by kit manufacturer for materials being joined and installation conditions.

D. Bus-Bar Connectors: Mechanical type, cast silicon bronze, solderless compression-type wire terminals, and long-barrel, two-bolt connection to ground bus bar.

2.4 GROUNDING ELECTRODES

A. Ground Rods: Copper-clad steel; 3/4 inch by 10 feet.

PART 3 - EXECUTION

3.1 APPLICATIONS

A. Conductors: Install solid conductor for No. 8AWG and smaller, and stranded conductors for No. 6 AWG and larger unless otherwise indicated.

B. Grounding Bus: Install in electrical equipment rooms, in rooms housing service equipment, and elsewhere as indicated.

C. Conductor Terminations and Connections:

1. Pipe and Equipment Grounding Conductor Terminations: Bolted connectors.
2. Underground Connections: Welded connectors.
3. Connections to Structural Steel: Welded connectors.

3.2 GROUNDING AT THE SERVICE

A. Equipment grounding conductors and grounding electrode conductors shall be connected to the ground bus. Install a main bonding jumper between the neutral and ground buses.

3.3 EQUIPMENT GROUNDING

A. Install insulated equipment grounding conductors with all feeders and branch circuits.

B. Air-Duct Equipment Circuits: Install insulated equipment grounding conductor to duct-mounted electrical devices operating at 120 V and more, including air cleaners, heaters, dampers, humidifiers, and other duct electrical equipment. Bond conductor to each unit and to air duct and connected metallic piping.

C. Water Heater: Install a separate insulated equipment grounding conductor to each electric water heater. Bond conductor to heater units, piping, connected equipment, and components.

D. Poles Supporting Outdoor Lighting Fixtures: Install grounding electrode and a separate insulated equipment grounding conductor in addition to grounding conductor installed with branch-circuit conductors.

3.4 INSTALLATION

A. Grounding Conductors: Route along shortest and straightest paths possible unless otherwise indicated or required by Code. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage.

B. Ground Rods: Drive rods until tops are 2 inches below finished floor or final grade unless otherwise indicated.

1. Interconnect ground rods with grounding electrode conductor below grade and as otherwise indicated. Make connections without exposing steel or damaging coating if any.
2. For grounding electrode system, install at least three rods spaced at least one-rod length from each other and located at least the same distance from other grounding electrodes, and connect to the service grounding electrode conductor.

C. Bonding Straps and Jumpers: Install in locations accessible for inspection and maintenance except where routed through short lengths of conduit.

1. Bonding to Structure: Bond straps directly to basic structure, taking care not to penetrate any adjacent parts.
2. Bonding to Equipment Mounted on Vibration Isolation Hangers and Supports: Install bonding so vibration is not transmitted to rigidly mounted equipment.
3. Use exothermic-welded connectors for outdoor locations; if a disconnect-type connection is required, use a bolted clamp.

D. Grounding and Bonding for Piping:

1. Metal Water Service Pipe: Install insulated copper grounding conductors, in conduit, from building's main service equipment, or grounding bus, to main metal water service entrances to building. Connect grounding conductors to main metal water service pipes; use a bolted clamp connector or bolt a lug-type connector to a pipe flange by using one of the lug bolts of the flange. Where a dielectric main water fitting is installed, connect grounding conductor on street side of fitting. Bond metal grounding conductor conduit or sleeve to conductor at each end.
2. Water Meter Piping: Use braided-type bonding jumpers to electrically bypass water meters. Connect to pipe with a bolted connector.
3. Gas Piping: Bond each aboveground portion of gas piping system downstream from equipment shutoff valve.

E. Bonding Interior Metal Ducts: Bond metal air ducts to equipment grounding conductors of associated fans, blowers, electric heaters, and air cleaners. Install bonding jumper to bond across flexible duct connections to achieve continuity.

3.5 FIELD QUALITY CONTROL

A. Perform tests and inspections.

B. Tests and Inspections:

1. After installing grounding system but before permanent electrical circuits have been energized, test for compliance with requirements.
2. Inspect physical and mechanical condition. Verify tightness of accessible, bolted, electrical connections with a calibrated torque wrench according to manufacturer's written instructions.
3. Test completed grounding system at service disconnect enclosure grounding terminal and at individual ground rods. Make tests at ground rods before any conductors are connected.

    a. Measure ground resistance no fewer than two full days after last trace of precipitation and without soil being moistened by any means other than natural drainage or seepage and without chemical treatment or other artificial means of reducing natural ground resistance.
    b. Perform tests by fall-of-potential method according to IEEE 81.

C. Grounding system will be considered defective if it does not pass tests and inspections.

D. Prepare test and inspection reports.

E. Report measured ground resistances that exceed 5 ohms.

F. Excessive Ground Resistance: If resistance to ground exceeds specified value, notify Architect promptly and include recommendations to reduce ground resistance.

END OF SECTION 16060

SECTION 16075- IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Identification for raceways.
2. Identification of power and control cables.
3. Identification for conductors.
4. Underground-line warning tape.
5. Warning labels and signs.
6. Instruction signs.
7. Equipment identification labels.
8. Miscellaneous identification products.

1.3 QUALITY ASSURANCE

A. Comply with ANSI A13.1 and IEEE C2.

B. Comply with NFPA 70.

C. Comply with 29 CFR 1910.144 and 29 CFR 1910.145.

D. Comply with ANSI Z535.4 for safety signs and labels.

E. Adhesive-attached labeling materials, including label stocks, laminating adhesives, and inks used by label printers, shall comply with UL 969.

1.4 COORDINATION

A. Coordinate identification names, abbreviations, colors, and other features with requirements in other Sections requiring identification applications, Drawings, Shop Drawings, manufacturer's wiring diagrams, and the Operation and Maintenance Manual; and with those required by codes, standards, and 29 CFR 1910.145. Use consistent designations throughout Project.

B. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.

C. Coordinate installation of identifying devices with location of access panels and doors.

D. Install identifying devices before installing acoustical ceilings and similar concealment.

PART 2 - PRODUCTS

2.1 POWER AND CONTROL CABLE IDENTIFICATION MATERIALS

A. Comply with ANSI A13.1 for minimum size of letters for legend and for minimum length of color field for each cable size.

B. Vinyl Labels: Preprinted, flexible label laminated with a clear, weather- and chemical-resistant coating and matching wraparound clear adhesive tape for securing ends of legend label.

C. Self-Adhesive, Self-Laminating Polyester Labels: Preprinted, 3-mil- thick flexible label with acrylic pressure-sensitive adhesive that provides a clear, weather- and chemical-resistant, self-laminating, protective shield over the legend. Labels sized to fit the cable diameter such that the clear shield overlaps the entire printed legend.

2.2 CONDUCTOR IDENTIFICATION MATERIALS

A. Color-Coding Conductor Tape: Colored, self-adhesive vinyl tape not less than 3 mils thick by 1 to 2 inches wide.

2.3 UNDERGROUND-LINE WARNING TAPE

A. Tape:

1. Recommended by manufacturer for the method of installation and suitable to identify and locate underground electrical and communications utility lines.
2. Printing on tape shall be permanent and shall not be damaged by burial operations.
3. Tape material and ink shall be chemically inert, and not subject to degrading when exposed to acids, alkalis, and other destructive substances commonly found in soils.

B. Color and Printing:

1. Comply with ANSI Z535.1 through ANSI Z535.5.
2. Inscriptions for Red-Colored Tapes: ELECTRIC LINE, HIGH VOLTAGE .
3. Inscriptions for Orange-Colored Tapes: TELEPHONE CABLE, CATV CABLE, COMMUNICATIONS CABLE, OPTICAL FIBER CABLE.

2.4 WARNING LABELS AND SIGNS

A. Comply with NFPA 70 and 29 CFR 1910.145.

B. Self-Adhesive Warning Labels: Factory-printed, multicolor, pressure-sensitive adhesive labels, configured for display on front cover, door, or other access to equipment unless otherwise indicated.

2.5 INSTRUCTION SIGNS

A. Engraved, laminated acrylic or melamine plastic, minimum 1/16 inch thick for signs up to 20 sq. inches and 1/8 inch thick for larger sizes.

1. Engraved legend with black letters on white face.
2. Punched or drilled for mechanical fasteners.
3. Framed with mitered acrylic molding and arranged for attachment at applicable equipment.

2.6 EQUIPMENT IDENTIFICATION LABELS

A. Engraved, Laminated Acrylic or Melamine Label: Punched or drilled for screw mounting. White letters on a dark-gray background. Minimum letter height shall be 3/8 inch.

2.7 MISCELLANEOUS IDENTIFICATION PRODUCTS

A. Paint: Comply with requirements in painting Sections for paint materials and application requirements. Select paint system applicable for surface material and location (exterior or interior).

B. Fasteners for Labels and Signs: Self-tapping, stainless-steel screws or stainless-steel machine screws with nuts and flat and lock washers.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Verify identity of each item before installing identification products.

B. Location: Install identification materials and devices at locations for most convenient viewing without interference with operation and maintenance of equipment.

C. Apply identification devices to surfaces that require finish after completing finish work.

D. Self-Adhesive Identification Products: Clean surfaces before application, using materials and methods recommended by manufacturer of identification device.

E. Attach signs and plastic labels that are not self-adhesive type with mechanical fasteners appropriate to the location and substrate.

F. Underground-Line Warning Tape: During backfilling of trenches install continuous underground-line warning tape directly above line at 12 inches below finished grade. Use multiple tapes where width of multiple lines installed in a common trench or concrete envelope exceeds 16 inches overall.

G. Painted Identification: Comply with requirements in painting Sections for surface preparation and paint application.

3.2 IDENTIFICATION SCHEDULE

A. Accessible Raceways and Cables within Buildings: Identify the covers of each junction and pull box of the following systems with self-adhesive vinyl labels with the wiring system legend and system voltage. Also indicated the panelboard and circuit number in each junction box.

B. Power-Circuit Conductor Identification, 600 V or Less: For conductors in pull and junction boxes, use color-coding conductor tape to identify the phase.

1. Color-Coding for Phase and Voltage Level Identification, 600 V or Less: Use colors listed below for ungrounded service feeder and branch-circuit conductors.

a. Colors for 208/120-V Circuits:

1) Phase A: Black.
2) Phase B: Red.
3) Phase C: Blue.

b. Colors for 480/277-V Circuits:

1) Phase A: Brown.
2) Phase B: Orange.
3) Phase C: Yellow.

c. Field-Applied, Color-Coding Conductor Tape: Apply in half-lapped turns for a minimum distance of 6 inches from terminal points and in boxes where splices or taps are made. Apply last two turns of tape with no tension to prevent possible unwinding. Locate bands to avoid obscuring factory cable markings.

C. Locations of Underground Lines: Identify with underground-line warning tape for power, lighting, communication, and control wiring.

D. Warning Labels for Indoor Cabinets, Boxes, and Enclosures for Power and Lighting: Self-adhesive warning labels.

1. Comply with 29 CFR 1910.145.
2. Identify system voltage with black letters on an orange background.
3. Apply to exterior of door, cover, or other access.

E. Operating Instruction Signs: Install instruction signs to facilitate proper operation and maintenance of electrical systems and items to which they connect. Install instruction signs with approved legend where instructions are needed for system or equipment operation.

F. Arc-Flash Labels: Install arc-flash warning labels on all distribution equipment.

G. Equipment Identification Labels: On each unit of equipment, install unique designation label that is consistent with wiring diagrams, schedules, and the Operation and Maintenance Manual. Apply labels to disconnect switches and protection equipment, central or master units, control panels, control stations, terminal cabinets, and racks of each system. Systems include power, lighting, control, communication, signal, monitoring, and alarm systems unless equipment is provided with its own identification.

1. Labeling Instructions:

a. Indoor Equipment: Engraved, laminated acrylic or melamine label. Unless otherwise indicated, provide a single line of text with 1/2-inch- high letters on 1-1/2-inch- high label; where two lines of text are required, use labels 2 inches high.
b. Outdoor Equipment: Engraved, laminated acrylic or melamine label .
c. Elevated Components: Increase sizes of labels and letters to those appropriate for viewing from the floor.

d. Unless provided with self-adhesive means of attachment, fasten labels with appropriate mechanical fasteners that do not change the NEMA or NRTL rating of the enclosure.

2. Equipment to Be Labeled:

a. Panelboards: Typewritten directory of circuits in the location provided by panelboard manufacturer. Panelboard identification shall be engraved, laminated acrylic or melamine label.
b. Enclosures and electrical cabinets.
c. Access doors and panels for concealed electrical items.
d. Transformers: Label that includes tag designation shown on Drawings for the transformer, feeder, and panelboards or equipment supplied by the secondary.
e. Enclosed switches.
f. Enclosed circuit breakers.
g. Enclosed controllers.
h. Variable-speed controllers.
i. Lighting Control Panels

END OF SECTION 16075

SECTION 16120 - LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Building wires and cables rated 600 V and less.
2. Connectors, splices, and terminations rated 600 V and less.

1.3 DEFINITIONS

A. VFC: Variable frequency controller.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.5 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

PART 2 - PRODUCTS

2.1 CONDUCTORS AND CABLES

A. Copper Conductors: Comply with NEMA WC 70/ICEA S-95-658.

B. Conductor Insulation: Comply with NEMA WC 70/ICEA S-95-658 for Type THHN-2-THWN-2.

C. Multi-conductor Cable: Comply with NEMA WC 70/ICEA S-95-658 for metal-clad cable, Type MC with ground wire.

2.2 CONNECTORS AND SPLICES

A. Description: Factory-fabricated connectors and splices of size, ampacity rating, material, type, and class for application and service indicated.

PART 3 - EXECUTION

3.1 CONDUCTOR MATERIAL APPLICATIONS

A. Feeders: Copper. Solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.

B. Branch Circuits: Copper. Solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.

3.2 CONDUCTOR INSULATION AND MULTICONDUCTOR CABLE APPLICATIONS AND WIRING METHODS

A. Service Entrance: Type THHN-2-THWN-2, single conductors in raceway.

B. Exposed Feeders: Type THHN-2-THWN-2, single conductors in raceway.

C. Feeders Concealed in Ceilings, Walls, Partitions, and Crawlspaces: Type THHN-2-THWN-2, single conductors in raceway.

D. Feeders Concealed in Concrete, below Slabs-on-Grade, and Underground: Type THHN-2-THWN-2, single conductors in raceway.

E. Feeders Installed below Raised Flooring: Type THHN-2-THWN-2, single conductors in raceway.

F. Exposed Branch Circuits, Including in Crawlspaces: Type THHN-2-THWN-2, single conductors in raceway.

G. Branch Circuits Concealed in Ceilings, Walls, and Partitions: Metal-clad cable, Type MC.

H. Branch Circuits Concealed in Concrete, below Slabs-on-Grade, and Underground: Type THHN-2-THWN-2, single conductors in raceway.

I. Cord Drops and Portable Appliance Connections: Type SO, hard service cord with stainless-steel, wire-mesh, strain relief device at terminations to suit application.

3.3 INSTALLATION OF CONDUCTORS AND CABLES

A. Conceal cables in finished walls, ceilings, and floors unless otherwise indicated.

B. Complete raceway installation between conductor and cable termination points according to Section 16130 "Raceways and Boxes for Electrical Systems" prior to pulling conductors and cables.

C. Use manufacturer-approved pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.

D. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips, that will not damage cables or raceway.

E. Install exposed cables parallel and perpendicular to surfaces of exposed structural members, and follow surface contours where possible.

F. Support cables according to Section 16051 "Electrical Related Work."

3.4 CONNECTIONS

A. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A.

B. Make splices, terminations, and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings than unspliced conductors.

C. Wiring at Outlets: Install conductor at each outlet, with at least 6 inches of slack.

3.5 IDENTIFICATION

A. Identify and color-code conductors and cables according to Section "Identification for Electrical Systems."

B. Identify each spare conductor at each end with identity number and location of other end of conductor, and identify as spare conductor.

3.6 FIELD QUALITY CONTROL

A. Perform the following tests and inspections:

1. After installing conductors and cables and before electrical circuitry has been energized, test service entrance and feeder conductors for compliance with requirements.
2. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.

B. Test and Inspection Reports: Prepare a written report to record the following:

1. Procedures used.
2. Results that comply with requirements.
3. Results that do not comply with requirements and corrective action taken to achieve compliance with requirements.

C. Cables will be considered defective if they do not pass tests and inspections.

END OF SECTION 16120

SECTION 16130 - RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Metal conduits, tubing, and fittings.
2. Nonmetal conduits, tubing, and fittings.
3. Metal wireways and auxiliary gutters.
4. Boxes, enclosures, and cabinets.

PART 2 - PRODUCTS

2.1 METAL CONDUITS, TUBING, AND FITTINGS

A. Listing and Labeling: Metal conduits, tubing, and fittings shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Rigid, Galvanized Steel Conduit (RGS): Comply with ANSI C80.1 and UL 6.

C. Electric Metallic Tubing (EMT): Comply with ANSI C80.3 and UL 797.

D. Liquidtight, Flexible Metallic Conduit (LFMC): Flexible steel conduit with PVC jacket and complying with UL 360.

E. Fittings for Metal Conduit: Comply with NEMA FB 1 and UL 514B.

1. Fittings for EMT:

a. Material: Steel.
b. Type: Setscrew or compression.

2. Expansion Fittings: PVC or steel to match conduit type, complying with UL 651, rated for environmental conditions where installed, and including flexible external bonding jumper.

F. Joint Compound for RGS: Approved, as defined in NFPA 70, by authorities having jurisdiction for use in conduit assemblies, and compounded for use to lubricate and protect threaded conduit joints from corrosion and to enhance their conductivity.

2.2 NONMETALLIC CONDUITS, TUBING, AND FITTINGS

A. Listing and Labeling: Nonmetallic conduits, tubing, and fittings shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Rigid, Non-metallic Conduit (RNC): Type EPC-40-PVC and Type EPC-80-PVC, complying with NEMA TC 2 and UL 651 unless otherwise indicated.

C. Fittings for RNC: Comply with NEMA TC 3; match to conduit or tubing type and material.

2.3 METAL WIREWAYS AND AUXILIARY GUTTERS

A. Description: Sheet metal, complying with UL 870 and NEMA 250, Type 3R for exterior and Type 12 for interior unless otherwise indicated, and sized according to NFPA 70.

1. Metal wireways installed outdoors shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Fittings and Accessories: Include covers, couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings to match and mate with wireways as required for complete system.

C. Wireway Covers: Screw-cover type unless otherwise indicated.

D. Finish: Manufacturer's standard enamel finish.

2.4 BOXES, ENCLOSURES, AND CABINETS

A. General Requirements for Boxes, Enclosures, and Cabinets: Boxes, enclosures, and cabinets installed in wet locations shall be listed for use in wet locations.

B. Sheet Metal Outlet and Device Boxes: Comply with NEMA OS 1 and UL 514A.

C. Cast-Metal Outlet and Device Boxes: Comply with NEMA FB 1, ferrous alloy, Type FD, with gasketed cover.

D. Luminaire Outlet Boxes: Nonadjustable, designed for attachment of luminaire weighing 50 lb. Outlet boxes designed for attachment of luminaires weighing more than 50 lb shall be listed and marked for the maximum allowable weight.

E. Small Sheet Metal Pull and Junction Boxes: NEMA OS 1.

F. Box extensions used to accommodate new building finishes shall be of same material as recessed box.

G. Device Box Dimensions: 4 inches square by 2-1/8 inches deep.

H. Gangable boxes are allowed.

PART 3 - EXECUTION

3.1 RACEWAY APPLICATION

A. Outdoors: Apply raceway products as specified below unless otherwise indicated:

1. Exposed Conduit: RGS.
2. Concealed Conduit, Aboveground: RGS.
3. Underground Conduit: Concrete-encased RNC, Type EPC-40-PVC and RGS where not encased.
4. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): LFMC .
5. Boxes and Enclosures, Aboveground: NEMA 250, Type 3R .

B. Indoors: Apply raceway products as specified below unless otherwise indicated:

1. Exposed,: RGS.

2. Concealed in Ceilings and Interior Walls and Partitions: EMT.
3. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): LFMC.
4. Damp or Wet Locations: RGS.
5. Boxes and Enclosures: Unless noted otherwise, NEMA 250, Type 1,.

C. Raceway Fittings: Compatible with raceways and suitable for use and location.

1. RGS: Use threaded rigid steel conduit fittings unless otherwise indicated. Comply with NEMA FB 2.10.
2. EMT: Use set-screw or compression, steel fittings. Comply with NEMA FB 2.10.
3. Flexible Conduit: Use only fittings listed for use with flexible conduit. Comply with NEMA FB 2.20.

3.2 INSTALLATION

A. Comply with NECA 1 and NECA 101 for installation requirements except where requirements on Drawings or in this article are stricter. Comply with NFPA 70 limitations for types of raceways allowed in specific occupancies and number of floors.

B. Keep raceways at least 6 inches away from parallel runs of flues and steam or hot-water pipes. Install horizontal raceway runs above water and steam piping.

C. Complete raceway installation before starting conductor installation.

D. Arrange stub-ups so curved portions of bends are not visible above finished slab.

E. Install no more than the equivalent of three 90-degree bends in any conduit run except for control wiring conduits, for which fewer bends are allowed. Support within 12 inches of changes in direction.

F. Conceal conduit within finished walls, ceilings, and floors unless otherwise indicated. Install conduits parallel or perpendicular to building lines.

G. Support conduit within 12 inches of enclosures to which attached.

H. Raceways Embedded in Slabs: Only conduits to recessed floor boxes shall be embedded in slabs.

1. Run conduit larger than 1-inch trade size, parallel or at right angles to main reinforcement. Where at right angles to reinforcement, place conduit close to slab support. Secure raceways to reinforcement at maximum 10-footintervals.
2. Arrange raceways to cross building expansion joints at right angles with expansion fittings.
3. Arrange raceways to keep a minimum 2 inches of concrete cover in all directions.
4. Change from RNC, Type EPC-40-PVC, to RGS before rising above floor.

I. Stub-ups to Above Recessed Ceilings:

1. Use EMT for raceways.
2. Use a conduit bushing or insulated fitting to terminate stub-ups not terminated in hubs or in an enclosure.

J. Threaded Conduit Joints, Exposed to Wet, Damp, Corrosive, or Outdoor Conditions: Apply listed compound to threads of raceway and fittings before making up joints. Follow compound manufacturer's written instructions.

K. Coat field-cut threads on PVC-coated raceway with a corrosion-preventing conductive compound prior to assembly.

L. Raceway Terminations at Locations Subject to Moisture or Vibration: Use insulating bushings to protect conductors including conductors smaller than No. 4 AWG.

M. Terminate threaded conduits into threaded hubs or with locknuts on inside and outside of boxes or cabinets. Install bushings on conduits up to 1-1/4-inch trade size and insulated throat metal bushings on 1-1/2-inch trade size and larger conduits terminated with locknuts. Install insulated throat metal grounding bushings on service conduits.

N. Install raceways square to the enclosure and terminate at enclosures with locknuts. Install locknuts hand tight plus 1/4 turn more.

O. Do not rely on locknuts to penetrate nonconductive coatings on enclosures. Remove coatings in the locknut area prior to assembling conduit to enclosure to assure a continuous ground path.

P. Cut conduit perpendicular to the length. For conduits 2-inch trade size and larger, use roll cutter or a guide to make cut straight and perpendicular to the length.

Q. Install pull wires in empty raceways. Use polypropylene or monofilament plastic line with not less than 200-lb tensile strength. Leave at least 12 inches of slack at each end of pull wire. Cap underground raceways designated as spare above grade alongside raceways in use.

R. Install devices to seal raceway interiors at accessible locations. Locate seals so no fittings or boxes are between the seal and the following changes of environments. Seal the interior of all raceways at the following points:

1. Where conduits pass from warm to cold locations, such as boundaries of refrigerated spaces.
2. Where an underground raceway enters a building or structure.
3. Where otherwise required by NFPA 70.

S. Comply with manufacturer's written instructions for solvent welding RNC and fittings.

T. Expansion-Joint Fittings:

1. Install in each run of aboveground RNC that is located where environmental temperature change may exceed 30 deg F and that has straight-run length that exceeds 25 feet. Install in each run of aboveground RMC and EMT conduit that is located where environmental temperature change may exceed 100 deg F and that has straight-run length that exceeds 100 feet.
2. Install type and quantity of fittings that accommodate temperature change listed for each of the following locations:

    a. Outdoor Locations Not Exposed to Direct Sunlight: 125 deg F temperature change.
    b. Outdoor Locations Exposed to Direct Sunlight: 155 deg F temperature change.
    c. Indoor Spaces Connected with Outdoors without Physical Separation: 125 deg F temperature change.
    d. Attics: 135 deg F temperature change.

3. Install fitting(s) that provide expansion and contraction for at least 0.00041 inch per foot of length of straight run per deg F of temperature change for PVC conduits. Install fitting(s) that provide expansion and contraction for at least 0.000078 inch per foot of length of straight run per deg F of temperature change for metal conduits.
4. Install expansion fittings at all locations where conduits cross building or structure expansion joints.
5. Install each expansion-joint fitting with position, mounting, and piston setting selected according to manufacturer's written instructions for conditions at specific location at time of installation. Install conduit supports to allow for expansion movement.

U. Flexible Conduit Connections: Comply with NEMA RV 3. Use a maximum of 72 inches of LFMC for recessed and semi-recessed luminaires, equipment subject to vibration, noise transmission, or movement; and for transformers and motors.

V. Mount boxes at heights indicated on Drawings. If mounting heights of boxes are not individually indicated, give priority to ADA requirements. Install boxes with height measured to bottom of box unless otherwise indicated.

W. Recessed Boxes in Masonry Walls: Saw-cut opening for box in center of cell of masonry block, and install box flush with surface of wall. Prepare block surfaces to provide a flat surface for a raintight connection between box and cover plate or supported equipment and box.

X. Horizontally separate boxes mounted on opposite sides of walls so they are not in the same vertical channel.

Y. Locate boxes so that cover or plate will not span different building finishes.

Z. Support boxes of three gangs or more from more than one side by spanning two framing members or mounting on brackets specifically designed for the purpose.

AA. Fasten junction and pull boxes to or support from building structure. Do not support boxes by conduits.

3.3 INSTALLATION OF UNDERGROUND CONDUIT

A. Direct-Buried Conduit:

1. Excavate trench bottom to provide firm and uniform support for conduit. Prepare trench bottom as specified in Section "Earth Moving" for pipe less than 6 inches in nominal diameter.
2. Install backfill as specified."
3. After installing conduit, backfill and compact. Start at tie-in point, and work toward end of conduit run, leaving conduit at end of run free to move with expansion and contraction as temperature changes during this process. Firmly hand tamp backfill around conduit to provide maximum supporting strength. After placing controlled backfill to within 12 inches of finished grade, make final conduit connection at end of run and complete backfilling with normal compaction.
4. Install manufactured duct elbows for stub-ups at poles and equipment and at building entrances through floor unless otherwise indicated. Encase elbows for stub-up ducts throughout length of elbow.
5. Install manufactured rigid steel conduit elbows for stub-ups at poles and equipment and at building entrances through floor.

    a. Couple steel conduits to ducts with adapters designed for this purpose, and encase coupling with 3 inches of concrete for a minimum of 12 inches on each side of the coupling.
    b. For stub-ups at equipment mounted on outdoor concrete bases and where conduits penetrate building foundations, extend steel conduit horizontally a minimum of 60 inches from edge of foundation or equipment base. Install insulated grounding bushings on terminations at equipment.
6. Underground Warning Tape: Comply with requirements in Section 16075 "Identification for Electrical Systems."

3.4 SLEEVE AND SLEEVE-SEAL INSTALLATION FOR ELECTRICAL PENETRATIONS

A. Install sleeves and sleeve seals at penetrations of exterior floor and wall assemblies.

3.5 FIRESTOPPING

A. Install firestopping at penetrations of fire-rated floor and wall assemblies. Comply with requirements in Section "Penetration Firestopping."

3.6 PROTECTION

A. Protect coatings, finishes, and cabinets from damage and deterioration.

1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
2. Repair damage to PVC coatings or paint finishes with matching touchup coating recommended by manufacturer.

END OF SECTION 16130

SECTION 16140 - WIRING DEVICES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Receptacles, receptacles with integral GFCI, and associated device plates.
2. Tamper-resistant receptacles.
3. Weather-resistant receptacles.
4. Snap switches and wall-box dimmers.
5. Floor service outlets and poke-through assemblies.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: List of legends and description of materials and process used for premarking wall plates.

1.4 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For wiring devices to include in all manufacturers' packing-label warnings and instruction manuals that include labeling conditions.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers' Names: Shortened versions (shown in parentheses) of the following manufacturers' names are used in other Part 2 articles:

1. Cooper Wiring Devices; Division of Cooper Industries, Inc. (Cooper).
2. Hubbell Incorporated; Wiring Device-Kellems (Hubbell).
3. Leviton Mfg. Company Inc. (Leviton).
4. Pass & Seymour/Legrand (Pass & Seymour).

B. Source Limitations: Obtain each type of wiring device and associated wall plate from single source from single manufacturer.

2.2 GENERAL WIRING-DEVICE REQUIREMENTS

A. Wiring Devices, Components, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Comply with NFPA 70.

2.3 STRAIGHT-BLADE RECEPTACLES

A. Convenience Receptacles, 125 V, 20 A: Comply with NEMA WD 1, NEMA WD 6 Configuration 5-20R, UL 498, and FS W-C-596.

1. Products: Subject to compliance with requirements, provide one of the following:

    a. Cooper; CR5362 (duplex).
    b. Hubbell; HBL5352 (duplex).
    c. Leviton; 5352 (duplex).
    d. Pass & Seymour; 5362 (duplex).

B. Tamper-Resistant Convenience Receptacles, 125 V, 20 A: Comply with NEMA WD 1, NEMA WD 6 Configuration 5-20R, UL 498 Supplement sd, and FS W-C-596.

1. Products: Subject to compliance with requirements, provide one of the following:

    a. Cooper; TR8300.
    b. Hubbell; HBL8300SGA.
    c. Leviton; 8300-SGG.
    d. Pass & Seymour; TR63H.

2.4 GFCI RECEPTACLES

A. General Description:

1. Straight blade, non-feed-through type.
2. Comply with NEMA WD 1, NEMA WD 6, UL 498, UL 943 Class A, and FS W-C-596.
3. Include indicator light that shows when the GFCI has malfunctioned and no longer provides proper GFCI protection.

B. Duplex GFCI Convenience Receptacles, 125 V, 20 A:

1. Products: Subject to compliance with requirements, provide one of the following:

    a. Cooper; VGF20.
    b. Hubbell; GFR5352L.
    c. Pass & Seymour; 2095.
    d. Leviton; 7590.

C. Tamper-Resistant GFCI Convenience Receptacles, 125 V, 20 A:

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

    a. Hubbell; GFTR20.
    b. Pass & Seymour; 2095TR.

D. Duplex GFCI Weather Resistant Receptacles, 125V, 20A:
    1. Products: Subject to compliance with requirements, provide one of the following:
        a. Cooper: WRVGF20.
        b. Pass & Seymour: 2095TRWRW.
        c. Leviton: W7899-W.

2.5 TOGGLE SWITCHES

A. Comply with NEMA WD 1, UL 20, and FS W-S-896.

B. Switches, 120/277 V, 20 A:

1. Products: Subject to compliance with requirements, provide one of the following:

    1) Single Pole:
        a) Cooper; AH1221.
        b) Hubbell; HBL1221.
        c) Leviton; 1221-2.
        d) Pass & Seymour; CSB20AC1.

2.6 WALL-BOX DIMMERS

2.7 WALL-BOX DIMMERS

A. 0-10 V Dimmers:

1. General: Comply with UL 1472 and CSA-C22.2; cULus and UL listed.
2. 0-10V Dimmers: radiant® Part No. RH4FBL3P[TC][W]; preset single pole and 3-way operation; 120 or 277VAC, 60Hz; Rating: 30 mA Sink Current 10A & 120V and 5A @ 277V; constant memory returns lights to previous level after a power failure; adjustable dial allows users to trim the fixture; no derating required in multi-gang applications; white LED locator light; polycarbonate enclosure material;

2.8 WALL PLATES

A. Single and combination types shall match corresponding wiring devices.

1. Plate-Securing Screws: Metal with head color to match plate finish.
2. Material for Finished Spaces: Smooth, high-impact thermoplastic.
3. Material for Unfinished Spaces: Galvanized steel.
4. Kitchens: Stainless Steel.

B. Wet-Location, Weatherproof Cover Plates: NEMA 250, complying with Type 3R, weather-resistant, die-cast aluminum with lockable cover, listed and labeled for wet and damp locations "while in use".

2.9 FLOOR SERVICE FITTINGS

A. Type: Non-metallic, flush-type, dual-service concrete floor box suitable for wiring method used.

B. Conduit Hubs: Two, 1-inch hubs for power, and two, 1.5-inch hubs for communication cables.

C. Compartments: Barrier separates power from communication cabling.

D. Service Plate: Round, die-cast aluminum, with UL514 listed scrub shield; universal for use on carpet or tile floors. Finish per Architect.

E. Sub-Plate: Cast aluminum, type 4x4 with knockouts for (4) 20A, 125-volt receptacles and (4) communication jacks. Opening type for communication jacks to be coordinated with the end user.

F. Power Receptacles: (4) NEMA WD 6 Configuration 5-20R, gray finish, unless otherwise indicated.

G. Accessories:
1. Concrete cover and plugs: Keep concrete out of box during concrete pour.
2. Reducers: Adapt hubs to required conduit size.

2.10 POKE-THROUGH ASSEMBLIES

A. Description: Dual service, factory-fabricated and -wired assembly of below-floor junction box with multi-channeled, through-floor raceway/firestop unit and detachable matching floor service-outlet assembly.

B. Comply with UL 514 scrub water exclusion requirements.

C. Size: Selected to fit nominal 4-inch cored holes in floor and matched to floor thickness.

D. Fire Rating: Unit is listed and labeled for fire rating of floor-ceiling assembly.

E. Closure Plug: Arranged to close unused 4-inch cored openings and reestablish fire rating of floor.

F. Compartments: Barrier separates power from communication cabling.

G. Service Plate: Round, die-cast aluminum, with UL514 listed scrub shield; universal for use on carpet or tile floors. Finish per Architect.

H. Sub-Plate: Cast aluminum, type 4x4 with knockouts for (4) 20A, 125-volt receptacles and (4) communication jacks. Opening type for communication jacks to be coordinated with the end user.

I. Power Receptacles: (4) NEMA WD 6 Configuration 5-20R, gray finish, unless otherwise indicated.

2.11 FINISHES

A. Device Color: As selected by Architect unless otherwise indicated or required by NFPA 70 or device listing.

B. Wall Plate Color: For plastic covers, match device color.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Comply with NECA 1, including mounting heights listed in that standard, unless otherwise indicated.

B. Coordination with Other Trades:

1. Protect installed devices and their boxes. Do not place wall finish materials over device boxes and do not cut holes for boxes with routers that are guided by riding against outside of boxes.
2. Keep outlet boxes free of plaster, drywall joint compound, mortar, cement, concrete, dust, paint, and other material that may contaminate the raceway system, conductors, and cables.
3. Install device boxes in brick or block walls so that the cover plate does not cross a joint unless the joint is troweled flush with the face of the wall.
4. Install wiring devices after all wall preparation, including painting, is complete.

C. Conductors:

1. Do not strip insulation from conductors until right before they are spliced or terminated on devices.
2. Strip insulation evenly around the conductor using tools designed for the purpose. Avoid scoring or nicking of solid wire or cutting strands from stranded wire.
3. The length of free conductors at outlets for devices shall meet provisions of NFPA 70, Article 300, without pigtails.

D. Device Installation:

1. Replace devices that have been in temporary use during construction and that were installed before building finishing operations were complete.
2. Keep each wiring device in its package or otherwise protected until it is time to connect conductors.
3. Do not remove surface protection, such as plastic film and smudge covers, until the last possible moment.
4. Connect devices to branch circuits using pigtails that are not less than 6 inches in length.
5. When there is a choice, use side wiring with binding-head screw terminals. Wrap solid conductor tightly clockwise, two-thirds to three-fourths of the way around terminal screw.
6. Use a torque screwdriver when a torque is recommended or required by manufacturer.
7. When conductors larger than No. 12 AWG are installed on 15- or 20-A circuits, splice No. 12 AWG pigtails for device connections.
8. Tighten unused terminal screws on the device.
9. When mounting into metal boxes, remove the fiber or plastic washers used to hold device-mounting screws in yokes, allowing metal-to-metal contact.

E. Receptacle Orientation:

1. Install ground pin of vertically mounted receptacles up, and on horizontally mounted receptacles to the right.

F. Device Plates: Do not use oversized or extra-deep plates. Repair wall finishes and remount outlet boxes when standard device plates do not fit flush or do not cover rough wall opening.

G. Dimmers:

1. Install dimmers within terms of their listing.
2. Install unshared neutral conductors on line and load side of dimmers according to manufacturers' device listing conditions in the written instructions.

H. Arrangement of Devices: Unless otherwise indicated, mount flush, with long dimension vertical and with grounding terminal of receptacles on top. Group adjacent switches under single, multi-gang wall plates.

I. Adjust locations of floor service outlets to suit arrangement of partitions and furnishings.

J. Set nonmetallic floor boxes level. Trim after installation to fit flush with finished floor surface.

3.2 IDENTIFICATION

A. Comply with Section 16075 "Identification for Electrical Systems."

B. Identify each receptacle with panelboard identification and circuit number. Use hot, stamped, or engraved machine printing with black -filled lettering on face of plate, and durable wire markers or tags inside outlet boxes.

3.3 FIELD QUALITY CONTROL

A. Perform the following tests and inspections:

1. In healthcare facilities, prepare reports that comply with recommendations in NFPA 99.
2. Test Instruments: Use instruments that comply with UL 1436.
3. Test Instrument for Convenience Receptacles: Digital wiring analyzer with digital readout or illuminated digital-display indicators of measurement.

B. Tests for Convenience Receptacles:

1. Line Voltage: Acceptable range is 105 to 132 V.
2. Percent Voltage Drop under 15-A Load: A value of 6 percent or higher is unacceptable.
3. Ground Impedance: Values of up to 2 ohms are acceptable.
4. GFCI Trip: Test for tripping values specified in UL 1436 and UL 943.
5. Using the test plug, verify that the device and its outlet box are securely mounted.
6. Tests shall be diagnostic, indicating damaged conductors, high resistance at the circuit breaker, poor connections, inadequate fault current path, defective devices, or similar problems. Correct circuit conditions, remove malfunctioning units and replace with new ones, and retest as specified above.

C. Wiring device will be considered defective if it does not pass tests and inspections.

D. Prepare test and inspection reports.

END OF SECTION 16140

SECTION 16145 - LIGHTING CONTROL DEVICES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Timer switches.
2. Combination wallbox sensor/switches.
3. Indoor occupancy sensors.
4. Relay power packs for low voltage power and load switching.

B. Related Requirements:

1. Section 16140 "Wiring Devices".

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: Show installation details for occupancy and light-level sensors.

1. Interconnection diagrams showing field-installed wiring.
2. Include diagrams for power, signal, and control wiring.

1.4 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For each type of lighting control device to include in emergency, operation, and maintenance manuals.

PART 2 - PRODUCTS

2.1 TIMER SWITCHES

A. Basis of Design: Wattstopper TS-400. Subject to compliance with requirements, provide product indicated or comparable product.

B. Programmable wall switch with adjustable off-delay timer and features as specified herein.

C. Time switch shall be a completely self-contained control system that replaces a standard toggle switch. It shall have a ground wire and ground strap for safety. Switching mechanism shall be a latching air gap relay. Zero Crossing Circuitry shall be used to increase the relay life, protect from the effects of inrush current, and increase the switch's longevity.

D. Time switch shall be compatible with all electronic ballasts, motor loads, compact fluorescent and inductive loads. Triac and other harmonic generating devices shall not be allowed.

E. Time switch shall operate at universal voltages of 100-300 VAC; 50/60 Hz.

F. Time switch shall have no minimum load requirement and shall be capable of controlling 0 to 800 watt incandescent, fluorescent @ 100/120 VAC, 50/60 Hz; 0 to 1200 watts fluorescent @ 230/277 VAC, 50/60 Hz; 1/6 hp @ 125 VAC.

G. Time scroll feature shall allow manual overriding of the preset time-out period. Selecting time scroll UP shall allow time-out period to scroll up throughout the timer possibilities to the maximum. Time scroll DN (down) shall allow time-out period to scroll down to minimum.

H. Time switch shall have the option for a one second light flash warning at five minutes before the timer runs out and twice when the countdown reaches one minute (when used to control lighting loads). Time switch shall have the option for a beep warning that shall sound every five seconds once the time switch countdown reaches one minute.

I. Time switch shall have manual feature for timer reset where pressing the ON/OFF switch for more than 2 seconds resets the timer to the programmed time-out period.

J. Time switch shall have an electroluminescent backlit Liquid Crystal Display that shows the timer's countdown. Time-out period shall be adjustable in increments of 5 minutes from 5 minutes to 1 hour, and in increments of 15 minutes from 1 hour to 12 hours.

K. Time switch shall be capable of operating as an ON/OFF switch.

2.2 COMBINATION WALLBOX SENSOR/SWITCHES

A. General Requirements for Sensors: Automatic-wall-switch occupancy sensor, suitable for mounting in a single gang switchbox.

1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
2. Operating Ambient Conditions: Dry interior conditions, 32 to 120 deg F.

B. Passive Infrared Wallswitch Sensor:

1. Basis of Design: Wattstopper PW-100 Series. Subject to compliance with requirements, provide product indicated or comparable product.
2. Sensor shall be capable of detecting presence in the control area by detecting changes in the infrared energy. The Passive Infrared (PIR) technology shall utilize a temperature compensated, dual element sensor and a multi-element Fresnel lens. The lens shall be Poly IR4 material to offer superior performance in the infrared wavelengths and filter short wavelength IR, such as those emitted by the sun and other visible light sources. The lens shall have grooves facing in to avoid dust and residue build up which affects IR reception.
3. Sensor shall utilize SmartSet™ technology to optimize automatic time delay to fit occupant usage patterns. The use of SmartSet shall be selectable with a DIP switch.
4. Sensor shall utilize Zero Crossing circuitry to reduce stress on relay and therefore increase sensor life.
5. Sensor shall have no minimum load requirement and shall be capable of switching from 0 to 800 Watt incandescent; 0 to 800 Watt fluorescent or 1/6 hp @ 120 VAC, 50/60Hz; and 0 to 1200 Watt fluorescent @ 230/277 VAC, 50/60Hz.
6. To avoid false on activations and to provide immunity to RFI and EMI, Detection Signature Processing shall be used to examine the frequency, duration, and amplitude of a signal, to respond only to those signals caused by human motion.
7. Sensor shall cover up to 1,000 sq. ft. for walking motion, with a field view of 180 degrees.
8. Sensor shall have a time delay that is adjusted automatically (with the SmartSet setting) and shall have a fixed time delay of 5 to 30 minutes, set by DIP switches.
9. Sensor shall have a service switch to allow end-users to operate the sensor in the unlikely event of a failure, set by a DIP switch.
10. Sensor shall be able to control incandescent, magnetic low voltage, electronic low voltage, and fluorescent loads.
11. Switching mechanism shall be a relay(s). Triac and other harmonic generating devices shall not be allowed. Sensor shall have ground wire and grounded strap for safety.
12. The PIR wall switch sensor shall be a completely self-contained control system that replaces a standard toggle switch.
13. Voltage: Dual voltage, 120 and 277 V; type.

C. Ultrasonic Wallswitch Sensor:

1. Basis of Design: Wattstopper UW-100 Series. Subject to compliance with requirements, provide product indicated or comparable product.
2. Sensor shall be capable of detecting presence in the control area by detecting Doppler shifts in transmitted ultrasound. Ultrasonic sensing shall be volumetric in coverage with a frequency of 40 KHz. It shall utilize Advanced Signal Processing which automatically adjusts the detection threshold dynamically to compensate for constantly changing levels of activity and air flow throughout controlled space.
3. Sensor shall utilize SmartSet™ technology to optimize automatic time delay to fit occupant usage patterns. The use of SmartSet shall be selectable with a DIP switch.
4. Sensor shall utilize Zero Crossing circuitry to reduce stress on relay and therefore increase sensor life.
5. sensor shall have no minimum load requirement and shall be capable of switching from 0 to 800 Watt incandescent; 0 to 800 Watt fluorescent or 1/6 hp @ 120 VAC, 50/60Hz; and 0 to 1200 Watt fluorescent @ 230/277 VAC, 50/60Hz.
6. Sensor shall cover up to 400 sq. ft. for walking motion, and cover 180 degree.
7. Sensor shall have a time delay that is adjusted automatically (with the SmartSet setting) or shall have a fixed time delay of five to 30 minutes, set by DIP switches.
8. Sensor shall have a service switch to allow end-users to operate the sensor in the unlikely event of a failure; set by a trim pot or dip switch.
9. Sensor shall be able to control incandescent, magnetic low voltage, electronic low voltage, and fluorescent loads.

10. Switching mechanism shall be a relay(s). Triac and other harmonic generating devices shall not be allowed. Sensor shall have ground wire and grounded strap for safety.
11. The Ultrasonic wall switch sensor shall be a completely self contained control system that replaces a standard toggle switch.
12. Voltage: Dual voltage, 120 and 277 V; type.

D. Multi-way Dual Technology Wallswitch Sensor:

1. Basis of Design: Wattstopper DW-100 Series. Subject to compliance with requirements, provide product indicated or comparable product.
2. Sensor shall be capable of detecting presence in the control area by detecting Doppler shifts in transmitted ultrasound and passive infrared heat changes. Sensor shall utilize Dual Sensing Verification Principle for coordination between ultrasonic and PIR technologies to reduce likelihood of false operations.
3. For best results, sensor shall feature a trigger mode where the end-user can choose which technology will activate the sensor from off mode (initial), the type of detection that will reset the time delay (maintain), and the type of detection that will cause the sensor to be turned back on immediately after lights turned off due to lack of motion (re-trigger). Selection of technologies for initial, maintain, and re-trigger shall be done with DIP switches. Sensor shall have its trigger mode factory preset to allow for quick installation in most applications. In this default setting, both technologies must occur in order to initially activate lighting systems. Detection by either technology shall maintain lighting on, and detection by either technology shall turn lights back on after lights were turned off for five seconds or less in automatic mode and 30 seconds or less in manual mode.
4. Sensor shall have four occupancy logic options for customized control to meet application needs.
5. Ultrasonic sensing shall be volumetric in coverage with a frequency of 40 KHz. It shall utilize Advanced Signal Processing which automatically adjusts the detection threshold dynamically to compensate for constantly changing levels of activity and air flow throughout controlled space.
6. The PIR technology shall utilize a temperature compensated, dual element sensor and a multi-element Fresnel lens. The lens shall be Poly IR4 material to offer superior performance in the infrared wavelengths and filter short wavelength IR, such as those emitted by the sun and other visible light sources. The lens shall have grooves facing in to avoid dust and residue build up which affects IR reception.
7. Sensor shall utilize SmartSet™ technology to optimize automatic time delay to fit occupant usage patterns. The use of SmartSet shall be selectable with a DIP switch.
8. Sensor shall utilize Zero Crossing circuitry to reduce stress on relay and therefore increase sensor life.
9. Sensor shall have no minimum load requirement and shall be capable of switching from 0 to 800 Watt incandescent; 0 to 800 Watt fluorescent or 1/6 hp @ 120 VAC, 50/60Hz; and 0 to 1200 Watt fluorescent @ 230/277 VAC, 50/60Hz.
10. To avoid false on activations and to provide immunity to RFI and EMI, Detection Signature Analysis shall be used to examine the frequency, duration, and amplitude of a signal, to respond only to those signals caused by human motion.
11. Sensor shall cover up to 1,000 sq. ft. for walking motion, with a field view of 180 degrees.
12. Sensor shall have a time delay that is adjusted automatically (with the SmartSet setting) or shall have a fixed time delay of five to 30 minutes, set by DIP switches.
13. Sensor shall have a service switch to allow end-users to operate the sensor in the unlikely event of a failure; set by a trim pot.
14. Sensor shall be able to control incandescent, magnetic low voltage, electronic low voltage, and fluorescent loads.
15. Switching mechanism shall be a relay(s). Triac and other harmonic generating devices shall not be allowed. Sensor shall have ground wire and grounded strap for safety.
16. The Dual Technology wall switch sensor shall be a completely self contained control system that replaces a standard toggle switch.

17. Voltage: Dual voltage, 120 and 277 V; type.

2.3 INDOOR OCCUPANCY SENSORS AND POWER PACKS

A. General Requirements for Sensors: Wall- or ceiling-mounted, solid-state indoor occupancy sensors with a separate power pack.

1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
2. Operation: Unless otherwise indicated, turn lights on when coverage area is occupied, and turn them off when unoccupied; with a time delay for turning lights off, adjustable over a minimum range of 5 to 30 minutes.
3. Sensor Output: Contacts rated to operate the connected relay, complying with UL 773A. Sensor is powered from the power pack.

B. Power Pack: UL Listed, plenum-rated, RoHS-compliant. Power pack shall be a self-contained power supply and relay module . Power pack shall have primary voltage and frequency inputs of 120/230/277 VAC, 50/60Hz., and shall have dry contacts rated for 20-A ballast load at 120- and 277-V ac, for 13-A tungsten at 120-V ac, and for 1 hp at 120-V ac. Power pack shall provide a 24 VDC, 225 mA output with the relay connected and shall be classified as a Class 2 power source, as defined by NFPA 70. Power pack shall have an LED to indicate status of relay. Power pack shall have over-current protection if the low voltage current drawn exceeds 225 mA. In the event of an over-current, the low voltage +24VDC output shuts down to prevent permanent damage and the LED will blink continuously to indicate a fault condition. Power pack shall utilize zero crossing circuitry to protect from the effects of in-rush current and increase product longevity.

C. Mounting:
1. Sensor: Suitable for mounting in any position on a standard outlet box.
2. Relay: Externally mounted through a 1/2-inch knockout in a standard electrical enclosure.
3. Time-Delay and Sensitivity Adjustments: Recessed and concealed behind hinged door.

D. Indicator: Digital display, to show when motion is detected during testing and normal operation of sensor.

E. Bypass Switch: Override the "on" function in case of sensor failure.

F. Ceiling-mounted, PIR Type:

1. Basis of Design: Wattstopper CI-300 Series. Subject to compliance with requirements, provide product indicated or comparable product.
2. The passive infrared sensor shall be capable of detecting presence in the control area by detecting changes in the infrared energy. Small movements shall be detected such as when a person is writing while seated at a desk within an 8 feet radius of the sensor. To avoid false ON activations and to provide immunity to RFI and EMI, Digital Signature Analysis shall be used to examine the frequency, duration, and amplitude of a signal, to respond only to those signals caused by human motion.
3. Sensors shall utilize SmartSet technology to optimize time delay and sensitivity settings to fit occupants usage patterns. The use of SmartSet shall be selectable with a DIP switch.
4. Sensors shall be mounted to the ceiling with a flat, unobtrusive appearance and provide 360° of coverage.

5. Sensor shall utilize a temperature compensated dual element sensor and a multi-element Fresnel lens. Fresnel lens shall be a Poly IR 4 based material to offer superior performance in the Infrared wavelengths and filter short wavelength infrared, such as those emitted by the sun and other visible light sources. Lens shall have grooves facing in to avoid dust and residue build up which affects IR reception.
6. Sensor shall cover 360°, up to 1200 square feet of walking motion with the Standard Lens and up to 500 square feet of walking motion with the High Density lens when mounted at a ceiling height of 8 feet.

G. Ceiling-mounted, Ultrasonic Type:

1. Basis of Design: Wattstopper UT-300 Series. Subject to compliance with requirements, provide product indicated or comparable product.
2. The occupancy sensors shall be capable of detecting presence in the control area via Doppler shifts in transmitted ultrasound. Ultrasonic sensing shall be volumetric in coverage with a frequency of 40 KHz. It shall utilize Advance Signal Processing, which automatically adjusts the detection threshold dynamically to compensate for constantly changing levels of activity and airflow throughout controlled space.
3. To avoid false on activation and to provide immunity to RFI and EMI, Detection Signature Analysis shall be used to examine the frequency, duration, and amplitude of a signal so as to only respond to those signals caused by human motion.
4. Sensors shall provide 360° of coverage. Sensors shall cover 360° and walking motion up to 2000 square feet.
5. Sensors shall utilize SmartSet™ technology that automatically adjusts time delay settings to fit occupants' usage patterns for optimal energy efficiency. SmartSet feature shall be selectable with a DIP switch. Sensor shall have user-adjustable sensitivity setting.

H. Wall-mounted, PIR Type:

1. Basis of Design: Wattstopper CX-100 Series. Subject to compliance with requirements, provide product indicated or comparable product.
2. The passive infrared sensor shall be capable of detecting presence in the control area by detecting changes in the infrared energy. Small movements shall be detected such as when a person is writing while seated at a desk within 15 feet of the sensor.
3. To avoid false ON activations and to provide high sensitivity to minor motion, Pulse Count Processing and Detection Signature Analysis shall be used to examine the frequency, duration, and amplitude of the signal received by the sensor to respond only to those signals caused by human motion.
4. Sensor shall utilize mixed signal ASIC (application-specific integrated circuit) technology, which combines analog and digital processing into one chip package, to provide immunity to RFI and EMI.
5. Sensor shall utilize a temperature compensated dual element sensor and a multi-element Fresnel lens. Fresnel lens shall be a Poly IR 4 based material (for standard and Long Range lens) to offer superior filtering capability of competing light sources, such as the sun and other visible light sources. The lens shall have grooves facing in to avoid dust and residue build up which affects IR reception. Aisleway lenses shall be a Poly IR 2 based material that offers greater sensitivity to motion and superior detection performance.
6. Sensor shall cover up to 2000 square feet.
7. For accuracy and consistency, sensor shall have a DIP switch controlled, digital time delay adjustable from 15 seconds to 30 minutes.
8. Sensor shall have user-adjustable sensitivity settings.

2.4 CONDUCTORS AND CABLES

A. Power Wiring to Supply Side of Remote-Control Power Sources: Not smaller than No. 12 AWG. Comply with requirements in Section 16120 "Low-Voltage Electrical Power Conductors and Cables."

B. Classes 2 and 3 Control Cable: Multi-conductor cable with stranded-copper conductors not smaller than No. 18 AWG. Comply with requirements in Section 16120 "Low-Voltage Electrical Power Conductors and Cables."

PART 3 - EXECUTION

3.1 SENSOR INSTALLATION

A. Coordinate layout and installation of ceiling-mounted devices with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, smoke detectors, fire-suppression systems, and partition assemblies.

B. Install and aim sensors in locations to achieve not less than 90 percent coverage of areas indicated. Do not exceed coverage limits specified in manufacturer's written instructions.

3.2 WIRING INSTALLATION

A. Wiring Method: Comply with Section 16120 "Low-Voltage Electrical Power Conductors and Cables." Minimum conduit size is 1/2 inch.

B. Wiring within Enclosures: Comply with NECA 1. Separate power-limited and nonpower-limited conductors according to conductor manufacturer's written instructions.

C. Size conductors according to lighting control device manufacturer's written instructions unless otherwise indicated.

D. Splices, Taps, and Terminations: Make connections only on numbered terminal strips in junction, pull, and outlet boxes; terminal cabinets; and equipment enclosures.

3.3 IDENTIFICATION

A. Identify components and power and control wiring according to Section 16075 "Identification for Electrical Systems."

1. Identify controlled circuits in lighting contactors.
2. Identify circuits or luminaires controlled by photoelectric and occupancy sensors at each sensor.

B. Label time switches and contactors with a unique designation.

3.4 FIELD QUALITY CONTROL

A. Perform the following tests and inspections:

1. Operational Test: After installing time switches and sensors, and after electrical circuitry has been energized, start units to confirm proper unit operation.
2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

B. Lighting control devices will be considered defective if they do not pass tests and inspections.

C. Prepare test and inspection reports.

3.5 ADJUSTING

A. Occupancy Adjustments: When requested within 3 months from date of Substantial Completion, provide on-site assistance in adjusting sensors to suit actual occupied conditions. Provide up to two visits to Project during other-than-normal occupancy hours for this purpose.

1. For occupancy and motion sensors, verify operation at outer limits of detector range. Set time delay to suit Owner's operations.
2. For daylighting controls, adjust set points and deadband controls to suit Owner's operations.
3. Align high-bay occupancy sensors using manufacturer's laser aiming tool.

3.6 DEMONSTRATION

A. Coordinate demonstration of products specified in this Section with demonstration requirements for low-voltage, programmable lighting control systems specified in Section 16571 "Relay-Based Lighting Controls."

B. Train Owner's maintenance personnel to adjust, operate, and maintain lighting control devices.

END OF SECTION 16145

SECTION 16410 - ENCLOSED SWITCHES AND CIRCUIT BREAKERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Fusible switches.
2. Enclosed circuit breakers.
3. Enclosures.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of enclosed switch, circuit breaker, accessory, and component indicated. Include dimensioned elevations, sections, weights, and manufacturers' technical data on features, performance, electrical characteristics, ratings, accessories, and finishes.

1. Enclosure types and details for types other than NEMA 250, Type 1.
2. Current and voltage ratings.
3. Short-circuit current ratings (interrupting and withstand, as appropriate).
4. Detail features, characteristics, ratings, and factory settings of individual overcurrent protective devices, accessories, and auxiliary components.
5. Include time-current coordination curves (average melt) for each type and rating of overcurrent protective device; include selectable ranges for each type of overcurrent protective device. Submit on translucent log-log graph paper**.**

B. Shop Drawings: For enclosed switches and circuit breakers. Include plans, elevations, sections, details, and attachments to other work.

1. Wiring Diagrams: For power, signal, and control wiring.

C. Field quality-control reports.

1. Test procedures used.
2. Test results that comply with requirements.
3. Results of failed tests and corrective action taken to achieve test results that comply with requirements.

1.4 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For enclosed switches and circuit breakers to include in emergency, operation, and maintenance manuals. In addition to items specified in Section 017823 "Operation and Maintenance Data," include the following:

1. Manufacturer's written instructions for testing and adjusting enclosed switches and circuit breakers.
2. Time-current coordination curves (average melt) for each type and rating of overcurrent protective device; include selectable ranges for each type of overcurrent protective device. Submit on translucent log-log graph paper**.**

1.5 QUALITY ASSURANCE

A. Source Limitations: Obtain enclosed switches and circuit breakers, overcurrent protective devices, components, and accessories, within same product category, from single source from single manufacturer.

B. Product Selection for Restricted Space: Drawings indicate maximum dimensions for enclosed switches and circuit breakers, including clearances between enclosures, and adjacent surfaces and other items. Comply with indicated maximum dimensions.

C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

D. Comply with NFPA 70.

1.6 PROJECT CONDITIONS

A. Environmental Limitations: Rate equipment for continuous operation under the following conditions unless otherwise indicated:

1. Ambient Temperature: Not less than minus 22 deg F and not exceeding 104 deg F.

1.7 COORDINATION

A. Coordinate layout and installation of switches, circuit breakers, and components with equipment served and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.

PART 2 - PRODUCTS

2.1 FUSIBLE SWITCHES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
2. General Electric Company; GE Consumer & Industrial - Electrical Distribution.
3. Siemens Energy & Automation, Inc.
4. Square D; a brand of Schneider Electric.

B. Type HD, Heavy Duty, Single Throw, 240 or 600-V ac, 1200 A and Smaller: UL 98 and NEMA KS 1, horsepower rated, with clips or bolt pads to accommodate specified fuses, lockable handle with capability to accept three padlocks, and interlocked with cover in closed position.

C. Accessories:

1. Equipment Ground Kit: Internally mounted and labeled for copper and aluminum ground conductors.
2. Neutral Kit: Internally mounted; insulated, capable of being grounded and bonded; labeled for copper and aluminum neutral conductors.
3. Class R Fuse Kit: Provides rejection of other fuse types when Class R fuses are specified.
4. Lugs: Mechanical type, suitable for number, size, and conductor material.
5. Service-Rated Switches: Labeled for use as service equipment.

2.2 MOLDED-CASE CIRCUIT BREAKERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
2. General Electric Company; GE Consumer & Industrial - Electrical Distribution.
3. Siemens Energy & Automation, Inc.
4. Square D; a brand of Schneider Electric.

B. General Requirements: Comply with UL 489, NEMA AB 1, and NEMA AB 3, with interrupting capacity to comply with available fault currents.

C. Thermal-Magnetic Circuit Breakers: Inverse time-current element for low-level overloads and instantaneous magnetic trip element for short circuits. Provide with adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger. Provide with electronic trip units for circuit breaker frame sizes 400A and larger.

D. Adjustable, Instantaneous-Trip Circuit Breakers: Magnetic trip element with front-mounted, field-adjustable trip setting.

E. Electronic Trip Circuit Breakers: Field-replaceable rating plug, rms sensing, with the following field-adjustable settings:

1. Instantaneous trip.
2. Long- and short-time pickup levels.
3. Long- and short-time time adjustments.
4. Ground-fault pickup level, time delay, and I^2t response.

F. Features and Accessories:

1. Standard frame sizes, trip ratings, and number of poles.
2. Lugs: Mechanical type, suitable for number, size, trip ratings, and conductor material.
3. Shunt Trip: Trip coil energized from separate circuit, with coil-clearing contact.
4. Undervoltage Trip: Set to operate at 35 to 75 percent of rated voltage without intentional time delay.

2.3 ENCLOSURES

A. Enclosed Switches and Circuit Breakers: NEMA AB 1, NEMA KS 1, NEMA 250, and UL 50, to comply with environmental conditions at installed location.

1. Indoor, Dry and Clean Locations: NEMA 250, Type 1.
2. Indoor Locations Subject to Dust, Falling Dirt, and Dripping Noncorrosive Liquids: NEMA 250, Type 12.
3. Outdoors: NEMA 250, Type 3R, unless noted otherwise on plans.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine elements and surfaces to receive enclosed switches and circuit breakers for compliance with installation tolerances and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install individual wall-mounted switches and circuit breakers with tops at uniform height unless otherwise indicated.

B. Install fuses in fusible devices.

C. Comply with NECA 1.

3.3 IDENTIFICATION

A. Comply with requirements in Section 16075 "Identification for Electrical Systems."

1. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs.
2. Label each enclosure with engraved metal or laminated-plastic nameplate.

3.4 FIELD QUALITY CONTROL

A. Perform tests and inspections.

B. Acceptance Testing Preparation:

1. Test insulation resistance for each enclosed switch and circuit breaker, component, connecting supply, feeder, and control circuit.
2. Test continuity of each circuit.

C. Tests and Inspections:

1. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
2. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.

D. Enclosed switches and circuit breakers will be considered defective if they do not pass tests and inspections.

3.5 ADJUSTING

A. Adjust moving parts and operable components to function smoothly, and lubricate as recommended by manufacturer.

END OF SECTION 16410

SECTION 16415 - LOW-VOLTAGE TRANSFORMERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following types of dry-type transformers rated 600 V and less, with capacities up to 1000 kVA:

1. Distribution transformers.

1.3 ACTION SUBMITTALS

A. Product Data: Include rated nameplate data, capacities, weights, dimensions, minimum clearances, installed devices and features, and performance for each type and size of transformer indicated.

B. Shop Drawings: Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.

1. Wiring Diagrams: Power, signal, and control wiring.

1.4 INFORMATIONAL SUBMITTALS

A. Source quality-control test reports.

B. Field quality-control test reports.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For transformers to include in emergency, operation, and maintenance manuals.

1.6 QUALITY ASSURANCE

A. Source Limitations: Obtain each transformer type through one source from a single manufacturer.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

C. Comply with IEEE C57.12.91, "Test Code for Dry-Type Distribution and Power Transformers."

1.7 DELIVERY, STORAGE, AND HANDLING

A. Temporary Heating: Apply temporary heat according to manufacturer's written instructions within the enclosure of each ventilated-type unit, throughout periods during which equipment is not energized and when transformer is not in a space that is continuously under normal control of temperature and humidity.

1.8 COORDINATION

A. Coordinate size and location of concrete bases with actual transformer provided. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified with concrete.

B. Coordinate installation of wall-mounting and structure-hanging supports with actual transformer provided.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1.
2. Eaton Electrical Inc.; Cutler-Hammer Products.
3. General Electric Company.
4. Siemens Energy & Automation, Inc.
5. Square D; Schneider Electric.

2.2 GENERAL TRANSFORMER REQUIREMENTS

A. Description: Factory-assembled and -tested, air-cooled units for 60-Hz service.

B. Cores: Grain-oriented, non-aging silicon steel.

C. Coils: Continuous windings without splices except for taps.

1. Internal Coil Connections: Brazed or pressure type.
2. Coil Material: Copper.

2.3 DISTRIBUTION TRANSFORMERS

A. Comply with NEMA ST 20, and list and label as complying with UL 1561.

B. Cores: One leg per phase.

C. Indoor Transformer Enclosure: Ventilated , NEMA 250, Type 2.

1. Core and coil shall be encapsulated within resin compound, sealing out moisture and air.

D. Transformer Enclosure Finish: Comply with NEMA 250.

1. Finish Color: ANSI 49 gray.

E. Taps for Transformers 25 kVA and Larger: Two 2.5 percent taps above and four 2.5 percent taps below normal full capacity.

F. Insulation Class: 220 deg C, UL-component-recognized insulation system with a maximum of 115 deg C rise above 40 deg C ambient temperature.

G. Energy Efficiency for Transformers Rated 15 kVA and Larger:

1. Complying with NEMA TP 1, Class 1 efficiency levels.
2. Tested according to NEMA TP 2.

H. Low-Sound-Level Requirements: Minimum of 3 dBA less than NEMA ST 20 standard sound levels when factory tested according to IEEE C57.12.91.

I. Low-Sound-Level Requirements: Maximum sound levels, when factory tested according to IEEE C57.12.91, as follows:
1. 51 to 150 kVA: 50
2. 151 to 300 kVA: 55

J.

2.4 IDENTIFICATION DEVICES

A. Nameplates: Engraved, laminated-plastic or metal nameplate for each distribution transformer, mounted with corrosion-resistant screws. Nameplates and label products are specified in Section 260553 "Identification for Electrical Systems."

2.5 SOURCE QUALITY CONTROL

A. Test and inspect transformers according to IEEE C57.12.91.

B. Factory Sound-Level Tests: Conduct sound-level tests on equipment for this Project.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions for compliance with enclosure- and ambient-temperature requirements for each transformer.

B. Verify that field measurements are as needed to maintain working clearances required by NFPA 70 and manufacturer's written instructions.

C. Examine walls, floors, roofs, and concrete bases for suitable mounting conditions where transformers will be installed.

D. Verify that ground connections are in place and requirements in Section 16060 "Grounding and Bonding for Electrical Systems" have been met. Maximum ground resistance shall be 5 ohms at location of transformer.

E. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install wall-mounting transformers level and plumb with wall brackets fabricated by transformer manufacturer.

B. Construct concrete bases and anchor floor-mounting transformers according to manufacturer's written instructions and requirements in Section 16051 "Electrical Related Work."

3.3 CONNECTIONS

A. Ground equipment according to Section 16060 "Grounding and Bonding for Electrical Systems."

B. Connect wiring according to Section 16120 "Low-Voltage Electrical Power Conductors and Cables."

3.4 FIELD QUALITY CONTROL

A. Tests and Inspections:

1. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.

B. Remove and replace units that do not pass tests or inspections and retest as specified above.

C. Test Labeling: On completion of satisfactory testing of each unit, attach a dated and signed "Satisfactory Test" label to tested component.

3.5 ADJUSTING

A. Record transformer secondary voltage at each unit for at least 48 hours of typical occupancy period. Adjust transformer taps to provide optimum voltage conditions at secondary terminals. Optimum is defined as not exceeding nameplate voltage plus 10 percent and not being lower than nameplate voltage minus 3 percent at maximum load conditions. Submit recording and tap settings as test results.

B. Output Settings Report: Prepare a written report recording output voltages and tap settings.

3.6 CLEANING

A. Vacuum dirt and debris; do not use compressed air to assist in cleaning.

END OF SECTION 16415

SECTION 16442- PANELBOARDS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Distribution panelboards.
2. Lighting and appliance branch-circuit panelboards.

1.3 DEFINITIONS

A. SVR: Suppressed voltage rating.

B. TVSS: Transient voltage surge suppressor.

C. Inominal: Nominal discharge current.

D. MCOV: Maximum continuous operating voltage.

E. Mode(s), also Modes of Protection: The pair of electrical connections where the VPR applies.

F. MOV: Metal-oxide varistor; an electronic component with a significant non-ohmic current-voltage characteristic.

G. OCPD: Overcurrent protective device.

H. SCCR: Short-circuit current rating.

I. SPD: Surge protective device.

J. VPR: Voltage protection rating.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of panelboard, load center, switching and overcurrent protective device, transient voltage suppression device, accessory, and component indicated. Include dimensions and manufacturers' technical data on features, performance, electrical characteristics, ratings, and finishes.

B. Shop Drawings: For each panelboard, load center, and related equipment.

1. Include dimensioned plans, elevations, sections, and details. Show tabulations of installed devices, equipment features, and ratings.
2. Detail enclosure types and details for types other than NEMA 250, Type 1.
3. Detail bus configuration, current, and voltage ratings.
4. Short-circuit current rating of panelboards and overcurrent protective devices.
5. Include evidence of NRTL listing for series rating of installed devices.
6. Detail features, characteristics, ratings, and factory settings of individual overcurrent protective devices and auxiliary components.
7. Include wiring diagrams for power, signal, and control wiring.
8. Include time-current coordination curves for each type and rating of overcurrent protective device included in panelboards. Submit on translucent log-log graft paper; include selectable ranges for each type of overcurrent protective device.

1.5 INFORMATIONAL SUBMITTALS

A. Field Quality-Control Reports:

1. Test procedures used.
2. Test results that comply with requirements.
3. Results of failed tests and corrective action taken to achieve test results that comply with requirements.

B. Panelboard Schedules: For installation in panelboards. Submit final versions after load balancing.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For panelboards and components to include in emergency, operation, and maintenance manuals. In addition to items specified in Section 017823 "Operation and Maintenance Data," include the following:

1. Manufacturer's written instructions for testing and adjusting overcurrent protective devices.
2. Time-current curves, including selectable ranges for each type of overcurrent protective device that allows adjustments.

1.7 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Keys: Two spares for each type of panelboard cabinet lock.

1.8 QUALITY ASSURANCE

A. Source Limitations: Obtain panelboards, overcurrent protective devices, components, and accessories from single source from single manufacturer.

B. Product Selection for Restricted Space: Drawings indicate maximum dimensions for panelboards including clearances between panelboards and adjacent surfaces and other items. Comply with indicated maximum dimensions.

C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

D. Comply with NEMA PB 1.

E. Comply with NFPA 70.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Handle and prepare panelboards for installation according to NEMA PB 1.

1.10 PROJECT CONDITIONS

A. Environmental Limitations:

1. Do not deliver or install panelboards until spaces are enclosed and weathertight, wet work in spaces is complete and dry, work above panelboards is complete, and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.
2. Rate equipment for continuous operation under the following conditions unless otherwise indicated:

    a. Ambient Temperature: Not exceeding 0 deg F to plus 104 deg F.
    b. Altitude: Not exceeding 6600 feet.

B. Service Conditions: NEMA PB 1, usual service conditions, as follows:

1. Ambient temperatures within limits specified.
2. Altitude not exceeding 6600 feet.

1.11 COORDINATION

A. Coordinate layout and installation of panelboards and components with other construction that penetrates walls or is supported by them, including electrical and other types of equipment, raceways, piping, encumbrances to workspace clearance requirements, and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.

B. Coordinate sizes and locations of concrete bases with actual equipment provided. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified with concrete.

1.12 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace transient voltage suppression devices that fail in materials or workmanship within specified warranty period.

1. Warranty Period: Ten years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS FOR PANELBOARDS

A. Enclosures: Flush- and surface-mounted cabinets.

1. Rated for environmental conditions at installed location.

a. Indoor Dry and Clean Locations: NEMA 250, Type 1 .
b. Outdoor Locations: NEMA 250, Type 3R.
c. Kitchen Areas: Flush, NEMA 250, Type 12, stainless steel.

2. Front: Secured to box with concealed trim clamps. For surface-mounted fronts, match box dimensions; for flush-mounted fronts, overlap box.
3. Hinged Front Cover: Entire front trim hinged to box and with standard door within hinged trim cover.
4. Gutter Extension and Barrier: Same gage and finish as panelboard enclosure; integral with enclosure body. Arrange to isolate individual panel sections.
5. Finishes:

a. Panels and Trim: Unless noted otherwise, phosphatized steel , factory finished immediately after cleaning and pretreating with manufacturer's standard two-coat, baked-on finish consisting of prime coat and thermosetting topcoat.
b. Back Boxes: Unless noted otherwise, galvanized steel .

6. Directory Card: Typewritten, inside panelboard door, mounted in metal frame with transparent protective cover.

B. Incoming Mains Location: Top and bottom.

C. Conductor Connectors: Suitable for use with conductor material and sizes.

1. Material: Hard-drawn copper, 98 percent conductivity.
2. Main and Neutral Lugs: Mechanical type.
3. Ground Lugs and Bus-Configured Terminators: Mechanical type.

D. Future Devices: Mounting brackets, bus connections, filler plates, and necessary appurtenances required for future installation of devices.

E. Panelboard Short-Circuit Current Rating: Fully rated to interrupt symmetrical short-circuit current available at terminals.

2.2 PERFORMANCE REQUIREMENTS

A. Surge Suppression: Factory installed as an integral part of indicated panelboards, complying with UL 1449.

2.3 DISTRIBUTION PANELBOARDS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
2. General Electric Company; GE Consumer & Industrial - Electrical Distribution.
3. Siemens Energy & Automation, Inc.
4. Square D; a brand of Schneider Electric.

B. Panelboards: NEMA PB 1, power and feeder distribution type.

C. Doors: Secured with vault-type latch with tumbler lock; keyed alike.

1. For doors more than 36 inches high, provide two latches, keyed alike.

D. Phase, Neutral, and Ground Buses:

1. Material: Hard-drawn copper, 98 percent conductivity.
2. Equipment Ground Bus: Adequate for feeder and branch-circuit equipment grounding conductors; bonded to box.

E. Mains: Circuit breaker or Lugs only. See Panel Schedules on drawings.

F. Overcurrent Protective Devices: Bolt-on circuit breakers; plug-in circuit breakers where individual positive-locking device requires mechanical release for removal.

2.4 LIGHTING AND APPLIANCE BRANCH-CIRCUIT PANELBOARDS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
2. General Electric Company; GE Consumer & Industrial - Electrical Distribution.
3. Siemens Energy & Automation, Inc.
4. Square D; a brand of Schneider Electric.

B. Panelboards: NEMA PB 1, lighting and appliance branch-circuit type.

C. Phase, Neutral, and Ground Buses:

1. Material: Hard-drawn copper, 98 percent conductivity.
2. Equipment Ground Bus: Adequate for feeder and branch-circuit equipment grounding conductors; bonded to box.

D. Mains: Circuit breaker or lugs only. See Panel Schedules on drawings.

E. Overcurrent Protective Devices: Bolt-on circuit breakers, replaceable without disturbing adjacent units.

F. Doors: Concealed hinges; secured with flush latch with tumbler lock; keyed alike.

2.5 DISCONNECTING AND OVERCURRENT PROTECTIVE DEVICES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Eaton Electrical Inc.; Cutler-Hammer Business Unit.

2. General Electric Company; GE Consumer & Industrial - Electrical Distribution.
3. Siemens Energy & Automation, Inc.
4. Square D; a brand of Schneider Electric.

B. Molded-Case Circuit Breaker (MCCB): Comply with UL 489, with interrupting capacity to meet available fault currents.

1. Thermal-Magnetic Circuit Breakers: Inverse time-current element for low-level overloads, and instantaneous magnetic trip element for short circuits. Provide with adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger. Provide with electronic trip units for circuit breaker frame sizes 400A and larger.
2. Adjustable Instantaneous-Trip Circuit Breakers: Magnetic trip element with front-mounted, field-adjustable trip setting.
3. Electronic trip circuit breakers with rms sensing; field-replaceable rating plug or field-replicable electronic trip; and the following field-adjustable settings:

    a. Instantaneous trip.
    b. Long- and short-time pickup levels.
    c. Long- and short-time time adjustments.

4. Molded-Case Circuit-Breaker (MCCB) Features and Accessories:

    a. Standard frame sizes, trip ratings, and number of poles.
    b. Lugs: Mechanical style, suitable for number, size, trip ratings, and conductor materials.
    c. Application Listing: Appropriate for application; Type SWD for switching fluorescent lighting loads; Type HID for feeding fluorescent and high-intensity discharge (HID) lighting circuits.
    d. Shunt Trip: 120 -V trip coil energized from separate circuit, set to trip at 55 percent of rated voltage.
    e. Auxiliary Contacts: One SPDT switch with "a" and "b" contacts; "a" contacts mimic circuit-breaker contacts and "b" contacts operate in reverse of circuit-breaker contacts.
    f. Multipole units enclosed in a single housing or factory assembled to operate as a single unit. Handle ties are not allowed.
    g. Handle Padlocking Device: Fixed attachment, for locking circuit-breaker handle in off position.

2.6 TRANSIENT VOLTAGE SURGE SUPPRESSORS

A. Manufacturer: Identical to that of the panel manufacturer that the TVSS is installed in.

B. General: Comply with UL 1449.

1. Include LED indicator lights for power and protection status.
2. Internal thermal protection that disconnects the SPD before damaging internal suppressor components.
3. Include Form-C contacts rated at 5 A and 250-V ac, one normally open and one normally closed, for remote monitoring of protection status.

C. Peak Surge Current Rating: The minimum single-pulse surge current withstand rating per phase shall not be less than 100 kA. The peak surge current rating shall be the arithmetic sum of the ratings of the individual MOVs in a given mode.

D. Protection modes and UL 1449 VPR for grounded wye circuits with 480Y/277 V and 208Y/120 V, three-phase, four-wire circuits shall not exceed the following:

1. Line to Neutral: 1200 V for 480Y/277 V; 700 V for 208Y/120 V.
2. Line to Ground: 1200 V for 480Y/277 V; 700 V for 208Y/120 V.
3. Neutral to Ground: 1200 V for 480Y/277 V; 700 V for 208Y/120 V.

E. Line to Line: 2000 V for 480Y/277 V; 1200 V for 208Y/120 V.

F. SCCR: Equal or exceed 100kA.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Receive, inspect, handle, and store panelboards according to NEMA PB 1.1.

B. Examine panelboards before installation. Reject panelboards that are damaged or rusted or have been subjected to water saturation.

C. Examine elements and surfaces to receive panelboards for compliance with installation tolerances and other conditions affecting performance of the Work.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install panelboards and accessories according to NEMA PB 1.1.

B. Temporary Lifting Provisions: Remove temporary lifting eyes, channels, and brackets and temporary blocking of moving parts from panelboards.

C. Mount top of trim 90 inches above finished floor unless otherwise indicated.

D. Mount panelboard cabinet plumb and rigid without distortion of box. Mount recessed panelboards with fronts uniformly flush with wall finish and mating with back box.

E. Install overcurrent protective devices and controllers not already factory installed.

1. Set field-adjustable, circuit-breaker trip ranges.

F. Install filler plates in unused spaces.

G. For flush-mounted panels, stub four 1-inch empty conduits from panelboard into accessible ceiling space or space designated to be ceiling space in the future.

H. Arrange conductors in gutters into groups and bundle and wrap with wire ties after completing load balancing.

I. Comply with NECA 1.

3.3 IDENTIFICATION

A. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs complying with Section 16075 "Identification for Electrical Systems."

B. Create a directory to indicate installed circuit loads after balancing panelboard loads; incorporate Owner's final room designations. Obtain approval before installing. Use a computer or typewriter to create directory; handwritten directories are not acceptable.

C. Panelboard Nameplates: Label each panelboard with a nameplate complying with requirements for identification specified in Section 16075 "Identification for Electrical Systems."

D. Device Nameplates: Label each branch circuit device in distribution panelboards with a nameplate complying with requirements for identification specified in Section 16075 "Identification for Electrical Systems."

3.4 FIELD QUALITY CONTROL

A. Perform tests and inspections.

B. Acceptance Testing Preparation:

1. Test insulation resistance for each panelboard bus, component, connecting supply, feeder, and control circuit.
2. Test continuity of each circuit.

C. Tests and Inspections:

1. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
2. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.

D. Panelboards will be considered defective if they do not pass tests and inspections.

E. Prepare test and inspection reports, including a certified report that identifies panelboards included and that describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

3.5 ADJUSTING

A. Adjust moving parts and operable component to function smoothly, and lubricate as recommended by manufacturer.

B. Set field-adjustable circuit-breaker trip ranges as specified in Section 16055 "Overcurrent Protective Device Coordination ."

3.6 PROTECTION

A. Temporary Heating: Apply temporary heat to maintain temperature according to manufacturer's written instructions.

END OF SECTION 16442

SECTION 16491- FUSES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Cartridge fuses rated 600-V ac and less for use in control circuits, enclosed switches, enclosed controllers and motor-control centers.
2. Spare-fuse cabinets.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated. Include construction details, material, dimensions, descriptions of individual components, and finishes for spare-fuse cabinets. Include the following for each fuse type indicated:

1. Ambient Temperature Adjustment Information: If ratings of fuses have been adjusted to accommodate ambient temperatures, provide list of fuses with adjusted ratings.

a. For each fuse having adjusted ratings, include location of fuse, original fuse rating, local ambient temperature, and adjusted fuse rating.
b. Provide manufacturer's technical data on which ambient temperature adjustment calculations are based.

2. Dimensions and manufacturer's technical data on features, performance, electrical characteristics, and ratings.
3. Current-limitation curves for fuses with current-limiting characteristics.
4. Time-current coordination curves (average melt) and current-limitation curves (instantaneous peak let-through current) for each type and rating of fuse. Submit on translucent log-log graph paper**.**
5. Coordination charts and tables and related data.
6. Fuse sizes for elevator feeders and elevator disconnect switches.

1.4 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For fuses to include in emergency, operation, and maintenance manuals. In addition to items specified in Section 017823 "Operation and Maintenance Data," include the following:

1. Ambient temperature adjustment information.
2. Current-limitation curves for fuses with current-limiting characteristics.

3. Time-current coordination curves (average melt) and current-limitation curves (instantaneous peak let-through current) for each type and rating of fuse. Submit on translucent log-log graph paper.
4. Coordination charts and tables and related data.

1.5 QUALITY ASSURANCE

A. Source Limitations: Obtain fuses, for use within a specific product or circuit, from single source from single manufacturer.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

C. Comply with NEMA FU 1 for cartridge fuses.

D. Comply with NFPA 70.

1.6 PROJECT CONDITIONS

A. Where ambient temperature to which fuses are directly exposed is less than 20deg F or more than 104deg F , apply manufacturer's ambient temperature adjustment factors to fuse ratings.

1.7 COORDINATION

A. Coordinate fuse ratings with utilization equipment nameplate limitations of maximum fuse size and with system short-circuit current levels.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following :

1. Cooper Bussmann, Inc.
2. Edison Fuse, Inc.
3. Ferraz Shawmut, Inc.
4. Littelfuse, Inc.

2.2 CARTRIDGE FUSES

A. Characteristics: NEMA FU 1, nonrenewable cartridge fuses with voltage ratings consistent with circuit voltages.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine fuses before installation. Reject fuses that are moisture damaged or physically damaged.

B. Examine holders to receive fuses for compliance with installation tolerances and other conditions affecting performance, such as rejection features.

C. Examine utilization equipment nameplates and installation instructions. Install fuses of sizes and with characteristics appropriate for each piece of equipment.

D. Evaluate ambient temperatures to determine if fuse rating adjustment factors must be applied to fuse ratings.

E. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 FUSE APPLICATIONS

A. Cartridge Fuses:

1. Service Entrance: Class L, time delay.
2. Feeders: Class RK1, time delay .
3. Motor Branch Circuits: Class RK1, time delay.
4. Other Branch Circuits: Class RK1, time delay.
5. Control Circuits: Class CC, time delay.

3.3 INSTALLATION

A. Install fuses in fusible devices. Arrange fuses so rating information is readable without removing fuse.

3.4 IDENTIFICATION

A. Install labels complying with requirements for identification specified in Section 16075 "Identification for Electrical Systems" and indicating fuse replacement information on inside door of each fused switch and adjacent to each fuse block, socket, and holder.

END OF SECTION 16491

SECTION 16511- INTERIOR LIGHTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Interior lighting fixtures, lamps, and ballasts.
2. Emergency lighting units.
3. Exit signs.
4. Lighting fixture supports.
5. Interior solid-state luminaires that use LED technology.

B. Related Sections:

1. Section 260923 "Lighting Control Devices" for automatic control of lighting, including time switches, photoelectric relays, occupancy sensors, and multipole lighting relays and contactors.
2. Section 260933 "Central Dimming Controls" and Section 260936 "Modular Dimming Controls" for architectural dimming systems.
3. Section 260943.23 "Relay-Based Lighting Controls" for manual or programmable control systems with low-voltage control wiring or data communication circuits. Section 262726 "Wiring Devices" for manual wall-box dimmers for incandescent lamps.

1.3 DEFINITIONS

A. BF: Ballast factor.

B. CCT: Correlated color temperature.

C. CRI: Color-rendering index.

D. LED: Light-emitting diode.

E. LER: Luminaire efficacy rating.

F. Lumen: Measured output of lamp and luminaire, or both.

G. Luminaire: Complete lighting fixture, including ballast housing if provided.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of lighting fixture, arranged in order of fixture designation. Include data on features, accessories, finishes, and the following:

1. Physical description of lighting fixture including dimensions.
2. Emergency lighting units including battery and charger.
3. Ballast, including BF.
4. Energy-efficiency data.
5. Life, output (lumens, CCT, and CRI), and energy-efficiency data for lamps.
6. Photometric data and adjustment factors based on laboratory tests, complying with IESNA Lighting Measurements Testing & Calculation Guides, of each lighting fixture type. The adjustment factors shall be for lamps, ballasts, and accessories identical to those indicated for the lighting fixture as applied in this Project.

    a. Testing Agency Certified Data: For indicated fixtures, photometric data shall be certified by a qualified independent testing agency. Photometric data for remaining fixtures shall be certified by manufacturer.

B. Shop Drawings: For nonstandard or custom lighting fixtures. Include plans, elevations, sections, details, and attachments to other work.

1. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
2. Wiring Diagrams: For power, signal, and control wiring.

C. Samples: For each lighting fixture indicated in the Interior Lighting Fixture Schedule. Each Sample shall include the following:

1. Lamps and ballasts, installed.
2. Cords and plugs.
3. Pendant support system.

D. Installation instructions.

E. Qualification Data: For qualified agencies providing photometric data for lighting fixtures.

F. Product Certificates: For each type of ballast for bi-level and dimmer-controlled fixtures, from manufacturer.

G. Field quality-control reports.

H. Warranty: Sample of special warranty.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For lighting equipment and fixtures to include in emergency, operation, and maintenance manuals.

1. Provide a list of all lamp types used on Project; use ANSI and manufacturers' codes.

1.6 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Lamps: 10 for every 100 of each type and rating installed. Furnish at least one of each type.

1.7 QUALITY ASSURANCE

A. Luminaire Photometric Data Testing Laboratory Qualifications: Provided by an independent agency, with the experience and capability to conduct the testing indicated, that is an NRTL as defined by OSHA in 29 CFR 1910, complying with the IESNA Lighting Measurements Testing & Calculation Guides.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

C. Comply with NFPA 70.

1.8 COORDINATION

A. Coordinate layout and installation of lighting fixtures and suspension system with other construction that penetrates ceilings or is supported by them, including HVAC equipment, fire-suppression system, and partition assemblies.

1.9 WARRANTY

A. Special Warranty for Emergency Lighting Batteries: Manufacturer's standard form in which manufacturer of battery-powered emergency lighting unit agrees to repair or replace components of rechargeable batteries that fail in materials or workmanship within specified warranty period.

1. Warranty Period for Emergency Lighting Unit Batteries: 10 years from date of Substantial Completion. Full warranty shall apply for first year, and prorated warranty for the remaining nine years.
2. Warranty Period for Emergency Fluorescent Ballast and Self-Powered Exit Sign Batteries: Seven years from date of Substantial Completion. Full warranty shall apply for first year, and prorated warranty for the remaining six years.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basic of Design Product: Subject to compliance with requirements, provide product indicated on Drawings or a comparable product. .

2.2 GENERAL REQUIREMENTS FOR LIGHTING FIXTURES AND COMPONENTS

A. Recessed Fixtures: Comply with NEMA LE 4 for ceiling compatibility for recessed fixtures.

B. Fluorescent and LED Fixtures: Comply with UL 1598. Where LER is specified, test according to NEMA LE 5 and NEMA LE 5A as applicable.

C. Metal Parts: Free of burrs and sharp corners and edges.

D. Sheet Metal Components: Steel unless otherwise indicated. Form and support to prevent warping and sagging.

E. Doors, Frames, and Other Internal Access: Smooth operating, free of light leakage under operating conditions, and designed to permit relamping without use of tools. Designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during relamping and when secured in operating position.

F. Diffusers and Globes:

1. Acrylic Lighting Diffusers: 100 percent virgin acrylic plastic. High resistance to yellowing and other changes due to aging, exposure to heat, and UV radiation.

    a. Lens Thickness: At least 0.125 inch minimum unless otherwise indicated.
    b. UV stabilized.

2. Glass: Annealed crystal glass unless otherwise indicated.

G. Factory-Applied Labels: Comply with UL 1598. Include recommended lamps and ballasts. Labels shall be located where they will be readily visible to service personnel, but not seen from normal viewing angles when lamps are in place.

1. Label shall include the following lamp and ballast characteristics:

    a. "USE ONLY" and include specific lamp type.
    b. Lamp diameter code (T-4, T-5, T-8, T-12, etc.), tube configuration (twin, quad, triple, etc.), base type, and nominal wattage for fluorescent and compact fluorescent luminaires.
    c. Start type (preheat, rapid start, instant start, etc.) for fluorescent and compact fluorescent luminaires.
    d. CCT and CRI for all luminaires.

2.3 BALLASTS FOR LINEAR FLUORESCENT LAMPS

A. General Requirements for Electronic Ballasts:

1. Comply with UL 935 and with ANSI C82.11.
2. Designed for type and quantity of lamps served.
3. Ballasts shall be designed for full light output unless another BF, dimmer, or bi-level control is indicated.
4. Sound Rating: Class A.
5. Total Harmonic Distortion Rating: Less than 10 percent.
6. Transient Voltage Protection: IEEE C62.41.1 and IEEE C62.41.2, Category A or better.
7. Operating Frequency: 42 kHz or higher.
8. Lamp Current Crest Factor: 1.7 or less.

9. BF: 0.88 or higher.
10. Power Factor: 0.98 or higher.
11. Parallel Lamp Circuits: Multiple lamp ballasts shall comply with ANSI C82.11 and shall be connected to maintain full light output on surviving lamps if one or more lamps fail.

B. Luminaires controlled by occupancy sensors shall have programmed-start ballasts.

C. Electronic Programmed-Start Ballasts for T5 and T5HO Lamps: Comply with ANSI C82.11 and the following:

1. Lamp end-of-life detection and shutdown circuit for T5 diameter lamps.
2. Automatic lamp starting after lamp replacement.

D. Single Ballasts for Multiple Lighting Fixtures: Factory wired with ballast arrangements and bundled extension wiring to suit final installation conditions without modification or rewiring in the field.

E. Ballasts for Low-Temperature Environments:

1. Temperatures 0 Deg F and Higher: Electronic type rated for 0 deg F starting and operating temperature with indicated lamp types.

2.4 BALLASTS FOR COMPACT FLUORESCENT LAMPS

A. Description: Electronic-programmed rapid-start type, complying with UL 935 and with ANSI C 82.11, designed for type and quantity of lamps indicated. Ballast shall be designed for full light output unless dimmer or bi-level control is indicated:

1. Lamp end-of-life detection and shutdown circuit.
2. Automatic lamp starting after lamp replacement.
3. Sound Rating: Class A.
4. Total Harmonic Distortion Rating: Less than 20 percent.
5. Transient Voltage Protection: IEEE C62.41.1 and IEEE C62.41.2, Category A or better.
6. Operating Frequency: 20 kHz or higher.
7. Lamp Current Crest Factor: 1.7 or less.
8. BF: 0.95 or higher unless otherwise indicated.
9. Power Factor: 0.98 or higher.
10. Interference: Comply with 47 CFR 18, Ch. 1, Subpart C, for limitations on electromagnetic and radio-frequency interference for non-consumer equipment.

2.5 LED FIXTURES

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. NRTL Compliance: Luminaires for hazardous locations shall be listed and labeled for indicated class and division of hazard by an NRTL.

C. FM Global Compliance: Luminaires for hazardous locations shall be listed and labeled for indicated class and division of hazard by FM Global.

D. Bulb shape complying with ANSI C79.1.

E. Lamp base complying with ANSI C81.61.

F. CRI of minimum 80. CCT of 3500 K.

G. Rated lamp life of minimum 50,000 hours at L70.

H. Lamps dimmable from 100 percent to 1 percent of maximum light output.

I. Photometric data and adjustment factors shall be based on laboratory tests, complying with IESNA Lighting Measurements Testing and Calculation Guides, of each lighting fixture type. The adjustment factors shall be for lamps and accessories identical to those indicated for the lighting fixture as applied in this Project, IES LM-79, and IES LM-80.

J. LED driver shall be integral to fixture unless otherwise noted.

K. Nominal Operating Voltage: 120 V ac through 277 V ac.

L. Housings:

1. Extruded-aluminum housing and heat sink.

2.6 EMERGENCY FIXTURE POWER UNIT

A. Internal Type: Self-contained, modular, battery-inverter unit, factory mounted within lighting fixture body and compatible with ballast or driver. Comply with UL 924.

1. Emergency Connection: Operate fluorescent lamp(s) or array(s) of LED's continuously at an output of 1100 lumens. Connect unswitched circuit to battery-inverter unit and switched circuit to fixture ballast.
2. Nightlight Connection: Operate one fluorescent lamp or LED array continuously.
3. Test Push Button and Indicator Light: Visible and accessible without opening fixture or entering ceiling space.

    a. Push Button: Push-to-test type, in unit housing, simulates loss of normal power and demonstrates unit operability.
    b. Indicator Light: LED indicates normal power on. Normal glow indicates trickle charge; bright glow indicates charging at end of discharge cycle.

4. Battery: Sealed, maintenance-free, nickel-cadmium type.
5. Charger: Fully automatic, solid-state, constant-current type with sealed power transfer relay.
6. Integral Self-Test: Factory-installed electronic device automatically initiates code-required test of unit emergency operation at required intervals. Test failure is annunciated by an integral audible alarm and a flashing red LED.

2.7 EXIT SIGNS

A. General Requirements for Exit Signs: Comply with UL 924; for sign colors, visibility, luminance, and lettering size, comply with authorities having jurisdiction.

B. Internally Lighted Signs:

1. Lamps for AC Operation: Fluorescent, two for each fixture, 20,000 hours of rated lamp life.
2. Lamps for AC Operation: LEDs, 50,000 hours minimum rated lamp life.
3. Self-Powered Exit Signs (Battery Type): Integral automatic charger in a self-contained power pack.

    a. Battery: Sealed, maintenance-free, nickel-cadmium type.
    b. Charger: Fully automatic, solid-state type with sealed transfer relay.
    c. Operation: Relay automatically energizes lamp from battery when circuit voltage drops to 80 percent of nominal voltage or below. When normal voltage is restored, relay disconnects lamps from battery, and battery is automatically recharged and floated on charger.
    d. Test Push Button: Push-to-test type, in unit housing, simulates loss of normal power and demonstrates unit operability.
    e. LED Indicator Light: Indicates normal power on. Normal glow indicates trickle charge; bright glow indicates charging at end of discharge cycle.
    f. Integral Self-Test: Factory-installed electronic device automatically initiates code-required test of unit emergency operation at required intervals. Test failure is annunciated by an integral audible alarm and a flashing red LED.

2.8 EMERGENCY LIGHTING UNITS

A. General Requirements for Emergency Lighting Units: Self-contained units complying with UL 924.

1. Battery: Sealed, maintenance-free, lead-acid type.
2. Charger: Fully automatic, solid-state type with sealed transfer relay.
3. Operation: Relay automatically turns lamp on when power-supply circuit voltage drops to 80 percent of nominal voltage or below. Lamp automatically disconnects from battery when voltage approaches deep-discharge level. When normal voltage is restored, relay disconnects lamps from battery, and battery is automatically recharged and floated on charger.
4. Test Push Button: Push-to-test type, in unit housing, simulates loss of normal power and demonstrates unit operability.
5. LED Indicator Light: Indicates normal power on. Normal glow indicates trickle charge; bright glow indicates charging at end of discharge cycle.
6. Wire Guard: Heavy-chrome-plated wire guard protects lamp heads or fixtures.
7. Integral Time-Delay Relay: Holds unit on for fixed interval of 5 minutes when power is restored after an outage.
8. Integral Self-Test: Factory-installed electronic device automatically initiates code-required test of unit emergency operation at required intervals. Test failure is annunciated by an integral audible alarm and a flashing red LED.

2.9 FLUORESCENT LAMPS

A. T8 rapid-start lamps, rated 32 W maximum, nominal length of 48 inches, 2800 initial lumens (minimum), CRI 75 (minimum), color temperature 3500 K, and average rated life 20,000 hours unless otherwise indicated.

B. T8 rapid-start lamps, rated 17 W maximum, nominal length of 24 inches, 1300 initial lumens (minimum), CRI 75 (minimum), color temperature 3500 K, and average rated life of 20,000 hours unless otherwise indicated.

C. T5 rapid-start lamps, rated 28 W maximum, nominal length of 45.2 inches, 2900 initial lumens (minimum), CRI 85 (minimum), color temperature 3500 K, and average rated life of 20,000 hours unless otherwise indicated.

D. Compact Fluorescent Lamps: 4-Pin, CRI 80 (minimum), color temperature 3500 K, average rated life of 10,000 hours at three hours operation per start, and suitable for use with dimming ballasts unless otherwise indicated.

1. 13 W: T4, double or triple tube, rated 900 initial lumens (minimum).
2. 18 W: T4, double or triple tube, rated 1200 initial lumens (minimum).
3. 26 W: T4, double or triple tube, rated 1800 initial lumens (minimum).
4. 32 W: T4, triple tube, rated 2400 initial lumens (minimum).
5. 42 W: T4, triple tube, rated 3200 initial lumens (minimum).

2.10 LIGHTING FIXTURE SUPPORT COMPONENTS

A. Comply with Section 16051 "Basic Materials & Methods" for channel- and angle-iron supports and nonmetallic channel and angle supports.

B. Single-Stem Hangers: 1/2-inch steel tubing with swivel ball fittings and ceiling canopy. Finish same as fixture.

C. Twin-Stem Hangers: Two, 1/2-inch steel tubes with single canopy designed to mount a single fixture. Finish same as fixture.

D. Wires: ASTM A 641/A 641M, Class 3, soft temper, zinc-coated steel, 12 gage .

E. Wires for Humid Spaces: ASTM A 580/A 580M, Composition 302 or 304, annealed stainless steel, 12 gage .

F. Rod Hangers: 3/16-inch minimum diameter, cadmium-plated, threaded steel rod.

G. Hook Hangers: Integrated assembly matched to fixture and line voltage and equipped with threaded attachment, cord, and locking-type plug.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Lighting fixtures:

1. Set level, plumb, and square with ceilings and walls unless otherwise indicated.
2. Install lamps in each luminaire.

B. Temporary Lighting: If it is necessary, and approved by Architect, to use permanent luminaires for temporary lighting, install and energize the minimum number of luminaires necessary. When construction is sufficiently complete, remove the temporary luminaires, disassemble, clean thoroughly, install new lamps, and reinstall.

C. Lay-in Ceiling Lighting Fixtures Supports: Use grid as a support element.

1. Install ceiling support system rods or wires, independent of the ceiling suspension devices, for each fixture. Locate not more than 6 inches from lighting fixture corners.
2. Support Clips: Fasten to lighting fixtures and to ceiling grid members at or near each fixture corner with clips that are UL listed for the application.
3. Fixtures of Sizes Less Than Ceiling Grid: Install as indicated on reflected ceiling plans or center in acoustical panel, and support fixtures independently with at least two 3/4-inch metal channels spanning and secured to ceiling tees.

D. Suspended Lighting Fixture Support:

1. Pendants and Rods: Where longer than 48 inches, brace to limit swinging.
2. Stem-Mounted, Single-Unit Fixtures: Suspend with twin-stem hangers.
3. Continuous Rows: Use tubing or stem for wiring at one point and tubing or rod for suspension for each unit length of fixture chassis, including one at each end.
4. Do not use grid as support for pendant luminaires. Connect support wires or rods to building structure.

E. Connect wiring according to Section 16120 "Low-Voltage Electrical Power Conductors and Cables."

3.2 IDENTIFICATION

A. Install labels with panel and circuit numbers on concealed junction and outlet boxes. Comply with requirements for identification specified in Section 16075 "Identification for Electrical Systems."

3.3 FIELD QUALITY CONTROL

A. Test for Emergency Lighting: Interrupt power supply to demonstrate proper operation. Verify transfer from normal power to battery and retransfer to normal.

B. Prepare a written report of tests, inspections, observations, and verifications indicating and interpreting results. If adjustments are made to lighting system, retest to demonstrate compliance with standards.

3.4 STARTUP SERVICE

A. Burn-in all lamps that require specific aging period to operate properly, prior to occupancy by Owner. Burn-in fluorescent and compact fluorescent lamps intended to be dimmed, for at least 100 hours at full voltage.

3.5 ADJUSTING

A. Occupancy Adjustments: When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting aimable luminaires to suit actual occupied conditions. Provide up to two visits to Project during other-than-normal occupancy hours for this purpose. Some of this work may be required after dark.

1. Adjust aimable luminaires in the presence of Architect.

END OF SECTION 16511

SECTION 16521- EXTERIOR LIGHTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Exterior luminaires with lamps and ballasts.
2. Luminaire-mounted photoelectric relays.
3. Poles and accessories.
4. Exterior solid-state luminaires that are designed for and exclusively use LED lamp technology.
5. Luminaire supports.

B. Related Sections:

1. Section 16511 "Interior Lighting" for exterior luminaires normally mounted on exterior surfaces of buildings.
2. Section 16751 "Relay-Based Lighting Controls" for manual or programmable control systems with low-voltage control wiring or data communication circuits.

1.3 DEFINITIONS

A. CCT: Correlated color temperature.

B. CRI: Color-rendering index.

C. LER: Luminaire efficacy rating.

D. Lumen: Measured output of lamp and luminaire, or both.

E. Luminaire: Complete lighting fixture, including ballast housing if provided.

F. Pole: Luminaire support structure, including tower used for large area illumination.

G. Standard: Same definition as "Pole" above.

1.4 STRUCTURAL ANALYSIS CRITERIA FOR POLE SELECTION

A. Dead Load: Weight of luminaire and its horizontal and vertical supports, lowering devices, and supporting structure, applied as stated in AASHTO LTS-4-M.

B. Live Load: Single load of 500 lbf, distributed as stated in AASHTO LTS-4-M.

C. Ice Load: Load of 3 lbf/sq. ft., applied as stated in AASHTO LTS-4-M Ice Load Map.

D. Wind Load: Pressure of wind on pole and luminaire and banners and banner arms, calculated and applied as stated in AASHTO LTS-4-M.

1. Basic wind speed for calculating wind load for poles 50 feet high or less is 130mph.

a. Wind Importance Factor: 1.23.
b. Minimum Design Life: 50 years.
c. Velocity Conversion Factors: 1.10.

1.5 ACTION SUBMITTALS

A. Product Data: For each luminaire, pole, and support component, arranged in order of lighting unit designation. Include data on features, accessories, finishes, and the following:

1. Physical description of luminaire, including materials, dimensions, effective projected area, and verification of indicated parameters.
2. Details of attaching luminaires and accessories.
3. Details of installation and construction.
4. Luminaire materials.
5. Photometric data and adjustment factors based on laboratory tests , complying with IES Lighting Measurements Testing and Calculation Guides, of each luminaire type. The adjustment factors shall be for lamps and accessories identical to those indicated for the luminaire as applied in the project IES LM-79 and IES LM80.

a. Testing Agency Certified Data: For indicated luminaires, photometric data shall be certified by a qualified independent testing agency. Photometric data for remaining luminaires shall be certified by manufacturer.
b. Manufacturer Certified Data: Photometric data shall be certified by manufacturer's laboratory with a current accreditation under the National Voluntary Laboratory Accreditation Program for Energy Efficient Lighting Products.

6. Photoelectric relays.
7. Ballasts, including energy-efficiency data.
8. Lamps, including life, output, CCT, CRI, lumens, and energy-efficiency data.
9. Materials, dimensions, and finishes of poles.
10. Means of attaching luminaires to supports, and indication that attachment is suitable for components involved.
11. Anchor bolts for poles.
12. Manufactured pole foundations.

B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.

1. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
2. Anchor-bolt templates keyed to specific poles and certified by manufacturer.
3. Design calculations, certified by a qualified professional engineer, indicating strength of screw foundations and soil conditions on which they are based.
4. Wiring Diagrams: For power, signal, and control wiring.

C. Samples: For products designated for sample submission in the Exterior Lighting Device Schedule. Each Sample shall include lamps and ballasts.

1.6 INFORMATIONAL SUBMITTALS

A. Pole and Support Component Certificates: Signed by manufacturers of poles, certifying that products are designed for indicated load requirements in AASHTO LTS-4-M and that load imposed by luminaire and attachments has been included in design. The certification shall be based on design calculations by a professional engineer.

B. Qualification Data: For qualified agencies providing photometric data for lighting fixtures.

C. Field quality-control reports.

D. Warranty: Sample of special warranty.

1.7 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For luminaires and poles to include in emergency, operation, and maintenance manuals.

1.8 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Lamps: One for every 100 of each type and rating installed. Furnish at least one of each type.

1.9 QUALITY ASSURANCE

A. Luminaire Photometric Data Testing Laboratory Qualifications: Provided by an independent agency, with the experience and capability to conduct the testing indicated, that is an NRTL as defined by OSHA in 29 CFR 1910, accredited under the NVLAP for Energy Efficient Lighting Products and complying with applicable IES testing standards.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

C. Provide luminaires from a single manufacturer for each luminaire type.

D. Comply with IEEE C2, "National Electrical Safety Code."

E. Comply with NFPA 70.

1.10 DELIVERY, STORAGE, AND HANDLING

A. Package aluminum poles for shipping according to ASTM B 660.

B. Store poles on decay-resistant-treated skids at least 12 inches above grade and vegetation. Support poles to prevent distortion and arrange to provide free air circulation.

C. Handle wood poles so they will not be damaged. Do not use pointed tools that can indent pole surface more than 1/4 inch deep. Do not apply tools to section of pole to be installed below ground line.

D. Retain factory-applied pole wrappings on fiberglass and laminated wood poles until right before pole installation. Handle poles with web fabric straps.

E. Retain factory-applied pole wrappings on metal poles until right before pole installation. For poles with nonmetallic finishes, handle with web fabric straps.

1.11 FIELD CONDITIONS

A. Verify existing and proposed utility structures prior to the start of work associated with luminaire installation.

B. Mark locations of exterior luminaires for approval by Architect prior to the start of luminaire installation.

1.12 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace products that fail in materials or workmanship; that corrode; or that fade, stain, perforate, erode, or chalk due to effects of weather or solar radiation within specified warranty period. Manufacturer may exclude lightning damage, hail damage, vandalism, abuse, or unauthorized repairs or alterations from special warranty coverage.

1. Warranty Period for Luminaires: Five years from date of Substantial Completion.
2. Warranty Period for Metal Corrosion: Five years from date of Substantial Completion.
3. Warranty Period for Color Retention: Five years from date of Substantial Completion.
4. Warranty Period for Poles: Repair or replace lighting poles and standards that fail in finish, materials, and workmanship within manufacturer's standard warranty period, but not less than three years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis of Design Product: Subject to compliance with requirements, provide product indicated on Drawings or a comparable product.

2.2 GENERAL REQUIREMENTS FOR LUMINAIRES

A. Luminaires shall comply with UL 1598 and be listed and labeled for installation in wet locations by an NRTL acceptable to authorities having jurisdiction.

B. Lateral Light Distribution Patterns: Comply with IESNA RP-8 for parameters of lateral light distribution patterns indicated for luminaires.

C. Metal Parts: Free of burrs and sharp corners and edges.

D. Sheet Metal Components: Corrosion-resistant aluminum unless otherwise indicated. Form and support to prevent warping and sagging.

E. Housings: Rigidly formed, weather- and light-tight enclosures that will not warp, sag, or deform in use. Provide filter/breather for enclosed luminaires.

F. Doors, Frames, and Other Internal Access: Smooth operating, free of light leakage under operating conditions, and designed to permit relamping without use of tools. Designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during relamping and when secured in operating position. Doors shall be removable for cleaning or replacing lenses. Designed to disconnect ballast when door opens.

G. Exposed Hardware Material: Stainless steel.

H. Plastic Parts: High resistance to yellowing and other changes due to aging, exposure to heat, and UV radiation.

I. Light Shields: Metal baffles, factory installed and field adjustable, arranged to block light distribution to indicated portion of normally illuminated area or field.

J. Reflecting surfaces shall have minimum reflectance as follows unless otherwise indicated:

1. White Surfaces: 85 percent.
2. Specular Surfaces: 83 percent.
3. Diffusing Specular Surfaces: 75 percent.

K. Lenses and Refractors Gaskets: Use heat- and aging-resistant resilient gaskets to seal and cushion lenses and refractors in luminaire doors.

L. Luminaire Finish: Manufacturer's standard paint applied to factory-assembled and -tested luminaire before shipping. Where indicated, match finish process and color of pole or support materials.

M. Factory-Applied Finish for Aluminum Luminaires: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

1. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.
2. Natural Satin Finish: Provide fine, directional, medium satin polish (AA-M32); buff complying with AA-M20; and seal aluminum surfaces with clear, hard-coat wax.
3. Class I, Clear Anodic Finish: AA-M32C22A41 (Mechanical Finish: medium satin; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class I, clear coating 0.018 mm or thicker) complying with AAMA 611.
4. Class I, Color Anodic Finish: AA-M32C22A42/A44 (Mechanical Finish: medium satin; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class I, integrally colored or electrolytically deposited color coating 0.018 mm or thicker) complying with AAMA 611.

    a. Color: As selected by Architect from manufacturer’s standard catalog of colors.

N. Factory-Applied Labels: Comply with UL 1598. Include recommended lamps and ballasts. Labels shall be located where they will be readily visible to service personnel, but not seen from normal viewing angles when lamps are in place.

1. Label shall include the following lamp and ballast characteristics:

    a. "USES ONLY" and include specific lamp type.
    b. CCT and CRI for all luminaires.

2.3 LED LUMINAIRE REQUIREMENTS

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. NRTL Compliance: Luminaires shall be listed and labeled for indicated class and division of hazard by an NRTL.

C. FM Global Compliance: Luminaires for hazardous locations shall be listed and labeled for indicated class and division of hazard by FM Global.

D. UL Compliance: Comply with UL 1598 and listed for wet location.

E. Lamp base complying with ANSI C81.61.

F. Bulb shape complying with ANSI C79.1.

G. CRI of minimum 70. CCT of 3500 K.

H. L70 lamp life of at least 50,000 hours.

I. Lamps dimmable from 100 percent to 5 percent of maximum light output.

J. Internal driver.

K. Source Limitations: Obtain luminaires from single source from a single manufacturer.

L. Source Limitations: For luminaires, obtain each color, grade, finish, type, and variety of luminaire from single source with resources to provide products of consistent quality in appearance and physical properties.

2.4 GENERAL REQUIREMENTS FOR POLES AND SUPPORT COMPONENTS

A. Structural Characteristics: Comply with AASHTO LTS-4-M.

1. Wind-Load Strength of Poles: Adequate at indicated heights above grade without failure, permanent deflection, or whipping in steady winds of speed indicated in "Structural Analysis Criteria for Pole Selection" Article.
2. Strength Analysis: For each pole, multiply the actual equivalent projected area of luminaires and brackets by a factor of 1.1 to obtain the equivalent projected area to be used in pole selection strength analysis.

B. Luminaire Attachment Provisions: Comply with luminaire manufacturers' mounting requirements. Use stainless-steel fasteners and mounting bolts unless otherwise indicated.

C. Mountings, Fasteners, and Appurtenances: Corrosion-resistant items compatible with support components.

1. Materials: Shall not cause galvanic action at contact points.
2. Anchor Bolts, Leveling Nuts, Bolt Caps, and Washers: Hot-dip galvanized after fabrication unless otherwise indicated.
3. Anchor-Bolt Template: Plywood or steel.

D. Handhole: Oval-shaped, with minimum clear opening of 2-1/2 by 5 inches, with cover secured by stainless-steel captive screws.

E. Concrete Pole Foundations: Cast in place, with anchor bolts to match pole-base flange. Concrete, reinforcement, and formwork are specified in Section 033000 "Cast-in-Place Concrete."

2.5 ALUMINUM POLES

A. Poles: Seamless, extruded structural tube complying with ASTM B 429/B 429M, Alloy 6063-T6 with access handhole in pole wall.

B. Poles: ASTM B 209, 5052-H34 marine sheet alloy with access handhole in pole wall.

1. Shape: Round, tapered.
2. Mounting Provisions: Butt flange for bolted mounting on foundation or breakaway support.

C. Pole-Top Tenons: Fabricated to support luminaire or luminaires and brackets indicated, and securely fastened to pole top.

D. Grounding and Bonding Lugs: Welded 1/2-inch threaded lug, complying with requirements in Section 260526 "Grounding and Bonding for Electrical Systems," listed for attaching grounding and bonding conductors of type and size listed in that Section, and accessible through handhole.

E. Brackets for Luminaires: Detachable, with pole and adapter fittings of cast aluminum. Adapter fitting welded to pole and bracket, then bolted together with stainless-steel bolts.

1. Tapered oval cross section, with straight tubular end section to accommodate luminaire.
2. Finish: Same luminaire.

F. Prime-Coat Finish: Manufacturer's standard prime-coat finish ready for field painting.

G. Aluminum Finish: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

1. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.
2. Natural Satin Finish: Provide fine, directional, medium satin polish (AA-M32); buff complying with AA-M20; and seal aluminum surfaces with clear, hard-coat wax.
3. Class I, Clear Anodic Finish: AA-M32C22A41 (Mechanical Finish: medium satin; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class I, clear coating 0.018 mm or thicker) complying with AAMA 611.
4. Class I, Color Anodic Finish: AA-M32C22A42/A44 (Mechanical Finish: medium satin; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class I, integrally colored or electrolytically deposited color coating 0.018 mm or thicker) complying with AAMA 611.

a. Color: As selected by Architect from manufacturer's full range.

2.6 POLE ACCESSORIES

A. Base Covers: Manufacturers' standard metal units, arranged to cover pole's mounting bolts and nuts. Finish same as pole.

PART 3 - EXECUTION

3.1 LUMINAIRE INSTALLATION

A. Install lamps in each luminaire.

B. Fasten luminaire to structural supports.

1. Use fastening methods and materials selected to resist seismic forces defined for the application and approved by manufacturer.

C. Supports:
1. Sized and rated for luminaire weight.
2. Able to maintain luminaire position after cleaning and relamping.
3. Support luminaires without causing deflection of finished surface.
4. Luminaire-mounting devices shall be capable of supporting a horizontal force of 100 percent of luminaire weight and a vertical force of 400 percent of luminaire weight.

D. Wiring Method: Install cables in raceways. Conceal raceways and cables.

E. Adjust luminaires that require field adjustment or aiming.

F. Coordinate layout and installation of luminaires with other construction.

G. Comply with requirements in Section 16120 "Low-Voltage Electrical Power Conductors and Cables" and 16130 "Raceways and Boxes for Electrical Systems" for wiring connections and wiring methods.

3.2 POLE INSTALLATION

A. Alignment: Align pole foundations and poles for optimum directional alignment of luminaires and their mounting provisions on the pole.

B. Clearances: Maintain the following minimum horizontal distances of poles from surface and underground features unless otherwise indicated on Drawings:

1. Fire Hydrants and Storm Drainage Piping: 60 inches.
2. Water, Gas, Electric, Communication, and Sewer Lines: 5 feet.
3. Trees: 15 feet from tree trunk.

C. Concrete Pole Foundations: Set anchor bolts according to anchor-bolt templates furnished by pole manufacturer. Concrete materials, installation, and finishing requirements are specified in Section 033000 "Cast-in-Place Concrete."

D. Foundation-Mounted Poles: Mount pole with leveling nuts, and tighten top nuts to torque level recommended by pole manufacturer.

1. Use anchor bolts and nuts selected to resist seismic forces defined for the application and approved by manufacturer.
2. Grout void between pole base and foundation. Use non-shrink or expanding concrete grout firmly packed to fill space.
3. Install base covers unless otherwise indicated.
4. Use a short piece of 1/2-inch- diameter pipe to make a drain hole through grout. Arrange to drain condensation from interior of pole.

E. Raise and set poles using web fabric slings (not chain or cable).

3.3 BOLLARD LUMINAIRE INSTALLATION

A. Align units for optimum directional alignment of light distribution.

B. Install on concrete base with top 4 inches above finished grade or surface at bollard location. Cast conduit into base, and shape base to match shape of bollard base. Finish by troweling and rubbing smooth. Concrete materials, installation, and finishing are specified in Section 033000 "Cast-in-Place Concrete."

3.4 INSTALLATION OF INDIVIDUAL GROUND-MOUNTING LUMINAIRES

A. Install on concrete base with top 4 inches above finished grade or surface at luminaire location. Cast conduit into base, and finish by troweling and rubbing smooth. Concrete materials, installation, and finishing are specified in Section 033000 "Cast-in-Place Concrete."

3.5 CORROSION PREVENTION

A. Aluminum: Do not use in contact with earth or concrete. When in direct contact with a dissimilar metal, protect aluminum by insulating fittings or treatment.

B. Steel Conduits: Comply with Section 16130 "Raceways and Boxes for Electrical Systems." In concrete foundations, wrap conduit with 0.010-inch- thick, pipe-wrapping plastic tape applied with a 50 percent overlap.

3.6 GROUNDING

A. Ground metal poles and support structures according to Section 260526 "Grounding and Bonding for Electrical Systems."

1. Install grounding electrode for each pole unless otherwise indicated.
2. Install grounding conductor pigtail in the base for connecting luminaire to grounding system.

3.7 FIELD QUALITY CONTROL

A. Inspect each installed fixture for damage. Replace damaged fixtures and components.

B. Illumination Observations: Verify normal operation of lighting units after installing luminaires and energizing circuits with normal power source.

C. Prepare a written report of tests, inspections, observations, and verifications indicating and interpreting results. If adjustments are made to lighting system, retest to demonstrate compliance with standards.

END OF SECTION 16521

SECTION 16571 - RELAY-BASED LIGHTING CONTROLS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

B. Section 16145, "Lighting Control Devices".

1.2 SUMMARY

A. Section Includes:

1. Programmable Lighting Control Panels using mechanically held relays for switching.
2. Digital Lighting Management Controllers using relays for switching individual spaces (Room Controllers).

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for control modules, power distribution components, relays, manual switches and plates, and conductors and cables.
2. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.

B. Shop Drawings: For each relay panel and related equipment.

1. Include dimensioned plans, elevations, sections, and details. Show tabulations of installed devices, equipment features, and ratings.
2. Detail enclosure types and details for types other than NEMA 250, Type 1.
3. Detail wiring partition configuration, current, and voltage ratings.
4. Short-circuit current rating of relays.
5. Include diagrams for power, signal, and control wiring.
6. Block Diagram: Show interconnections between components specified in this Section and devices furnished with power distribution system components. Indicate data communication paths and identify networks, data buses, data gateways, concentrators, and other devices to be used. Describe characteristics of data communication lines.

1.4 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Submit evidence that lighting controls are compatible with connected monitoring and control devices and systems specified in other Sections.

1. Show interconnecting signal and control wiring, and interface devices that prove compatibility of inputs and outputs.

B. Field quality-control reports.

C. Sample Warranty: For manufacturer's special warranty.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For lighting controls to include in emergency, operation, and maintenance manuals.

1. Include programming record sheet and lighting control operational summary sheet.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Handle and prepare panels for installation according to NECA 407.

PART 2 - PRODUCTS

2.1 SYSTEM DESCRIPTION - PROGRAMMABLE LIGHTING CONTROL PANEL

A. Input signal from field-mounted manual switches, or digital signal sources, shall open or close one or more lighting control relays in the lighting control panels. Any combination of inputs shall be programmable to any number of control relays.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

C. Comply with 47 CFR, Subparts A and B, for Class A digital devices.

D. Comply with UL 916.

2.2 SYSTEM DESCRIPTION - DIGITAL LIGHTING MANAGMENT CONTROLLERS

A. Digital Room Controllers – Self-configuring, digitally addressable one, two or three relay controllers with 0-10 volt or forward phase control dimming outputs (if applicable) and single relay application-specific plug load controllers.

B. Digital Occupancy Sensors – Self-configuring, digitally addressable and calibrated occupancy sensors with LCD display and two-way active infrared (IR) communications.

C. Digital Switches – Self-configuring, digitally addressable pushbutton switches, dimmers, and scene switches with two-way active infrared (IR) communications.

D. Configuration Tools – Handheld remote for room configuration provides two way infrared (IR) communications to digital devices and allows complete configuration and reconfiguration of the device / room from up to 30 feet away. Unit to have Organic LED display, simple pushbutton interface, and allow bi-directional communication of room variables and occupancy sensor settings. Computer software also customizes room settings.

2.3 PROGRAMMABLE LIGHTING CONTROL RELAY PANELS

A. Basis-of-Design Product: The basis-of-design is ILC Apprentice II. Subject to compliance with requirements, provide product indicated on Drawings or comparable product.

B. Description: Standalone lighting control panel using mechanically latched relays to control lighting and appliances.

C. Lighting Control Panel:
1. Description
a. Lighting Control Panels shall be UL listed and consist of the following:
1) Enclosure/Tub: NEMA 1.
2) Cover: Surface or Flush as required, hinged, lockable and shall restrict access to line voltage section.
3) Interior: Barrier for separation of high voltage (class 1) and low voltage (class 2) wiring. It shall include intelligence boards, power supply and controls relays. Clock display and keypad shall be mounted on interior cabinet door for easy user access and programming.
2. Features
a. Panel shall accept up to eight single pole relays. Relays shall be individual latching relays with 20 Amp load contacts for ballast (including HID, magnetic or electronic type ballasts), tungsten and general purpose loads. Provide isolated auxiliary contacts for pilot light switching. Relays shall use quick connectors and be individually replaceable to facilitate ease of use.
b. Where indicated, panels shall provide space within the high voltage section of the enclosure to accommodate up to 12 multi-pole contactors. Two sections of DIN rail mounting shall be provided as standard. No field drilling or fabrication shall be required for mounting contactors or other accessories within the enclosure.
c. The lighting control panel shall provide a stagger up delay, override push buttons, pilot light outputs, and LED status light indicators for each relay or contactor control channel.
d. The clock shall have a backlight display, user keypad and shall provide 8 channels of time or astronomical control. Preprogrammed lighting control scenarios shall include: scheduled on/off, manual on/scheduled off, manual on/automatic switch sweep off, astronomic or photocell on/off and astronomic or photocell control with scheduled on/off. Time clock shall provide up to 42 holidays, automatic daylight savings adjustment, astronomic coordinates by major cities, and help screens. Program memory shall be non-volatile and clock shall retain time keeping during power outages for at least 48 hours.
e. The panel shall have 8 universal switch inputs that are low voltage, self-configuring and shall not require programming to accept momentary on/ momentary off switch, push button switch (cycling), maintained switch or 24VDC signals from occupancy sensors, photocells or other interfacing devices.
f. Occupancy sensor and time control shall be integrated to allow occupancy sensor control after hours with hold on of lighting during occupancy scheduled time. During occupied time, control scenarios shall be selectable for time schedule of lighting on or occupancy sensor detection of lighting on initially and then hold on of lighting during occupied hours. Control shall provide selectable occupancy sensor blink warning prior to shut off and adjustable occupancy sensor time delay from the time clock keypad.
g. After-hour interior lighting shut off control shall provide a full duration override time of 1 to 240 minutes with a warning blink five minutes prior to shutting the lighting off. An impending shut off will be cancelled and the override period re-initialized through the operation of any assigned switch input.
h. After-hour interior lighting shut off control may be by line voltage power interrupt control to automatic control switches. The lighting control relay panel shall provide

a warning blink signal to automatic control switches, thus allowing a five-minute delay prior to shutting off lighting. The lighting shut off event may be cancelled by pressing the automatic control switch push button. The lighting control panel time clock shall provide periodic lighting sweep signals to shut off automatic control switches.

2.4 DIGITAL LIGHTING MANAGEMENT CONTROLLERS

A. Basis-of-Design Product: The basis-of-design is WattStopper LMRC series. Subject to compliance with requirements, provide product indicated on Drawings or comparable product.

B. Room Controllers shall automatically bind the room loads to the connected devices in the space without commissioning or the use of any tools. Room Controllers shall be provided to match the room lighting load and control requirements. The controllers will be simple to install and shall not have, dip switches, potentiometers or require special configuration. The control units shall include the following features:

1. Automatic room configuration to the most energy-efficient sequence of operation based upon the devices in the room.
2. Simple replacement – Using the default automatic configuration capabilities, a room controller may be replaced with an off-the-shelf unit without requiring any configuration or setup.
3. Device Status LEDs to indicate power, load status, data transmission, and configuration status.
4. Quick installation features including standard junction box mounting and quick low voltage connections via RJ-45 connectors.
5. Plenum rated.
6. Manual override with indication.
7. Zero crossing circuitry for each load to extend contact life.

C. It shall be possible to connect multiple room controllers together with Category 6 communication cables to create a local network of controllers for a larger space.

2.5 FIELD MOUNTED SIGNAL SOURCES FOR PROGRAMMABLE LIGHTING CONTROL PANEL

A. Automatic Control Switch: Push button wall switch capable of on/off manual operation and shall also be capable of receiving automatic control signals through interrupting power to the circuit feeding the switch and load. Control switch shall be capable of 3-way, 4-way, or multi-way switching. Self-adjusting zero cross switching technology shall be used to protect from the effects of high inrush current and to increase switch/relay operation life. Control switch shall have user adjustable settings for occupancy sensor/control panel operating mode, enable/disable audible beep, and enable/disable command on feature. Settings shall be made using the switch push button and configuration LEDs and shall not require the removal of the switch faceplate. Lighting control panel operation shall include the capability of automatically shutting switches off, turning switches on, and delaying switches off. Delay off operation shall provide a one or two second warning blink followed by a five minute delay time period before shutting off the lights. During the delay off period, the locator LED shall blink and, if enabled, an audible warning beep shall sound each minute for the first four minutes and each five seconds during the last minute of the delay time period. The delayed shut off may be canceled by pressing the front push button.

B. Low Voltage Momentary Switch: Modular, momentary contact, three wire, for operating one or more relays and to override automatic controls.

1. Match color and style specified in Section 16140 "Wiring Devices."
2. Integral green LED pilot light to indicate when circuit is on.

2.6 FIELD MOUNTED SIGNAL SOURCES FOR DIGITAL LIGHTING MANAGEMENT CONTROLLERS

A. Occupancy Sensors: Ceiling mounted passive infrared (PIR), ultrasonic or dual technology digital (passive infrared and ultrasonic) occupancy sensor. Furnish the Company's system which accommodates the square-foot coverage requirements for each area controlled, utilizing room controllers, digital occupancy sensors and accessories which suit the lighting and electrical system parameters.

1. Digital Occupancy Sensors shall provide graphic LCD display for digital calibration and electronic documentation. Provide digital calibration and pushbutton programming for the following variables:
   a. Sensitivity: 0-100% in 10% increments.
   b. Time Delay: 1-30 minutes in 1 minute increments.
   c. Test Mode: 5-second time delay.
2. Units shall not have any dip switches or potentiometers for field settings.

B. Digital Wall Switches: Low voltage momentary pushbutton switches in 1, 2, 3, 4, 5 and 8 button configuration; available in white, light almond, ivory, grey, red and black; compatible with wall plates with decorator opening. Wall switches shall include the following features:

1. Two-way infrared (IR) transceiver for use with personal and configuration remote controls.
2. Removable buttons for field replacement with engraved buttors and/or alternate color buttons. Button replacement may be completed without removing the switch from the wall.
3. Red configuration LED on each switch that blinks to indicate data transmission.
4. Two RJ-45 ports for connection to DLM local network.
5. Multiple digital wall switches may be installed in a room by simply connecting them to the free topology DLM local network. No additional configuration shall be required to achieve multi-way switching.

2.7 CONDUCTORS AND CABLES

A. Power Wiring to Supply Side of Class 2 Power Source: Not smaller than No. 12 AWG, complying with Section 16120 "Low-Voltage Electrical Power Conductors and Cables."

B. Classes 2 and 3 Control Cables: Multiconductor cable with copper conductors not smaller than No. 18 AWG, complying with Section 16120 "Low-Voltage Electrical Power Conductors and Cables."

C. Digital and Multiplexed Signal Cables: Unshielded, twisted-pair cable with copper conductors, complying with TIA/EIA-568-B.2, Category 6 for horizontal copper cable.

PART 3 - EXECUTION

3.1 GENERAL

A. Install the work of this Section in accordance with manufacturer's printed instructions unless otherwise indicated.

3.2 EXAMINATION

A. Receive, inspect, handle, and store panels according to NECA 407.

B. Examine panels before installation. Reject panels that are damaged or rusted or have been subjected to water saturation.

C. Examine elements and surfaces to receive panels for compliance with installation tolerances and other conditions affecting performance of the Work.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 WIRING INSTALLATION

A. Comply with NECA 1.

B. Wiring Method: Install cables in raceways except within consoles, cabinets, desks, and counters. Conceal raceway and cables except in unfinished spaces.

1. Comply with requirements for raceways and boxes specified in Section 16130 "Raceways and Boxes for Electrical Systems."

C. Wiring within Enclosures: Bundle, lace, and train conductors to terminal points with no excess and without exceeding manufacturer's limitations on bending radii. Install lacing bars and distribution spools.

3.4 PANEL INSTALLATION

A. Comply with NECA 1.

B. Install panels and accessories according to NECA 407.

C. Mount top of trim 90 inches above finished floor unless otherwise indicated.

D. Mount panel cabinet plumb and rigid without distortion of box.

E. Install filler plates in unused spaces.

3.5 IDENTIFICATION

A. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Section 16075 "Identification for Electrical Systems."

B. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs complying with Section 16075 "Identification for Electrical Systems."

C. Create a directory to indicate loads served by each relay; incorporate Owner's final room designations. Obtain approval before installing. Use a PC or typewriter to create directory; handwritten directories are unacceptable.

D. Lighting Control Panel Nameplates: Label each panel with a nameplate complying with requirements for identification specified in Section 16075 "Identification for Electrical Systems."

3.6 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections. Upon completion of the installation, the manufacturer's factory authorized representative shall start up and verify a complete fully functional system.

B. Perform the following tests and inspections with the assistance of a factory-authorized service representative:

1. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
2. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.

C. Acceptance Testing Preparation:

1. Test continuity of each circuit.

D. Lighting control panel will be considered defective if it does not pass tests and inspections.

E. Prepare test and inspection reports, including a certified report that identifies lighting control panels and describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations made after remedial action.

3.7 STARTUP SERVICE

A. Engage a factory-authorized service representative to perform startup service.

1. Complete installation and startup checks according to manufacturer's written instructions.
2. Confirm correct communications wiring, initiate communications between panels, and program the lighting control system according to approved configuration schedules, time-of-day schedules, and input override assignments.
3. Program control panel to match sequence on drawings, unless directed otherwise by the end user.

B. Calibrate all sensor time delays and sensitivity to guarantee proper detection of occupants and energy savings. Adjust time delay so that controlled area remains lighted for 5 minutes after occupant leaves area.

C. Provide written or computer-generated documentation on the commissioning of the system including room by room description including:

1. Sensor parameters, time delays, sensitivities, and setpoints.
2. Sequence of operation, (e.g. manual ON, Auto OFF. etc.).
3. Load Parameters (e.g. blink warning, etc.).

D. Re-commissioning – After 30 days from occupancy re-calibrate all sensor time delays and sensitivities to meet the Owner's Project Requirements. Provide a detailed report to the Architect / Owner of re-commissioning activity.

3.8 ADJUSTING

A. Occupancy Adjustments: When requested within 12 months from date of Substantial Completion, provide on-site assistance in adjusting system to suit actual occupied conditions. Provide up to two visits to Project during other-than-normal occupancy hours for this purpose.

3.9 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain the control unit and operator interface. Provide a minimum of 4 hours training.

END OF SECTION 16571

SECTION 16721- FIRE-ALARM SYSTEM

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

B. The complete installation shall conform to the applicable sections of NFPA 72 and NFPA 70, National Electrical Code.

C. NFPA 90A

D. NFPA 101

E. Americans with Disabilities Act

F. ASME/ANSI A17.1 and A17.3

1.2 SUMMARY

A. This section includes fire alarm system components that include, but are not limited to, the following::

1. Fire-alarm control unit.
2. Power supplies
3. Single and multiple station smoke alarms.
4. Addressable manual fire-alarm stations.
5. Addressable smoke detectors.
6. Addressable heat detectors.
7. Conventional smoke detectors.
8. Conventional heat detectors.
9. Notification appliances.
10. Remote annunciator.
11. Addressable monitoring and control interface devices.

B. Work covered by this specification section includes the furnishing of labor, equipment, materials, and complete operational performance required for installation of the Fire Alarm System as shown on the drawings, as specified, and as directed by the Architect/Engineer.

C. The work covered by this section of the specification shall be coordinated with the related work as specified elsewhere under the project specifications.

1.3 SYSTEM DESCRIPTION AND GENERAL REQUIREMENTS

A. General: Complete, microprocessor-based, addressable fire detection and alarm system with manual and automatic alarm initiation, and addressable analog initiating devices as indicated .

B. The fire alarm system shall allow for loading and editing special instructions and operating sequences as required. The system shall be capable of on-site programming to accommodate system expansion and facilitate changes in operation. All software-programmed operations shall be stored in a non-volatile memory within the fire alarm control unit. Loss of primary and secondary power shall not erase the instructions stored in memory.

C. All control equipment must have transient protection to comply with UL864 requirements.

D. Where Fire Alarm circuits leave the building, additional transient protection must be provided for each circuit. Devices must be UL listed under standard # 497B.

E. System connections for alarm-notification circuits and voice/alarm communication circuits shall be Class B/Style Y.

F. System connections for signaling line addressable device circuits shall be Class B/Style 4.

G. System connections for initiating device circuits shall be Class B/Style B.

H. Power supplies, signaling line circuits, initiating device circuits, notification appliance circuits, control equipment, and control panel components shall all be sized and designed so that no more than 75% of the capacity of the circuit / component is utilized. For example, no more than 75 addressable devices shall be connected to a signaling line circuit with a capacity of 100 devices; notification appliance circuits with a capacity of 2 amps shall not be loaded any greater than 1.5 amps; and power supplies rated for 4 amps shall not be loaded any greater than 3 amps.

I. Power Requirements

1. All control panels and power supplies shall receive 120 VAC power via dedicated circuits. Circuit breakers serving fire alarm control equipment shall have a red marking, shall be accessible to authorized personnel only, and shall be identified as service fire alarm control equipment. The location of the circuit breaker or circuit disconnecting means shall be permanently identified at the associated fire alarm control unit.
2. The system shall be provided with sufficient battery capacity to operate the entire system upon loss of normal 120 VAC power in normal supervisory mode for a period of 24 hours plus an additional 5 minutes of alarm operation at the end of this period. Provide 25% spare battery capacity for future expansion. Include additional battery cans and chargers as necessary.
3. The system shall automatically transfer to battery standby upon normal power failure. All battery charging and recharging operations shall be automatic.
4. The system batteries shall be supervised so that a low battery condition or disconnection of the battery shall be audibly and visibly indicated at the control unit.

J. System Survivability:

1. Smoke detectors shall be placed above each fire alarm system control unit, including remote power supplies and amplifiers, in accordance with NFPA 72.

K. Smoker Detector Sensitivity and Environmental Compensation:

1. The FACP / detector shall maintain a moving average of the detector’s smoke chamber value to automatically compensate (move the threshold) for dust, dirt, and component degradation conditions that could affect detection operations. The control unit / detector shall automatically maintain constant smoke obscuration sensitivity for each sensor by compensating for environmental factors.

2. The FACP shall automatically indicate when individual detectors are excessively dirty, dirty, or almost dirty so that maintenance can be done on all detectors simultaneously.
3. The FACP shall be listed for automatic compliance with NFPA 72 sensitivity testing requirement.
4. Remote Smoke-Detector Sensitivity Adjustment: The sensitivity of each addressable detector shall be able to be remotely adjusted and displayed at the FACP. Controls shall select specific addressable smoke detectors for adjustment, display their current status and sensitivity settings, and change those settings.
5. Day / Night Sensitivity: It shall be possible to program automated changes in sensitivity of specific detector groups based on repetitive time schedules.

1.4 SYSTEM SEQUENCE OF OPERATION

A. Alarm Sequence: Upon activation of any manual station or any automatic alarm detection device the following shall take place:

1. An audible and visual general alarm condition shall be indicated at the FACP and the annunciators.
2. The alarm shall be recorded in a separate alarm history log.
3. Audible and visible alarm notification signals throughout the building are activated. Alarms shall remain on until silenced by the alarm silence switch at the FACP. Any subsequent alarm shall reactivate the alarm notification appliances.
4. All smoke doors on the floor of alarm normally held open by magnetic door holders shall be released after a 5-second delay.
5. All designated egress doors shall be unlocked.
6. Supply and return fans serving the area where the alarm originated shall be shut down.
7. A supervised alarm signal shall be transmitted to notify the monitoring station.

B. Supervisory and Trouble Sequence: Upon detecting any trouble or supervisory condition, the following shall take place:

1. An audible signal shall sound and the associated visual signal shall illuminate at the FACP and the annunciators. Audible and visual differentiation between supervisory and trouble conditions shall be provided. The differentiation shall be clearly identified in plain-language on the FACP alphanumeric display.
2. A record of the supervisory or trouble condition shall be kept in the associated FACP historical log.
3. Trouble and supervisory conditions shall initiate the transmission of a supervised trouble or supervisory signal, respectively, to the monitoring station.

C. Alarm Verification Sequence: Upon activation of any smoke detector, the control panel initiates a 60 second delay during which a second alarm from the same device must occur before the alarm sequence is activated.

1. The alarm verification operation shall be selectable by addressable device.
2. The control Unit shall have the capability to display the number of times (tally) a device had gone into a verification mode. Should this smoke verification tally reach a pre-programmed number, a trouble condition shall occur.

D. Elevator Recall Sequence: The activation of any elevator lobby, elevator pit, elevator shaft, or elevator machine room smoke detector shall , in addition to the alarm sequences listed above, cause the associated elevator cabs to be recalled according to the following sequence:

1. If the alarmed device is on any floor other than the main level of egress, the elevator cabs shall be recalled to the main level of egress.
2. If the alarmed device is on the main egress level, the elevator cabs shall be recalled to the predetermined alternate recall level as determined by the local authority having jurisdiction.

E. Elevator Shunt Trip Sequence: The activation of any elevator pit, elevator shaft, or elevator machine room heat detector shall, in addition to the operations listed above for elevator recall, causes the associated elevators to be shunt tripped. Power to the shunt trip coil shall be supervised by the system, and loss of power to the shunt trip control circuit shall initiate the supervisory sequence.

F. AHU Shutdown Sequence: The activation of any duct-mounted smoke detector shall, in addition to the alarm sequence indicated above, causes the associated air handling unit to be shut down.

G. Smoke Damper Control Sequence: Activation of a duct-mounted smoke detector located upstream of a smoke damper shall, in addition to the alarm sequence indicated above, cause the associated smoke damper to be shut.

H. Door Holder Sequence: The activation of a smoke detector within 5 feet of a smoke door shall cause, in addition to the above alarm sequence, the associated smoke door to close.

I. Kitchen Hood Suppression Release Control Sequence: Activation of the kitchen hood suppression release panel shall, in addition to the alarm sequence above, initiate the following control sequences (if not initiated directly by the Kitchen Hood Suppression System Panel):

1. All circuit breakers that feed power to appliances under the hood shall be shunt-tripped. Power to the shunt trip coils shall be supervised by the system, and loss of power to the shunt trip control circuits shall initiate the supervisory sequence.
2. Power to all normally closed, gas system solenoid valves shall be removed, shutting off the supply of natural gas to the appliances under the hood.
3. The kitchen hood supply fan shall be shut down.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product specified, including performance parameters and installation details.

B. Shop Drawings: For fire-alarm system. Include plans, elevations, sections, details, and attachments to other work.

1. Comply with recommendations in the "Documentation" Section of the "Fundamentals of Fire Alarm Systems" Chapter in NFPA 72.
2. Include power calculations indicating exactly what devices (and how much current they draw) are on each notification appliance circuit. Include voltage drop calculations for notification appliance circuits.
3. Include battery-size calculations.
4. Include voice/alarm signaling-service amplifier power calculations.
5. Include a riser diagram showing all panel interconnections and the quantity of devices on each circuit.
6. Include floor plans to indicate all panel and device locations showing address of each addressable device.

7. Include a list of labels for every addressable device in the system for approval by the Owner prior to programming.
8. Include a wire legend describing the manufacturer's recommended cables and cable characteristics.
9. Include a project-specific system sequence of operation description.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For fire-alarm systems and components to include in emergency, operation, and maintenance manuals. In addition to items specified in Section 017823 "Operation and Maintenance Data," include the following:

1. Comply with the "Records" Section of the "Inspection, Testing and Maintenance" Chapter in NFPA 72.
2. Provide "Record of Completion Documents" according to NFPA 72 article "Permanent Records" in the "Records" Section of the "Inspection, Testing and Maintenance" Chapter.
3. Record copy of site-specific software.
4. Provide "Maintenance, Inspection and Testing Records" according to NFPA 72 article of the same name and include the following:

    a. Frequency of testing of installed components.
    b. Frequency of inspection of installed components.
    c. Requirements and recommendations related to results of maintenance.
    d. Manufacturer's user training manuals.

5. Manufacturer's required maintenance related to system warranty requirements.
6. Abbreviated operating instructions for mounting at fire-alarm control unit.
7. Final device address list.

1.7 QUALITY ASSURANCE

A. System installers shall be trained and certified by the equipment manufacturer for installation of units required for this Project. At a minimum, installation shall be supervised by personnel certified by NICET as a fire-alarm Level III technician.

B. Shop Drawings shall be prepared by persons with the following qualifications:

1. Trained and certified by manufacturer in fire-alarm system design.
2. Licensed or certified by authorities having jurisdiction.

C. Source Limitations for Fire-Alarm System and Components: Obtain fire-alarm system from a single source and from a single manufacturer. Components shall be compatible with, and operate as, an extension of existing system.

D. Electrical Components, Devices, and Accessories: U.L. listed and labeled by a qualified testing agency, and marked for intended location and application.

E. Fire alarm system installer shall be located within 50 miles of the project location and shall have a minimum of 5 years experience in installing such systems.

F. Fire alarm system service provider shall be located within 50 miles of the project location and shall have a minimum of 10 years experience in servicing such systems.

1.8 WARRANTY

A. The entire fire alarm system shall be warranted free from defects in material and workmanship for a period of one year from the date of final system acceptance.

1.9 SERVICE AGREEMENT

A. Comply with UL 864.

B. Provide a full service and maintenance contract for the system, for the duration of the warranty period. Agreement shall include all equipment, labor, programming, testing, and adjusting as necessary during the warranty period to maintain a fully-functional, code-compliant system. Contract shall include a minimum of two visits for detector sensitivity adjustments.

PART 2 - PRODUCTS

2.1 FIRE-ALARM CONTROL PANEL (FACP)

A. General Requirements for Fire-Alarm Control Panels

1. A signal from one device shall not prevent the receipt of signals from any other device.
2. Loss of primary power at a FACP shall sound a trouble signal and shall indicate at that FACP when the system is operating on an alternate power supply.
3. Communication between each fire alarm control panel and addressable devices shall be completely digital.
4. Each panel shall have provisions for disabling and enabling all circuits individually for maintenance or testing purposes.
5. Each FACP shall contain separate alarm, trouble, and supervisory logs to prevent alarm and supervisory conditions from being overwritten by intermittent trouble conditions.
6. Each FACP shall be field-programmable, microprocessor-based, modular, power-limited design with electronic modules, complying with UL 864 and listed and labeled by an NRTL.
    a. System software and programs shall be held in flash electrically erasable programmable read-only memory (EEPROM), retaining the information through failure of primary and secondary power supplies.
    b. Include a real-time clock for time annotation of events on the event recorder and printer.

B. Alphanumeric Display and System Controls: Arranged for interface between human operator at fire-alarm control unit and addressable system components including annunciation and supervision. Display alarm, supervisory, and component status messages and the programming and control menu. Manual and automatic operation of alarm and supervisory initiating devices shall be annunciated on each FACP display indicating the location and type of device.

1. Annunciator and Display: Liquid-crystal type, 80 characters, minimum.
2. Keypad: Arranged to permit entry and execution of programming, display, and control commands and to indicate control commands to be entered into the system for control of smoke-detector sensitivity and other parameters.
3. Each FACP shall display only those primary controls and displays essential to operation during a fire alarm condition. Keyboards or keypads shall not be required to operate the

system during fire alarm conditions. A local audible device shall sound during each key press to provide an audible feedback to ensure that the key had been pressed properly.

C. Each FACP shall be capable of supporting a minimum of 100 addressable devices of any type on a single addressable circuit.

D. Each FACP shall be capable of being tested by one person. In test mode, control functions shall be bypassed and the monitoring station shall be disconnected. Should the one-person test feature be on for an inappropriate amount of time the FACP shall revert to the normal mode automatically. It shall be possible to separate addressable devices into test groups. Test groups shall be programmable and field editable. Each FACP shall be capable of a minimum of 8 test groups.

E. Each FACP shall be "network upgradeable". It shall not be necessary to replace the FACP in order to provide a networked system at a later date.

F. Each FACP shall be provided with a minimum of 2 RS-232 outputs capable of operating a remote maintenance terminal and/or printers; outputs shall be ASCII from an EIA RS-232C connection with an adjustable baud rate. Each output shall be field configurable for supervised or for unsupervised operation.

G. Provide integral DACT that communicates alarm, trouble, and supervisory conditions to a UL listed remote station. The monitoring service shall be provided under a separate contract with the owner. Capabilities of the transmitter shall be as specified below.

H. Relay Outputs: At a minimum, provide three, form C, programmable, relay contacts rated a minimum of 2-amps at 24-volts DC. Contacts shall be programmed to indicate system alarm, supervisory, and trouble conditions, respectively, for monitoring by other systems.

I. Primary Power: 24-V dc obtained from 120-V ac service and a power-supply module. Initiating devices, notification appliances, signaling lines, trouble signals, supervisory signals, digital alarm communicator transmitters etc. shall be powered by 24-V dc source.

1. Alarm current draw of entire fire-alarm system shall not exceed 75 percent of the power-supply module rating.

2.2 DIGITAL ALARM COMMUNICATOR TRANSMITTER

A. Digital alarm communicator transmitter shall be acceptable to the remote central station and shall comply with UL 632 and be listed and labeled by an NRTL.

B. Functional Performance: Unit shall receive an alarm, supervisory, or trouble signal from fire-alarm control unit and automatically capture one of two available telephone line(s) and dial a preset number for a remote monitoring station. When contact is made with the remote monitoring station, signals shall be transmitted. If service on either line is interrupted for longer than 45 seconds, transmitter shall initiate a local trouble signal and transmit the signal indicating loss of telephone line to the remote alarm receiving station over the remaining line. Transmitter shall automatically report telephone service restoration to the central station. If service is lost on both telephone lines, transmitter shall initiate the local trouble signal.

C. Digital data transmission shall include the following:

1. Address/zone of the alarm condition.
2. Address/zone of the supervisory condition.

3. Address/zone of the trouble-condition.
4. Loss of ac supply or loss of power.
5. Low battery.
6. Abnormal test signal.
7. Communication bus failure.

D. Self-Test: Conducted automatically every 24 hours with report transmitted to remote monitoring station.

2.3 REMOTE POWER SUPPLIES

A. Where additional notification power is required, provide remote power supplies as necessary to support the notification load.

B. Remote power supplies shall have a minimum of 4 DC output circuits and 8 amps of available power.

C. Mount remote power supplies as necessary in locations to be approved by the owner. Show remote power supply locations on submittal shop drawings.

2.4 BATTERIES

A. Batteries shall be sealed lead-acid, maintenance-free-type. Size all batteries to meet the requirements set in paragraph 1.3 "SYSTEM DESCRIPTION AND GENERAL REQUIREMENTS.

2.5 REMOTE SYSTEM ANNUNCIATOR

A. Annunciators shall use the same Primary Acknowledge, Silence, and Reset Keys, Status LEDs and LCD Display as the system FACP.

B. Mounting: Flush cabinet, NEMA 250, Type 1.

C. Operator keys shall be key-switch enabled to prevent unauthorized use. The key shall only be removable in the disabled position.

D. Annunciators shall display alarm, trouble, and supervisory status information for every device connected to the system.

2.6 MANUAL FIRE-ALARM STATIONS

A. General Requirements: Comply with UL 38.

1. Pull stations shall be addressable, Double-action (push-pull) type, fabricated of high impact red polycarbonate, and finished in red with molded, raised-letter operating instructions of contrasting color. Stations requiring the breaking of a glass panel are not acceptable. Stations requiring the breaking of a concealed rod may be provided.
2. Station Reset: Key- or wrench-operated switch.
3. Stations shall show visible indication of operation; and shall be mounted on recessed outlet box. If surface mounting is required by field conditions, provide manufacturer's red-painted surface back box.

4. Indoor Protective Shield: Where indicated on drawings, provide a factory-fabricated clear plastic enclosure hinged at the top to permit lifting for access to initiate an alarm. Lifting the cover actuates an integral battery-powered audible horn intended to discourage false-alarm operation. The horn shall be rated at a minimum of 85 dB at 10 feet and shall be powered by a 9-volt battery.
5. Weatherproof Protective Shield: When located outside or in high humidity areas, provide a weatherproof, factory-fabricated clear plastic enclosure hinged at the top to permit lifting for access to initiate an alarm.

2.7 ADDRESSABLE DETECTORS, BASES, AND HOUSINGS

A. General Requirements:

1. Integral Addressable Module: Arranged to communicate detector information to the fire-alarm control panel, to program detector sensitivity from the FACP, and to control programmable base / housing functions.
2. Mounting: Detector and associated electronic components shall be mounted in a twist-lock module that connects to a fixed base or is inside a protective housing. Provide terminals in the fixed base / housing for connection to building wiring.
3. Self-Restoring: Detectors do not require resetting or readjustment after actuation to restore them to normal operation.
4. Integral Visual-Indicating Light: LED type indicating detector activation and power-available status.
5. Supervision: Removal of a detector head from its base / housing shall cause a trouble signal at the FACP.

B. Detector Bases for Spot-Type Detectors: Bases shall be compatible with detector installed and shall provide for a quick and secure detector plug-in. Detectors without separate bases will not be allowed. Wiring connections shall be via screws accepting conductors in sizes from 24 AWG to 14 AWG.

1. Sounder Bases: Where noted on plans, detectors shall be provided with programmable sounder bases. It shall be possible to program the sounder to operate on local or general alarm conditions. Sounder shall be rated a minimum of 85 dB and shall implement the NFPA 72 standard “temporal 3 coded” evacuation signal. It shall be possible for several sounders in a common area to be synchronized. As an added security feature, sounder bases shall be provided with a mechanical locking feature for the detector, preventing unauthorized removal of a detector from the base.

C. Heat Detectors: U.L. 521. Analog, addressable, rate compensated, communicating actual temperature information to the FACP

1. Rate-of-rise temperature characteristic shall be selectable at fire-alarm control unit for 15 or 20 deg F (8 or 11 deg C) per minute.
2. Fixed-temperature sensing shall be independent of rate-of-rise sensing and shall be settable at fire-alarm control unit to operate at 135 or 155 deg F (57 or 68 deg C).

D. Photoelectric Smoke Detectors: U.L. 268. Analog, addressable, operating on the light scattering principle of smoke detection, communicating % per foot obscuration information to the FACP.

1. Sensitivity Range: 0.5% to 3.5% per foot of smoke obscuration.
2. Air velocity range: 0-2000 ft/min (minimum).

E. Duct-Mounted Smoke Detector: U.L. 268A. Analog, addressable, photoelectric smoke detector, communicating % per foot obscuration information to the FACP, mounted in a protective housing that accommodates sampling tubes and is suitable for mounting to HVAC ductwork.

1. Protective Housing: Impact resistant, suitable for mounting to either round or rectangular ducts, listed for use with the supplied detector.
2. Sensitivity Range: 0.5% to 3.5% per foot of smoke obscuration
3. Air velocity range: 300-4000 ft/min (minimum).
4. Sampling Tubes: Design and dimensions as recommended by manufacturer for specific duct size, air velocity, and installation conditions.
5. Relay Fan Shutdown: Form C contact rated to interrupt fan motor-control circuit.
6. Remote alarm/test station: Provide a remote alarm test station for each concealed, duct-mounted smoke detector in accordance with NFPA 72. Locate alarm / test station in a visible location, near the concealed detector.

2.8 ADDRESSABLE INTERFACE DEVICES

A. Description: Addressable, completely supervised control and monitor modules as required for a completely addressable system. The use of panel mounted conventional zone or relay circuits is not acceptable unless otherwise indicated on drawings. Modules shall mount in a standard electrical outlet box and shall be compatible with other addressable devices on the same signaling line circuit.

B. Addressable Control Module: Programmable relay with contacts rated a minimum of 1-amp at 24-volts DC, ½-amp at 120-volts AC.

C. Addressable Monitor Module: Provides class B supervision of a set of dry contacts and communicates status back to the FACP.

D. Addressable Signal Modules: Class A or class B supervised notification appliance circuit for selective control of specific horns, strobes, or speakers.

E. ISOLATOR MODULES

F. Addressable relay residing on the signaling line circuit that isolates devices downstream of the relay from the FACP and devices upstream of the relay upon detecting a short or ground fault on the circuit.

2.9 NOTIFICATION APPLIANCES

A. General Requirements for Notification Appliances: Connected to notification appliance signal circuits, zoned as indicated, equipped for mounting as indicated and with screw terminals for system connections.

1. Combination Devices: Factory-integrated audible and visual notification devices in a single mounting assembly. The audible and visual characteristics shall be as specified for each individual device, herein.
2. Circular shape when mounted in ceiling; square or rectangular shape when mounted in wall.
3. Where required by drawings provide protective guards that are UL listed with the device it is intended to protect.

4. Color: Unless noted otherwise, devices shall be white when mounted in ceilings and red when mounted in or on walls Surface-mounted back boxes shall be of the same color as the device mounted in it.

B. Fire Alarm Horns: U.L. 464. Electronic polarized type operating with a piezoelectric element in an impact-resistant, flame-retardant thermoplastic housing. Horns shall produce a minimum of 85dB, measured 10 feet from the source. All audible horn tones shall be in the NFPA recognized temporal code 3 format.

1. Mounting: Recessed in a 4-inch square handy box or surface-mounted in matching, finished surface box furnished by the manufacturer of the device.
2. Weatherproof: Rated for outdoor use where located outside or denoted as weatherproof on plans, furnished with weatherproof boxes, plates, or gaskets as required.

C. Visible Notification Appliances: U.L. 1971, unless noted or specified otherwise. Xenon strobe lights with clear lens mounted on an aluminum faceplate. The word "FIRE" shall be engraved in minimum 1-inch high letters on the faceplate.

1. For units with guards to prevent physical damage, light output ratings shall be determined with guards in place.
2. Mounting: Recessed in a 4-inch square handy box or surface-mounted in matching, finished surface box furnished by the manufacturer of the device.
3. Weatherproof: U.L. 1638. Rated for outdoor use where located outside or denoted as weatherproof on plans, furnished with weatherproof boxes, plates, or gaskets as required.
4. Flashing shall be in a temporal pattern, synchronized with audible units. All strobes on the same notification appliance circuit shall be synchronized.

2.10 MAGNETIC DOOR HOLDERS

A. Electromagnetic type holders, 24 VDC, developing a minimum of 25 pounds of holding force. Door holders / closers shall be wall mounted as indicated.

2.11 SYSTEM PRINTER

A. Printer shall be listed and labeled by an NRTL as an integral part of fire-alarm system.

PART 3 - EXECUTION

3.1 GENERAL

A. Power: Provide dedicated 20-amp, 120-volt circuit to each control panel and power supply. Circuit shall be identified and protected per NFPA 72.

B. DACT: Provide communication rough-in for connection of DACT to required telephone lines. Coordinate DACT requirements with communication system provider.

3.2 EQUIPMENT INSTALLATION

A. Comply with NFPA 72 and manufacturer's installation instructions for installation of fire-alarm equipment.

B. Install wall-mounted equipment, with tops of cabinets not more than 72 inches above the finished floor.

C. Manual Stations: Mount with operating handle 48-inches above finished floor, unless otherwise noted on plans. Mount within 5 feet of the exit doorway served. For doorway openings over 40-feet, provide a station on each end, within 5-feet of the opening.

D. Spot Type Smoke and Heat Detectors: Install where shown on drawings in accordance with NFPA 72 guidelines. Conflicts between plans and NFPA 72 requirements shall be brought to the immediate attention of the Engineer for resolution prior to device installation. No additional compensation will be provided for removal of detectors installed in violation of NFPA 72 requirements. Where field conditions are not as illustrated on plans, or where field changes impact device locations, notify the Engineer for resolution.
   1. Locate a minimum of 3-feet from a supply air diffuser.
   2. Locate a minimum of 12-inches from a surface-mounted light fixture.

E. Duct Smoke Detectors: Comply with NFPA 72 and NFPA 90A. Install sampling tubes so they extend the full width of duct.

F. Air Sampling Type Smoke Detectors: Install in accordance with manufacturer's instructions, in locations readily accessible for maintenance.

G. Heat Detectors for Elevator Control: Coordinate temperature rating and location with sprinkler ratings and locations. Locate within 2-feet of each sprinkler head.

H. Remote Status and Alarm Indicators: Furnish and install near each smoke detector and each sprinkler water-flow switch and valve-tamper switch that is not readily visible from normal viewing position.

I. Addressable Monitor and Control Modules: Mount within 3-feet of the device to be monitored or controlled.

J. Wall-mounted notification devices: Install 80 inches above the finished floor or 6 inches below the ceiling, whichever is lower, as measured from the bottom of the device.

3.3 CABLE INSTALLATION

A. Install wiring in metal raceway according to Division 16 Section "Raceways and Boxes for Electrical Systems."Conceal raceways except in unfinished spaced and as indicated on plans.

B. Install conductors in enclosures parallel with or at right angles to the sides and back of the enclosure. Bundle, lace, and train the conductors to terminal points with no excess. Connect conductors that are terminated, spliced, or interrupted in any enclosure associated with the fire alarm system to terminal blocks. Mark each terminal according to the wiring diagrams of the system. Make all connections with approved crimp-on terminal spade lugs pressure-type terminal blocks, or plug connectors.

C. Use numbered terminal strips in junction, pull or outlet boxes, cabinets, or equipment enclosures where any circuit tap is made.

D. Wire and cable shall be a type listed for its intended use by an approval agency acceptable to the Authority Having Jurisdiction (AHJ) and shall be installed in accordance with the appropriate articles from the current approved edition of the National Electric Code.

E. Color-code fire alarm cables with a red overall jacket. Paint fire alarm system junction boxes and covers red.

3.4 IDENTIFICATION

A. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Section 16075 "Identification for Electrical Systems."

3.5 GROUNDING

A. Ground equipment and cable shields as specified by the equipment manufacturer.

B. Ground fire-alarm control unit and associated circuits; comply with IEEE 1100. Install a ground wire from main service ground to fire-alarm control unit.

3.6 FIELD QUALITY CONTROL

A. Provide the services of a NICET level III project installation manager to supervise the total installation, including the field assembly and connection of components.

B. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust components, assemblies, and equipment installations, including connections.

C. Tests and Inspections:

1. Visual Inspection: Conduct visual inspection prior to testing.

    a. Inspection shall be based on completed Record Drawings and system documentation that is required by NFPA 72 in its "Completion Documents, Preparation" Table in the "Documentation" Section of the "Fundamentals of Fire Alarm Systems" Chapter.
    b. Comply with "Visual Inspection Frequencies" Table in the "Inspection" Section of the "Inspection, Testing and Maintenance" Chapter in NFPA 72; retain the "Initial/Reacceptance" column and list only the installed components.

2. System Testing: Comply with "Test Methods" Table in the "Testing" Section of the "Inspection, Testing and Maintenance" Chapter in NFPA 72. Correct deficiencies indicated by tests and completely retest work affected by such deficiencies. Verify by the system test that the total system meets the specifications and complies with applicable standards.
3. Test audible appliances for the public operating mode according to manufacturer's written instructions. Perform the test using a portable sound-level meter complying with Type 2 requirements in ANSI S1.4.
4. Factory-authorized service representative shall prepare the "Fire Alarm System Record of Completion" in the "Documentation" Section of the "Fundamentals of Fire Alarm Systems" Chapter in NFPA 72 and the "Inspection and Testing Form" in the "Records" Section of the "Inspection, Testing and Maintenance" Chapter in NFPA 72.

D. Reacceptance Testing: Perform reacceptance testing to verify the proper operation of added or replaced devices and appliances.

E. Fire-alarm system will be considered defective if it does not pass tests and inspections.

F. Provide a written record of inspections, test, and detailed test results in the form of a test log. Submit log to the owner upon the satisfactory completion of tests.

G. Perform a final test as required by the Authority Having Jurisdiction in order to obtain a certificate of occupancy. Demonstrate that the system meets the specifications and complies with applicable standards. This final test shall be witnessed by a representative of the Authority Having Jurisdiction, the Engineer, the Architect, and a factory-authorized service representative.

3.7 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain fire-alarm system. Provide a minimum of 8 hours of training.

END OF SECTION 16721

DIVISION 22

WATER DISTRIBUTION

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes water-distribution piping and specialties outside the building for the following:

1. Water main, valves, and fittings.

1.2 SUBMITTALS

A. Product Data: For the following:

1. Pipe

2. Valves and accessories.

B. Operation and Maintenance Data: For the following:

1. Valves.

1.3 QUALITY ASSURANCE

A. Regulatory Requirements:

1. Comply with requirements of utility company supplying water. Include tapping of water mains and backflow prevention.

2. Comply with standards of authorities having jurisdiction for potable-water-service piping, including materials, installation, testing, and disinfection.

3. Comply with standards of authorities having jurisdiction for fire-suppression water-service piping, including materials, hose threads, installation, and testing.

B. Piping materials shall bear label, stamp, or other markings of specified testing agency.

C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

D. Comply with FM's "Approval Guide" or UL's "Fire Protection Equipment Directory" for fire-service-main products.

E. NFPA Compliance: Comply with NFPA 24 for materials, installations, tests, flushing, and valve and hydrant supervision for fire-service-main piping for fire suppression.

F. NSF Compliance:

1. Comply with NSF 14 for plastic potable-water-service piping.

2. Comply with NSF 61 for materials for water-service piping and specialties for domestic water.

1.4 PROJECT CONDITIONS

A. Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:

1. Notify Architect not less than two days in advance of proposed utility interruptions.

2. Do not proceed with utility interruptions without Architect's written permission.

1.5 COORDINATION

A. Coordinate connection to water main with utility company and/or owner.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where subparagraph titles below introduce lists, the following requirements apply for product selection:

1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the products specified. Products: Subject to compliance with requirements, provide one of the products specified.

2. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the manufacturers specified.

3. Manufacturers: Subject to compliance with requirements, provide products by the manufacturers specified.

2.1 PIPING MATERIALS

A. Refer to Part 3 "Piping Applications" Article for applications of pipe, tube, fitting, and joining materials.

2.2 PIPE AND FITTINGS

A. Mechanical-Joint, Ductile-Iron Pipe: AWWA C151, with mechanical-joint, bell- and plain spigot end unless grooved or flanged ends are indicated.

1. Mechanical-Joint, Ductile-Iron Fittings: AWWA C110, ductile- or gray-iron standard pattern or AWWA C153, ductile-iron compact pattern.

2. Glands, Gaskets, and Bolts: AWWA C111, ductile- or gray-iron glands, rubber gaskets, and steel bolts.

B. PVC: SDR 26, Class 160, Type 1, Grade 1, ASTM D2241.

1. Comply with UL 1285 for fire-service mains if indicated.

2.3 JOINING MATERIALS

A. Refer to Division 2 Section "Utility Materials" for commonly used joining materials.

B. Brazing Filler Metals: AWS A5.8, BCuP Series.

C. Soldering Flux: ASTM B 813, water-flushable type.

D. Solder Filler Metal: ASTM B 32, lead-free type with 0.20 percent maximum lead content.

2.4 VALVES

A. AWWA, Cast-Iron, Gate Valves:

1. Manufacturers:

American AVK Co.; Valves & Fittings Div.
American Cast Iron Pipe Co.; American Flow Control Div.
American Cast Iron Pipe Co.; Waterous Co. Subsidiary.
Crane Co.; Crane Valve Group; Stockham Div.
East Jordan Iron Works, Inc.
Grinnell Corporation; Mueller Co.; Water Products Div.
McWane, Inc.; Clow Valve Co. Div. (Oskaloosa).
McWane, Inc.; Kennedy Valve Div.
McWane, Inc.; Tyler Pipe; Utilities Div.
NIBCO INC.
United States Pipe and Foundry Company.
Or Equal

B. Nonrising-Stem, Metal-Seated Gate Valves: AWWA C500, gray- or ductile-iron body and bonnet; with cast-iron or bronze double-disc gate, bronze gate rings, bronze stem, and stem nut.

1. Minimum Working Pressure: 200 psig.

2. End Connections: Mechanical joint.

3. Interior Coating: Complying with AWWA C550.

C. UL/FM, Cast-Iron Gate Valves:

1. Manufacturers:

American Cast Iron Pipe Co.; American Flow Control Div.
American Cast Iron Pipe Co.; Waterous Co. Subsidiary.

Central Sprinkler Company.
Crane Co.; Crane Valve Group; Stockham Div.
Grinnell Corporation.
Grinnell Corporation; Mueller Co.; Water Products Div.
McWane, Inc.; Clow Valve Co. Div. (Oskaloosa).
McWane, Inc.; Kennedy Valve Div.
McWane, Inc.; M & H Valve Company Div.
NIBCO INC.
United States Pipe and Foundry Company.
Or Equal

D. UL/FM, Nonrising-Stem Gate Valves: UL 262, FM-approved iron body and bonnet with flange for indicator post, bronze seating material, and inside screw.

1. Minimum Working Pressure: 175 psig

2. End Connections: Flanged.

2.5 GATE VALVE ACCESSORIES AND SPECIALTIES

A. Tapping-Sleeve Assemblies: Comply with MSS SP-60. Include sleeve and valve compatible with drilling machine.

1. Manufacturers:

American Cast Iron Pipe Co.; Waterous Co. Subsidiary.
East Jordan Iron Works, Inc.
Grinnell Corporation; Mueller Co.; Water Products Div.
International Piping Services Company.
McWane, Inc.; Clow Valve Co. Div. (Oskaloosa).
McWane, Inc.; Kennedy Valve Div.
McWane, Inc.; M & H Valve Company Div.
United States Pipe and Foundry Company.
Or Equal

2. Tapping Sleeve: Cast- or ductile-iron or stainless-steel, two-piece bolted sleeve with flanged outlet for new branch connection. Include sleeve matching size and type of pipe material being tapped and with recessed flange for branch valve.

3. Valve: AWWA, cast-iron, nonrising-stem, [seated gate valve with one raised face flange mating tapping-sleeve flange.

B. Valve Boxes: Comply with AWWA M44 for cast-iron valve boxes. Include top section, ajustable extension of length required for depth of burial of valve, plug with lettering “WATER,” bottom section with base of size to fit over valve, and approximately 5-inch diameter barrel.

1. Operating Wrenches: Steel tee-handle with one pointed end, stem of length to operate deepest buried valve, and socket matching valve operating nut.

C. Vertical-Type Indicator Posts: UL 789, FM-approved, cast-iron body with operating wrench, extension rod, and adjustable cast-iron barrel of length required for depth of burial of valve.

PART 2 - EXECUTION

3.1 PIPING APPLICATIONS

A. Refer to Division 2 Section “Earthwork” for excavating, trenching, and backfilling.

B. Underground Water-Service Piping: Use the following piping materials for each size range:

1. NPS 8: Ductile-iron, mechanical-joint pipe; ductile-iron, mechanical-joint fittings; and mechanical joints.

2. NPS 8: PVC, AWWA Class 150 pipe; PVC, AWWA Class 150 molded fittings; and gasketed joints.

C. Underground Fire-Service-Main Piping: Ductile-iron, push-on-joint pipe; ductile-iron, push-on-joint fittings; and gasketed or mechanical-joint pipe; ductile-iron, mechanical-joint fittings; and mechanical joints.

D. Underground Combined Water-Service and Fire-Service-Main Piping: Ductile-iron, push-on joint pipe; ductile-iron, push-on-joint fittings; and gasketed or mechanical-joint pipe; ductile-iron, mechanical-joint fittings; and mechanical joints.

3.2 VALVE APPLICATIONS

A. General Application: Use mechanical-joint-end valves for NPS 3 and larger underground installation. Use threaded- or flanged-end valves for installation in vaults. Use UL/FM, nonrising-stem gate valves for installation with indicator posts. Use corporation valves and curb valves with ends compatible with piping, for NPS 2 and smaller installation.

B. Drawings indicate valve types to be used. Where specific valve types are not indicated, the following requirements apply:

1. Underground Valves, NPS 4 and Larger, for Indicator Posts: UL/FM, Cast-iron, non-rising-stem gate valves with indicator post.

3.3 JOINT CONSTRUCTION

A. See Division 2 Section "Utility Materials" for basic piping joint construction.

B. Make pipe joints according to the following:

1. Ductile-Iron Piping, Gasketed Joints for Water-Service Piping: AWWA C600 and AWWA M41.

2. Ductile-Iron Piping, Gasketed Joints for Fire-Service-Main Piping: UL 194.

3. PVC Piping Gasketed Joints: Use joining materials according to AWWA C900. Construct joints with elastomeric seals and lubricant according to ASTM D 2774 or ASTM D 3139 and pipe manufacturer's written instructions.

4. Dissimilar Materials Piping Joints: Use adapters compatible with both piping materials, with OD, and with system working pressure. Refer to Division 2 Section "Utility Materials" for joining piping of dissimilar metals.

3.4 PIPING INSTALLATION

A. Water-Main Connection: Tap water main according to requirements of water utility company and of size and in location indicated.

B. Make connections larger than NPS 2 with tapping machine according to the following:

1. Install tapping sleeve and tapping valve according to MSS SP-60.

2. Install tapping sleeve and tapping valve on pipe to be tapped.

3. Use tapping machine compatible with valve and tapping sleeve; cut hole in main through valve.

4. Remove tapping machine and connect water piping.

5. Install valve with stem pointing up and with valve box.

C. Make connections NPS 2 and smaller with drilling machine according to the following:

1. Install service-saddle assemblies and corporation valves in size, quantity, and arrangement required by utility company standards.

2. Install service-saddle assemblies on water-service pipe to be tapped. Position outlets for corporation valves.

3. Use drilling machine compatible with service-saddle assemblies and corporation valves. Drill hole in main. Remove drilling machine and connect water-service piping.

4. Install corporation valves into service-saddle assemblies.

5. Install manifold for multiple taps in water main.

6. Install curb valve in water-service piping with head pointing up and with service box.

D. Comply with NFPA 24 for fire-service-main piping materials and installation.

E. Install ductile-iron, water-service piping according to AWWA C600 and AWWA M41.

F. Install PVC, AWWA pipe according to AWWA M23 and ASTM F 645.

G. Install PE pipe according to ASTM D 2774 and ASTM F 645.

H. Bury piping with depth of cover over top at least 30 inches, with top at least 12 inches below level of maximum frost penetration.

I. Extend water-service piping and connect to water-supply source and building water piping systems at outside face of building wall in locations and pipe sizes indicated.

1. Terminate water-service piping at building wall until building water piping systems are installed. Terminate piping with caps, plugs, or flanges as required for piping material. Make connections to building water piping systems when those systems are installed.

J. Install underground piping with restrained joints at horizontal and vertical changes in direction. Use restrained-joint piping, thrust blocks, anchors, tie-rods and clamps, and other supports.

K. Anchor service-entry piping to building wall.

3.5 ANCHORAGE INSTALLATION

A. Install anchorages for tees, plugs and caps, bends, crosses, valves, and hydrant branches. Include anchorages for the following piping systems:

1. Gasketed-Joint, Ductile-Iron, Water-Service Piping: According to AWWA C600.

2. Gasketed-Joint, PVC Water-Service Piping: According to AWWA M23.

3. Fire-Service-Main Piping: According to NFPA 24.

4. Apply full coat of asphalt or other acceptable corrosion-resistant material to surfaces of installed ferrous anchorage devices.

3.6 VALVE INSTALLATION

A. AWWA Gate Valves: Comply with AWWA C600 and AWWA M44. Install each underground valve with stem pointing up and with valve box.

B. UL/FM Gate Valves: Comply with NFPA 24. Install each underground valve and valves in vaults with stem pointing up and with vertical cast-iron indicator post.

C. Corporation Valves and Curb Valves: Install each underground curb valve with head pointed up and with service box.

3.7 CONNECTIONS

A. Piping installation requirements are specified in other Division 2 Sections. Drawings indicate general arrangement of piping and specialties.

B. See Division 2 Section "Utility Materials" for piping connections to valves and equipment.

C. Connect water-distribution piping to existing water main. Use tapping sleeve and tapping valve.

D. Connect water-distribution piping to interior domestic-water and fire-suppression piping.

E. Connect waste piping from drinking fountains to sanitary sewerage system.

3.8 FIELD QUALITY CONTROL

A. Piping Tests: Conduct piping tests before joints are covered and after thrust blocks have hardened sufficiently. Fill pipeline 24 hours before testing and apply test pressure to stabilize system. Use only potable water.

B. Hydrostatic Tests: Test at not less than 1-1/2 times working pressure for 2 hours.

1. Increase pressure in 50-psig increments and inspect each joint between increments. Hold at test pressure for 1 hour; decrease to 0 psig. Slowly increase again to test pressure and hold for 1 more hour. Maximum allowable leakage is 2 quarts per hour per 100 joints. Remake leaking joints with new materials and repeat test until leakage is within allowed limits.

C. Prepare reports of testing activities.

3.8 IDENTIFICATION

A. Install continuous underground detectable warning tape during backfilling of trench for underground water-service piping. Locate below finished grade, directly over piping. See Division 2 Section “Earthwork” for underground warning tapes.

B. Permanently attach equipment nameplate or marker, indicating plastic water-service piping, on main electrical meter panel. See Division 2 Section “Utility Materials” for identifying devices.

3.9 CLEANING

A. Clean and disinfect water-distribution piping as follows:

B. Purge new water-distribution piping systems and parts of existing systems that have been altered, extended, or repaired before use.

C. Use purging and disinfecting procedure prescribed by authorities having jurisdiction or, if method is not prescribed by authorities having jurisdiction, use procedure described in NFPA 24 for flushing of piping. Flush piping system with clean, potable water until dirty water does not appear at points of outlet.

D. Use purging and disinfecting procedure prescribed by authorities having jurisdiction or, if method is not prescribed by authorities having jurisdiction, use procedure described in AWWA C651 or as described below:

1. Fill system or part of system with water/chlorine solution containing at least 50 ppm of chlorine; isolate and allow to stand for 24 hours.

2. Drain system or part of system of previous solution and refill with water/chlorine solution containing at least 200 ppm of chlorine; isolate and allow to stand for 3 hours.

3. After standing time, flush system with clean, potable water until no chlorine remains in water coming from system.

4. Submit water samples in sterile bottles to authorities having jurisdiction. Repeat procedure if biological examination shows evidence of contamination.

5. Prepare reports of purging and disinfecting activities.

END OF SECTION 221113

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes sanitary sewerage outside the building.

1.2 PERFORMANCE REQUIREMENTS

A. Gravity-Flow, Nonpressure-Piping Pressure Ratings: At least equal to system test pressure.

B. Force-Main Pressure Ratings: At least equal to system operating pressure, but not less than 150 psig.

1.3 SUBMITTALS

A. Product Data: For the following:

1. Gravity Sewer Piping

2. Sewer Force Main Piping

1.4 PROJECT CONDITIONS

A. Site Information: Perform site survey, research public utility records, and verify existing utility locations.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where subparagraph titles below introduce lists, the following requirements apply for product selection:

B. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the manufacturers specified.

C. Manufacturers: Subject to compliance with requirements, provide products by the manufacturers specified.

2.2 PIPING MATERIALS

A. Refer to Part 3 “Piping Applications” Paragraph for applications of pipe and fitting materials.

2.3 PIPES AND FITTINGS

A. Hub-and-Spigot, Cast-Iron Soil Pipe and Fittings: ASTM A 74, gray iron, for gasketed joints.

1. Gaskets: ASTM C 564, rubber, compression type, thickness to match class of pipe.

B. Ductile-Iron Sewer Pipe: ASTM A 746, for push-on joints.

1. Standard-Pattern, Ductile-Iron Fittings: AWWA C110, ductile or gray iron, for push-on joints.

2. Compact-Pattern, Ductile-Iron Fittings: AWWA C153, for push-on joints.

3. Gaskets: AWWA C111, rubber.

C. PVC Sewer Pipe and Fittings: According to the following:

1. PVC Sewer Pipe and Fittings, NPS 15 and Smaller: AWWA C-900, for solvent-cemented or gasketed joints.

2. Gaskets: ASTM F 477, elastomeric seals.

2.4 MANHOLES

A. Normal-Traffic Precast Concrete Manholes: ASTM C 478, precast, reinforced concrete, of depth indicated, with provision for rubber gasketed joints.

1. Diameter: 48 inches, minimum, unless otherwise indicated.

2. Ballast: Increase thickness of precast concrete sections or add concrete to base section, as required to prevent flotation.

3. Base Section: 6-inch minimum thickness for floor slab and 4-inch minimum thickness for walls and base riser section, and having separate base slab or base section with integral floor.

4. Riser Sections: 4-inch minimum thickness and lengths to provide depth indicated.

5. Top Section: Eccentric-cone type, unless concentric-cone or flat-slab-top type is indicated. Top of cone of size that matches grade rings.

6. Gaskets: ASTM C 443, rubber.

7. Grade Rings: Include two or three reinforced-concrete rings, of 6- to 9-inch total thickness, that match 24-inchdiameter frame and cover.

8. Steps: Fiberglass, individual steps or ladder. Include width that allows worker to place both feet on one step and is designed to prevent lateral slippage off step. Cast or anchor into base, riser, and top section sidewalls with steps at 12- to 16-inch intervals. Omit steps for manholes less than 60 inches deep.

9. Steps: ASTM C 478, individual steps or ladder. Omit steps for manholes less than 60 inches deep.

10. Pipe Connectors: ASTM C 923, resilient, of size required, for each pipe connecting to base section.

B. Manhole Frames and Covers: ASTM A 536, Grade 60-40-18, ductile-iron castings designed for heavy-duty service. Include 24-inch ID by 7- to 9-inch riser with 4-inch minimum width flange, and 26-inch diameter cover. Include indented top design with lettering “SANITARY SEWER” cast into cover.

C. Manhole Cover Inserts: Manufactured, plastic form, of size to fit between manhole frame and cover and designed to prevent stormwater inflow. Include handle for removal and gasket for gastight sealing.

1. Manufacturers:

   FRW Industries, Inc.
   Knutson Manufacturing Co.
   Parson Environmental Products, Inc.
   Or Equal

2. Type: Solid.

2.4 CONCRETE

A. General: Cast-in-place concrete according to ACI 318, ACI 350R, and the following:

1. Cement: ASTM C 150, Type II.

2. Fine Aggregate: ASTM C 33, sand.

3. Coarse Aggregate: ASTM C 33, crushed gravel.

4. Water: Potable.

B. Portland Cement Design Mix: 4000 psi minimum, with 0.45 maximum water-cementitious materials ratio.

1. Reinforcement Fabric: ASTM A 185, steel, welded wire fabric, plain.

2. Reinforcement Bars: ASTM A 615/A 615M, Grade 60, deformed steel.

C. Structure Channels and Benches: Factory or field formed from concrete. Portland cement design mix, 4000 psi minimum, with 0.45 maximum water-cementitious materials ratio. Include channels and benches in manholes.

1. Channels: Concrete invert, formed to same width as connected piping, with height of vertical sides to three-fourths of pipe diameter. Form curved channels with smooth, uniform radius and slope.

a. Invert Slope: 1 percent through manhole.

2. Benches: Concrete, sloped to drain into channel.

a. Slope: 4 percent.

D. Ballast and Pipe Supports: Portland cement design mix, 3000 psi minimum, with 0.58 maximum water-cementitious materials ratio.

1. Reinforcement Fabric: ASTM A 185, steel, welded wire fabric, plain.

2. Reinforcement Bars: ASTM A 615/A 615M, Grade 60, deformed steel.

2.5 PROTECTIVE COATINGS

A. Description: One- or two-coat, coal-tar epoxy; 15-mil minimum thickness, unless otherwise indicated; factory or field applied to the following surfaces:

1. Concrete Manholes: On exterior and interior surfaces.

2. Manhole Frames and Covers: On entire surfaces.

2.6 BACKWATER VALVES

A. Gray-Iron Backwater Valves: ASME A112.14.1, gray-iron body and bolted cover, with bronze seat.

1. Manufacturers:

Josam Co.
McWane, Inc.; Tyler Pipe; Wade Div.
Smith, Jay R. Mfg. Co.
Watts Industries, Inc.; Ancon Drain Div.
Watts Industries, Inc.; Enpoco, Inc. Div.
Zurn Industries, Inc.; Hydromechanics Div.
Or Equal

2. Horizontal Type: With swing check valve and hub-and-spigot ends.

3. Combination Horizontal and Manual Gate-Valve Type: With swing check valve, integral gate valve, and hub-and-spigot ends.

4. Terminal Type: With bronze seat, swing check valve, and hub inlet.

B. PVC Backwater Valves: Similar to ASME A112.14.1, horizontal type; with PVC body, PVC removable cover, and PVC swing check valve.

1. Manufacturers:

Canplas, Inc.
IPS Corp.
NDS, Inc.
Plastic Oddities, Inc.
Sioux Chief Manufacturing Co., Inc.
Or Equal

2.6 CLEANOUTS

A. Gray-Iron Cleanouts: ASME A112.36.2M, round, gray-iron housing with clamping device and round, secured, scoriated, gray-iron cover. Include gray-iron ferrule with inside calk or spigot connection and countersunk, tapered-thread, brass closure plug. Use units with top-loading classifications according to the following applications:

1. Light Duty: In earth or grass foot-traffic areas.
2. Medium Duty: In paved foot-traffic areas.
3. Heavy Duty: In vehicle-traffic service areas.
4. Extra-Heavy Duty: In roads.
5. Sewer Pipe Fitting and Riser to Cleanout: ASTM A 74, Service class, cast-iron soil pipe and fittings.

B. PVC Cleanouts: PVC body with PVC threaded plug. Include PVC sewer pipe fitting and riser to cleanout of same material as sewer piping.

PART 2 - EXECUTION

3.1 INSTALLATION

A. Excavating, trenching, and backfilling are specified in Division 2 Section “Earthwork.”

B. Identification: Materials and their installation are specified in Division 2 Section “Earthwork.” Arrange for installing green warning tapes directly over piping and at outside edges of underground structures.

1. Use warning tape or detectable warning tape over ferrous piping.
2. Use detectable warning tape over nonferrous piping and over edges of underground structures.

C. Piping Applications: Include watertight joints.

1. NPS 4 and NPS 6: PVC sewer pipe and fittings, gaskets, and gasketed joints.

2. NPS 8 and NPS 10: PVC sewer pipe and fittings, gaskets, and gasketed joints.

D. Sleeve-Type Pipe Couplings: Use where required to join piping and no other appropriate method is specified. Do not use instead of specified joining methods.

E. General Locations and Arrangements: Drawing plans and details indicate general location and arrangement of underground sanitary sewerage piping. Location and arrangement of piping layout take design considerations into account. Install piping as indicated, to extent practical.

F. Install piping beginning at low point, true to grades and alignment indicated with unbroken continuity of invert. Place bell ends of piping facing upstream. Install gaskets, seals, sleeves, and couplings according to manufacturer's written instructions for using lubricants, cements, and other installation requirements. Maintain swab or drag in line, and pull past each joint as it is completed.

G. Use manholes for changes in direction, unless fittings are indicated. Use fittings for branch connections, unless direct tap into existing sewer is indicated.

H. Use proper size increasers, reducers, and couplings where different sizes or materials of pipes and fittings are connected. Reducing size of piping in direction of flow is prohibited.

I. Install gravity-flow piping and connect to building's sanitary drains, of sizes and in locations indicated. Terminate piping as indicated.

1. Install piping pitched down in direction of flow, at minimum slope of 0.4 percent, unless otherwise indicated.

2. Install piping with 36-inch minimum cover.

J. Extend sanitary sewerage piping and connect to building's sanitary drains, of sizes and in locations indicated. Terminate piping as indicated.

K. Pipe Joint Construction and Installation: Join and install pipe and fittings according to 6nstalllations indicated.

1. Refer to Division 2 Section "Utility Materials" for basic piping joint construction and installation.

2. PVC Sewer Pipe and Fittings:

3. Join pipe and gasketed fittings with gaskets according to ASTM D3034, SDR 35 for gravity sewer. Join pipe and fittings with gaskets according to ASTM D1869 for sewer force main (Class 160, SDR 26).

4. Join piping made of different materials or dimensions with couplings made for this application. Use couplings that are compatible with and that fit both systems' materials and dimensions.

L. Manhole Installation: Install complete with appurtenances and accessories indicated.

1. Form continuous concrete channels and benches between inlets and outlet.

2. Set tops of frames and covers flush with finished surface of manholes that occur in pavements. Set tops 3 inches above finished surface elsewhere, unless otherwise indicated.

3. Install precast concrete manhole sections with gaskets according to ASTM C 891.

M. Concrete Placement: Place cast-in-place concrete according to ACI 318 and ACI 350R.

N. Install backwater valves in piping where indicated.

O. Install cleanouts and riser extension from sewer pipe to cleanout at grade. Use cast-iron soil pipe fittings in sewer pipes at branches for cleanouts and cast-iron soil pipe for riser extensions to cleanouts. Install piping so cleanouts open in direction of flow in sewer pipe.

P. Set cleanout frames and covers in earth in cast-in-place concrete block, 18 by 18 by 12 inches deep. Set with tops 1 inch above surrounding grade.

Q. Set cleanout frames and covers in concrete pavement with tops flush with pavement surface.

R. Make connections to existing piping and underground structures so finished Work complies as nearly as practical with requirements specified for new Work.

S. Use commercially manufactured wye fittings for piping branch connections. Remove section of existing pipe; install wye fitting into existing piping; and encase entire wye fitting, plus 6-inch overlap, with not less than 6 inches of concrete with 28-day compressive strength of 3000 psi

T. Make branch connections from side into existing piping, NPS 4 to NPS 20. Remove section of existing pipe; install wye fitting into existing piping; and encase entire wye with not less than 6 inches of concrete with 28-day compressive strength of 3000 psi.

U. Protect existing piping and structures to prevent concrete or debris from entering while making tap connections. Remove debris or other extraneous material that may accumulate.

V. Clear interior of piping and structures of dirt and superfluous material as work progresses. Maintain swab or drag in piping, and pull past each joint as it is completed.

1. Place plug in end of incomplete piping at end of day and when work stops.

2. Flush piping between manholes and other structures to remove collected debris, if required by authorities having jurisdiction.

3.2 FIELD QUALITY CONTROL

A. Inspect interior of piping to determine whether line displacement or other damage has occurred. Inspect after approximately 24 inches of backfill is in place, and again at completion of Project.

1. Defects requiring correction include the following:

a. Alignment: Less than full diameter of inside of pipe is visible between structures.

b. Deflection: Flexible piping with deflection that prevents passage of ball or cylinder of size not less than 92.5 percent of piping diameter.

c. Crushed, broken, cracked, or otherwise damaged piping.

d. Infiltration: Water leakage into piping.

e. Exfiltration: Water leakage from or around piping.

2. Replace defective piping using new materials, and repeat inspections until defects are within allowances specified.

3. Reinspect and repeat procedure until results are satisfactory.

B. Test new piping systems, and parts of existing systems that have been altered, extended, or repaired, for leaks and defects.

1. Do not enclose, cover, or put into service before inspection and approval.

2. Test completed piping systems according to authorities having jurisdiction.

3. Schedule tests and inspections by authorities having jurisdiction with at least 24 hours' advance notice.

4. Submit separate reports for each test.

5. If authorities having jurisdiction do not have published procedures, perform tests as follows:

a. Sanitary Sewerage: Perform hydrostatic test.

i. Allowable leakage is maximum of 50 gal. per inch of nominal pipe size per mile of pipe, during 24-hour period.

ii. Close openings in system and fill with water.

iii. Purge air and refill with water.

iv. Disconnect water supply.

v. Test and inspect joints for leaks.

vi. Option: Test ductile-iron piping according to AWWA C600, Section "Hydrostatic Testing." Use test pressure of at least 10 psig.

6. Sanitary Sewerage: Perform air test according to UNI-B-6.

7. Manholes: Perform hydraulic test according to ASTM C 969.

8. Leaks and loss in test pressure constitute defects that must be repaired.

9. Replace leaking piping using new materials, and repeat testing until leakage is within allowances specified.

END OF SECTION 221313

DIVISION 32

SECTION 311000 CLEARING, GRUBBING AND PROOF-ROLLING

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 GENERAL REQUIREMENTS:

A. This specification shall govern for all work necessary to complete the clearing, grubbing and proof-rolling as indicated by the drawings and as required for the construction of the building.

PART 2 – PRODUCTS -- NOT APPLICABLE

PART 3 – CONSTRUCTION METHODS:

3.1 CLEARING, GRUBBING AND PROOF-ROLLING

A. The site should be stripped of topsoil, any soft or loose soils, undocumented fill, silts, roots and other vegetation. Utilities should be located and rerouted as necessary. Voids resulting from tree and shrub removal (if any) should be backfilled with engineered fill material as soon as practical to prevent possible water retention and saturation of the soil.

B. The exposed subgrade soils at the building footprint areas must be proof-rolled using a single axle rubber tired vehicle weighing at least 15 tons. Any soils observed to rut or deflect excessively (greater than 1-inch) under the moving loads should be undercut and replaced with properly compacted engineered fill. In order to limit degradation of the subgrade during proof-rolling, the number of passes should be minimized. After proof-rolling, the upper eight (8) inches of exposed soil should be scarified and then be recompacted to at least 95 percent of the Standard Proctor (ASTM D-698) maximum dry density. The Geotechnical Engineer or his representative should witness all proof-rolling and undercutting activities. These activities should be performed during a period of dry weather.

3. 2 DISPOSAL

A. Remove all materials from the clearing, grubbing, and stripping operation from the site.

END OF SECTION 31 10 00

SECTION 312000 EARTHWORK

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 DESCRIPTION

A. The extent of earthwork and site grading, including preparation of subgrade for pavements where shown on the drawings. The following operations are included in this section of the specifications:

1. Preparation of subgrade, complete.
2. Compacted fill under and around paving.
3. Excavation and backfilling, complete, including the footings and miscellaneous items.
4. Testing and Inspection Service: The Owner shall employ and pay for a testing and inspection service. Testing service will include soil survey for satisfactory soil materials, sampling and testing soil materials proposed for use in the work, and field testing facilities for quality control testing during earthwork operations.

1.3 QUALITY ASSURANCE

A. References
1. ASTM D698 - Moisture Density Relations of Soils and Soil-Aggregate Mixture using 5.5 (2.49 kg) Rammer and 12 inch (305 mm) Drop.
2. ASTM D2167 - Test Methods for Density and Unit Weight of Soil In Place by the Rubber Balloon Method.
3. Texas State Department of Highways and Public Transportation, referred to as THD, Standard Specifications for Construction of Highways, Streets and Bridges, latest editions.
4. American Association of State Highways and Transportation Officials, referred to as AASHTO.

1.4 SUBMITTALS

A. Test Reports: Reports of all tests and inspections shall be forwarded to the Owner, Architect, Structural Engineer and Contractor. Reports of tests shall state whether or not tests conform to contract documents.

1.5 STORAGE AND HANDLING

A. Material Storage: Stockpile excavated materials classified as satisfactory soil material where directed, until required for fill; place, grade and shape stockpiles for proper drainage.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Fill: Engineered fill materials should be free of organic debris and other deleterious materials, have a maximum clay lump size less than three inches and have a liquid limit of less than 40 with plasticity index (PI) values between 10 and 20 and plot above the “A” line on the Plasticity Chart. The fill should be placed in maximum lifts of eight (8) inches of loose materials and should be compacted within the range of one (1) percentage point below to three (3) percentage points above the optimum moisture content value as determined by the standard Proctor (ASTM D698) test. If water must be added, it should be uniformly applied and thoroughly mixed into the soil by disking or scarifying. Engineered fill should be compacted to at least 95 percent of the standard Proctor maximum dry density. The edges of any compacted fill above the surrounding surface grade should extend at least five feet beyond the edges of the building and parking areas prior to sloping.
Each lift of compacted soil should be tested by the Geotechnical Engineer or his representative prior to placement of subsequent lifts. As a guideline, it is recommended field density tests be taken at a frequency of not less than one test per lift for every 2,500 square feet (sf) in the building area and every 5,000 sf in parking and drive areas.

2.2 FABRICATION

A. No additional requirements.

PART 3 - EXECUTION

3.1 PROTECTION

A. Safety Codes and Standards: The Contractor shall be solely responsible for performing the work in a safe and workmanlike manner. The Contractor shall be responsible for familiarizing himself with and complying with all safety requirements of the governing authorities having jurisdiction.

B. Existing Utilities: Locate existing utilities underground by careful excavation before starting earthwork operations. If utilities are to remain in place, provide protection from damage during construction operations. Should uncharted or incorrectly charted piping or other utilities be encountered during excavation, consult the Architect immediately for directions as to procedure. Cooperate with Owner and public and private utility companies in keeping services and facilities in operation. Repair damaged utilities to satisfaction of utility owner.
   1. Do not interrupt existing utilities serving facilities occupied and used by the Owner or others, except when permitted in writing by Architect and then only after temporary utility services have been provided.

C. Use of Explosives: Do not bring explosives onto site or use in work without the prior written permission of Architect. Contractor is solely responsible for the handling, storage, and use of explosive materials when their use is permitted.

D. Protection of Persons and Property:
1. Barricade open excavations and post with warning lights as required for the safety of persons. Protect structures, utilities sidewalks, pavements, and other facilities immediately adjacent to excavations from damages caused by settlement, lateral movement, undermining, washout and other hazards.
2. Take precautions and provide necessary bracing and shoring to guard against movement or settlement of existing improvements or new construction. Contractor is entirely responsible for strength and adequacy of bracing and shoring, and for safety and support of construction from damage or injury caused by lack thereof or by movement or settlement.

3.2 EXCAVATION

A. Excavation consists of the removal and disposal of all material encountered to obtain required elevations. Excavations shall be made to proper depth, with allowances made for clearances to install services and forms. Cuts shall be accurately shaped to cross-sections and grades indicated.

1. Classification of Existing Materials: N/A

2. The foundation excavations should be observed by a representative of a testing agency prior to steel or concrete placement to assess that the foundation materials are capable of supporting the design loads and are consistent with the materials discussed in accordance with the geotechnical report. Soft or loose soil zones encountered at the bottom of the footing excavations should be removed to the level of firm soils or adequately compacted fill as directed by the Geotechnical Engineer. Cavities formed as a result of excavation of soft or loose soil zones should be backfilled with compacted engineered fill or granular fill including compacted crushed stone. Footing excavations should be observed and concrete placed as quickly as possible to avoid exposure of the footing bottoms to wetting and drying. Surface run-off water should be drained away from the excavations and not be allowed to pond prior to or after concrete placement. The foundation concrete should be placed during the same day the excavation is made. If it is required that footing excavations be left open for more than one day, they should be protected to reduce evaporation or entry of moisture.

B. Unauthorized Excavation: Unauthorized excavation consists of removal of the material indicated below elevations without specific direction of the Architect. Replace unauthorized excavation as herein specified. Excavations from footing carried below elevations indicated on drawings shall be filled with specified footing type concrete at Contractor's expense. Excavations carried below the grades indicated for trenches shall be backfilled with suitable soil or select fill at Contractor's expense.

C. Dewatering:
1. Perform earthwork and site grading in a manner to prevent surface water and sub grade or ground water from flowing into excavations, and to prevent water from flooding the project site and surrounding area.
2. Do not allow water to accumulate in excavations. Remove all water from excavations using dewatering methods, which will prevent softening of foundations bottoms, undercutting footings, and soil changes detrimental to stability of the sub grades and foundations. Provide and maintain pumps,

sumps, suction and discharge lines, and other dewatering components necessary to convey water away from the site.

3. Convey water removed from excavations and rainwater to collecting or runoff areas. Provide and maintain temporary drainage ditches and other diversions. Do not use trench excavations for site utilities as temporary drainage ditches.

D. In no case shall "water settling" or jetting be employed.

3.3 BACKFILL AND FILL

A. General:
1. Backfill consists of the placement of specified backfill material in layers, in the excavations to the required sub grade elevations.
2. Fill consists of the placement of specified fill materials, in layers, over the ground surface to the required elevations.

B. Backfill and Fill Materials:
1. Provide satisfactory soil materials for backfill and fill. Use excavated or borrow material that has been sampled, tested, and approved as satisfactory backfill and fill material by the testing service.

C. Placement and Compaction:
1. After subgrade preparation and observation have been completed, fill placement to attain the original grade or greater may begin. Engineered material should be used for fill in the structure as necessary to raise the site grades. The first layer of fill should be keyed into the existing subgrade to prevent slippage and placed in a relatively uniform horizontal lift on the compacted soils.
2. Fill should be placed in maximum lifts of eight (8) inches of loose materials and should be compacted within the range of one (1) percentage point below to three (3) percentage points above the optimum moisture content value as determined by the Standard Proctor test. If water must be added, it should be uniformly applied and thoroughly mixed into the soil by disking or scarifying.

3.4 COMPACTION

A. Perform the compaction of soil materials using suitable soil compaction equipment for the materials to be compacted and the work area locations.

B. Engineered fill should be compacted to at least 95 percent of the Standard Proctor maximum dry density as determined by ASTM Designation D 698. The edges of the compacted fill should extend at least ten (10) feet beyond the edge of the building. Each lift of compacted soil should be tested and inspected by the soils engineer or his representative prior to placement of subsequent lifts. As a guideline, it is recommended field density tests be taken at a frequency of not less than one (1) test per lift for every 2,500 sq. ft. in the building area and one (1) test per lift for every 5,000 sq. ft. in the parking/driveway areas.

C. Control soil compaction during construction for compliance with percentage of maximum density specified for each area classification.

D. Compaction Equipment:
1. Provide compaction equipment of suitable size and number, and in satisfactory working condition to compete the work on schedule.

2. Use sheepsfoot rollers, pneumatic tired roller, tamper rollers, vibrating tampers, pneumatic hand tampers, or other compaction equipment capable of obtaining the required density throughout the entire area being compacted.

E. Percentage of Maximum Density Requirements:
1. Buildings and Miscellaneous Structures: See Foundation Notes on drawing.
2. Concrete Pavements.

F. Moisture Control:
1. Provide equipment capable of adding measured amounts of moisture to the soil material as determined by moisture density relation tests. Maintain the actual moisture content in the soil material at the time of compaction to within the limits specified for each area classification.
2. Where the sub grade or layer of soil material must be moisture conditioned before compaction, uniformly apply the required amount of water to the surface of sub grade, or layer of soil material, in such a manner as to prevent free water appearing in the surface during or subsequent to compaction operations.
3. Remove and replace, or scarify and air dry, soil material that is too wet to permit compaction to specified percentage of maximum density.
4. Soil material that has been removed because it is too wet to permit compaction may be stockpiled or spread on the surface where directed by the Architect and permitted to dry. Assist drying by discing, harrowing or pulverizing, until the moisture content is reduced to a satisfactory value, as determined by moisture density relation tests. When accepted by the Architect, the soil material may be used in compacted backfill or fill.

3.5 GRADING AND DRAINAGE

A. Uniformly grade all areas within the limits of site grading under this section, including adjacent transition areas. Smooth the finished surface within the specified tolerances, compact with uniform levels or slopes between points where elevations are shown, or between such points and existing grades. Where finish contour lines are not shown ground surfaces shall be finished to drain away from buildings and minor surfaces shall be finished.

3.6 MAINTENANCE

A. Protection of existing site:
1. Carefully maintain benchmarks, monuments, layout stakes and other reference points.
2. Protect property, including adjoining property and public right-of-ways, from damage by trucks and equipment.

B. Protection of graded Areas:
1. Protect newly graded areas from traffic and erosion, and keep free of trash and debris.
2. Repair and re-establish grades in settled, eroded, and rutted areas to the specified tolerances.

C. Reconditioning Compacted Areas: When completed compacted areas are disturbed by subsequent construction operations or adverse weather, scarify the surface, reshape and compact to the required density prior to further construction. Use hand tamping for recompaction over underground utilities, if any.

3.7 DISPOSAL OF EXCESS AND WASTE MATERIALS

A. Remove all waste materials, including excavated material classified as unsatisfactory soil material, trash, and debris, from the Owner's property and legally dispose of it.

3.8 FIELD QUALITY CONTROL

A. The Architect will inspect construction throughout the various work stages.

B. Notify the Architect and Owner's testing agency at least 72 hours in advance, excluding Saturday and Sunday, before Earthwork.

C. Testing Laboratory Services:
1. Tests for Proposed Soil Materials: The testing service will determine the suitability of all materials to be used as fills. Submit one moisture-density curve for each type of soil encountered in sub grade and used as fill. Determine maximum densities in accordance with ASTM D698, current issue.
2. Testing service must inspect and approve all sub grades and fill layers before further construction work is performed thereon. Each sub grade and fill layer shall be tested for in-place density and moisture content in accordance with ASTM D2167 at a frequency of one test per 5,000 square feet or a minimum of 2 samples, whichever is greater, to assure that the fill is properly compacted.
3. If, in Architect's opinion, based on reports of testing service and inspection the sub grade or fills which have been placed are below specified density, Architect will require additional compaction and testing at Contractor's expense. Results of density test of soil-in-place will be considered satisfactory if average of any four consecutive density tests which may be selected are in each instance equal to or greater than specified density, and if not more than one density test out of five has a value more than 2% below required density.

3.9 WARRANTY/GUARANTEE

A. Contractor shall be responsible for additional work as may be required to correct work which does not conform to specified requirements, including density and tolerances.

END OF SECTION 31 20 00

SECTION 315000 STRUCTURAL EXCAVATION AND BACKFILL

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

A. This specification shall govern for all work necessary to accomplish the structural excavation required to complete the project.

PART 2 - MATERIALS

2.1 GENERAL

A. Structural excavation shall include all material encountered including earth, asphalt, base material, concrete, masonry, rock, trees, stumps, and roots.

PART 3 - EXECUTION

3.1 STRUCTURAL EXCAVATION EXCEEDING 5 FEET IN DEPTH:

A. Excavation Safety:
1. The Contractor's excavation safety procedures shall, in all respects, meet the current standards established by the U. S. Department of Labor, Occupational Safety and Health Administration (OSHA) on excavation, trenching and shoring.

B. Responsibility:
1. Contractor has the sole and exclusive responsibility for the sufficiency of the trench excavation safety systems utilized.
2. The Contractor shall specifically agree that neither the Owner nor the Engineer has such responsibility, and Contractor will not rely on the Owner or the Engineer or any of their representatives for inspection, design, supervision, construction or any other aspect of trench excavation safety protection.
3. Contractor shall fully indemnify, safe and hold harmless Owner and Engineer, their employees and agents (hereinafter the Indemnities) against any and all liability, damage, loss, claims, demands and actions of any nature whatsoever on account of personal injuries (including, without limitation on the foregoing, workers' compensation and death claims), or property loss or damage of any kind whatsoever, which arise out of or are in any manner connected with, or are claimed to arise out of or be in any way connected with, the negligence of the Contractor in the inspection, design, engineering, supervision, construction, safety devices or other activity connected with the trench excavation safety protection under this Agreement.
4. Contractor shall, at his own expense, investigate all such claims and demands, attend to their settlement or other disposition, defend all actions based thereon and pay all charges of attorneys and all other costs and expenses of any kind arising from any such liability, damage, loss, claims demands, and actions.

3.2 STRUCTURAL EXCAVATION 5 FEET OR LESS IN DEPTH:

A. GENERAL:
1. The limit of excavation shall be such to allow for placing and removing forms, installing sheeting, shoring, bracing, etc. The Contractor shall pile excavated material in a manner that will not endanger the work and will avoid obstructing sidewalks and driveways. Gutters shall be kept clear.

B. VERTICAL SIDES:
1. When necessary to protect existing or proposed structures or other improvements, the Contractor shall maintain vertical sides of the excavation.
2. The limit shall not exceed three feet outside the footing on a vertical plane parallel to the footing except where specifically approved otherwise by the Engineer.
3. The Contractor shall provide and install any sheeting, shoring and bracing as necessary to provide a safe work area as required to protect workmen, structures, equipment, trees, etc. The Contractor shall be responsible for the design and adequacy of all sheeting, shoring, and bracing.
4. The sheeting, shoring, and bracing shall be removed as the excavation is backfilled in such a manner as to prevent injurious caving.

C. SLOPING SIDES:
1. Where sufficient space is available, the Contractor shall be allowed to back slope the sides of the excavation.
2. The back slope shall be such that the excavation shall be safe from caving.
3. The type of material being excavated shall govern the back slope used. The Contractor shall be responsible for determining the back slope used, but in any case the back slope shall be no steeper than 1 foot horizontal to 1 foot vertical.

3.3 CONSTRUCTION METHODS

A. DEWATERING
1. The Contractor shall keep the excavation free from water by use of cofferdams, bailing, pumping, well point, or any combination as the particular situation may warrant.
2. All dewatering devices shall be installed in such a manner as to provide clearance for construction, removal of forms, and inspection of exterior of form work.
3. It is the intent of these specifications that the foundation be placed on a firm dry bed. The foundation bed shall be kept in a dewatered condition a sufficient period of time to insure the safety of the structure, but in no case shall dewatering be terminated sooner than 7 days after placing concrete. All dewatering methods and procedures are subject to the approval of the Engineer.
4. The excavation shall be protected from excessive rainfall and drying. The excavation shall be inspected and approved by the Engineer before work on the structure is started.
5. It is the intent of these specifications that the Contractor provide a relatively smooth, firm foundation bed for footings and slabs that bear directly on the undisturbed earth without additional cost to the Owner, regardless of the soil conditions encountered. The Engineer will be the judge as to whether these conditions have been met.
6. The Contractor shall pile excavated material in a manner that will not endanger the work.

B. UNAUTHORIZED OVEREXCAVATION
1. Excavation for slabs, footings, etc., that bear on earth shall not be carried below the elevation shown on the drawings.
2. In the event the excavation is carried on below the indicated elevation, the Contractor shall bring the slab, footing, etc., to the required grade by filling with concrete having a minimum compressive strength of at least 3000 p.s.i. at 28 days.

C. BACKFILL MATERIAL
   1. General:
      a. Suitable material chosen from the excavation shall be used for backfill. The material chosen shall be free of large lumps or clods, which will not readily break down under compaction.
      b. This material will be subject to approval by the Engineer.
      c. Backfill material shall be free of vegetation or other extraneous material.

   2. Excavated materials, which are to be used for, fill or backfill may be stockpiled on the site. The Engineer shall approve location of stockpiles.
   3. Top soil should be stockpiled separately and used for finish grading around structure.
   4. Fiberglass Manholes and Wetwells:
      a. Sand shall be used for backfill around manholes and/or wetwells for a distance of 2 feet from the outside surface and extending from the bottom of the excavation to the bottom of the top slab.
      b. Suitable material (as set out above) chosen from the excavation may be used for the remainder of the backfill.
      c. Location of stockpiles shall be approved by the Engineer.

D. SCHEDULE OF BACKFILLING
   1. Concrete and Masonry Structures:
      a. The Contractor shall begin backfilling of concrete structures no sooner than 7 days but no later than 14 days, after they are cast.
      b. The Contractor shall backfill brick and mortar structures after they have been in place at least 3 days.
   2. Fiberglass Manholes and Wetwells:
      a. The Contractor may begin backfilling of manholes and/or wetwells as soon as the concrete has been allowed to cure and any forms are removed.

E. BACKFILL
   1. General:
      a. Backfill shall be placed in layers of not more than 9 inches (loose measure) and mechanically tamped to at least 95% Standard Proctor Density A.S.T.M. Specification D-698. Flooding will NOT be permitted. Backfill shall be placed in such a manner as to prevent any wedging action against the structure.
   2. Fiberglass Manholes and Wetwells:
      a. Backfill shall be placed in layers of not more than 6 inches (loose measure) and mechanically tamped to at least 95% Standard Proctor Density. Flooding will NOT be permitted. Backfill shall be placed in such a manner as to prevent any wedging action against the structure.

F. EXCESS AND UNSUITABLE MATERIAL
   1. All excess and/or unsuitable excavated material shall be loaded and hauled off the Contractor.

END OF SECTION 31 50 00

SECTION 316200 DRIVEN PILES

PART 1 – GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Structural treated timber piles for building foundation.

B. Related Sections:
   1. Section 01 41 00 – Special Inspections
   2. Section 03 30 00 – Cast-In-Place Concrete

1.2 TESTING LABORATORY SERVICES

C. Permanent Piles: The independent Testing Laboratory specified in “Section 01 45 00" will perform the following services.
   1. Inspection: Perform inspections at source and at project site. Mark conforming piles for identification.
   2. Logging: Log the driving of all piling and record the following:
      a. Date driven, type of hammer, pile description including tip, length and butt dimensions measured just prior to driving.
      b. Location of pile.
      c. Number of blows per foot for full length of pile.
      d. Tip and butt elevation.
      e. Vibration Measurements.
      f. Record control elevations provided by Contractor.
      g. Heaved piles.
   3. Pile load tests.
   4. Reporting: Submit driving records daily.
   5. Inspect pile shells before concreting.

1.3 CONTRACTOR DUTIES

A. Protection of Property: The Contractor shall document the conditions of existing paving, structures, sewers, utilities, and other property on and adjacent to the work site and shall take suitable precautions to protect such property from damage which could result from the piling work. Should damage occur due to Contractor's operations, the Contractor shall repair or replace the damaged work to restore it to its original condition, without additional cost to the Owner.
   1. Documentation: Photograph existing conditions of structures, finishes, equipment, and adjacent improvements that might be construed as damage resulting from pile driving operations. File photos with Architect before starting pile driving.

B. Notification: The Contractor shall notify the Architect and the Testing Laboratory 48 hours prior to driving initial pile. Pile driving must not commence without representatives of the Architect and the Testing Laboratory being present.

C. Regulatory Agency: In accordance with the applicable Building Code, the Contractor shall notify the Director of the responsible regulatory agency at least 24 hours in advance of pile driving.

1.4 SUBMITTALS

A. Splice Data: Submit descriptive data for pile splice connector, including evidence of approval by the responsible regulatory agency.

1.5 QUALITY ASSURANCE

A. Vibration Monitoring: The Owner shall employ and pay an independent agency to monitor the vibrations during the pile driving. Modify operations with the Architect's concurrence as necessary to assure that vibrations are such that adjacent property is not damaged or impaired structurally.

B. Building Code: Comply with applicable provisions of the governing Building Codes.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Delivery: Deliver materials to Project site in such quantities and at such times to ensure continuity of pile driving operations and adherence to project schedule.

B. Storage: Store piles in orderly groups above ground and blocked to prevent distortion of piles.

C. Handling: Handle piles carefully without dropping, breaking, or abrading the surface. Repair damage or replace with new material.

1.7 PROJECT CONDITIONS

A. Basis for Bids: Bids shall be based on indicated number of piles and dimensions from point to cut-off, plus not less than 1 ft. of extra length for cutting piles at required cut-off elevations.

B. Cost Adjustment: In order to fix the cost to the Owner on longer or shorter piles, if conditions should require change in pile lengths, the Contractor shall submit in his proposal the following unit cost:

1. Cost per foot in 1'-0" increments for increase or decrease in pile length up to 5'-0".

C. No payment will be made for rejected piles including piles driven out of place, imperfect piles, or piles damaged in driving or handling.

D. Site Information: Data for subsurface conditions is available through the Owner and is not intended as a representation or warranty of continuity of conditions. It is expressly understood that the Owner, the Architect, and the Architect's consultants will not be responsible for interpretations or conclusions drawn by Contractor from the data, which is made available for the information and convenience of Contractor.

E. Protection: Protect structures, utilities, and other improvements and construction from damage caused by pile driving operations.

F. Control: Establish surveyed elevation bench marks on structures where directed by Architect before commencing work when structures are within 10 feet of pile driving operations. Record and report elevation of each bench mark at least twice a day while pile driving is in

progress and at completion of driving. If bench mark readings indicate displacement, halt driving operations until corrective action has been provided and is acceptable to Architect.

PART 2 – PRODUCTS

2.1 TREATED TIMBER PILES

A. Piles: Southern Pine smooth peeled conforming to ASTM D 25 with dimensions as follows:

1. Treated Timber Foundation Piles.
   a. Minimum tip diameter 7".
   b. Minimum butt diameter 12" measured 3'-0" from the end.
   c. Minimum length: as noted on drawings.

B. Preservative Treatment: Comply with AWPA Standards C1 and C3 for foundation piles using Grade 1 creosote (AWPA P1) with a minimum wet retention of 12 lbs. per cu. foot of wood, or CCA with a minimum wet retention of .8 lbs. per cu. foot of wood. Testing of retention by the gauge method will be acceptable.

2.2 DRIVING EQUIPMENT

A. General: Provide pile-driving equipment of type generally used in standard pile driving practice, operated at manufacturer's specified rate, to develop required rated energy per blow.

B. Hammer: Employ pile driving hammers of sufficient capacity, size, and type to be able to deliver consistently effective dynamic energy, suitable to piles to be driven and to sub-grade material into which they are to be driven, when operating at not more than 75 percent efficiency of rated driving energy.

C. Driving Caps: Equip hammer with cast steel or structural steel driving cap conforming to pile shape, to prevent damage to pile during driving.

D. Accessory Equipment: Provide necessary mandrels, drills and other acceptable equipment, suitable for the pile types and driving conditions involved.

PART 3 – EXECUTION

3.1 PRELIMINARY WORK

A. Investigation of Utilities: Investigate locations of underground utilities to identify possible interferences, before starting pile driving. Notify Architect of any interference discovered before or during driving and obtain instructions before proceeding.

B. Site Conditions: Do not drive piles until earthwork in area which piles are to be driven has been completed, as follows:

1. Excavations: Earth excavation shall be stopped at an elevation of 6" to 12" above bottom of footing before piles are driven. Final excavation of footing bottoms shall be done as part of earthwork, after piles have been driven and tested.
2. Fills: Fills will be constructed and compacted to elevation or grade indicated.

3.2 STATIC PILE LOAD TEST - 98245

3.3 STATIC PILE TESTS

A. General: Static pile tests will be used to verify design pile lengths and to confirm design load capacity of piles.

1. Furnish test piles 60 inches longer than production piles.
2. Actual length of piles will be based on results of static pile tests.

B. Pile Tests: Arrange and perform the following pile tests:

1. Axial Compressive Static Load Test: ASTM D 1143.

C. Drive test piles at locations indicated on the drawing and to a tip elevation below final cutoff elevation equal to pile length specified as basis of bid or, to refusal, whichever occurs first. Piles will be considered as driven to refusal when five blows of hammer are required to produce a total penetration of 1/4 inch or less.

1. Allow a minimum of seven days to elapse after driving test piles before starting pile testing.

D. Provide pile reaction frame, anchor piles, equipment, and instrumentation with sufficient reaction capacity to perform tests. Notify Construction Manager and Architect/ Engineer at least 48 hours in advance of performing tests. On completion of testing, remove testing structure, anchor piles, equipment, and instrumentation.

1. Number of Probe/Test Piles: As indicated on drawing

E. Driving Test Piles: Use test piles identical to those required for Project and drive with appropriate pile-driving equipment operating at rated driving energy to be used in driving permanent piles.

1. Pile Design Load: 25 tons.

F. Approval Criteria: Allowable design capacity of test piles shall be one-half of the load that results in the lesser of the following two values:

1. Net settlement, after deducting rebound, has not more than 0.01 inch/ton of test load.
2. Gross settlement of not more than 1 inch provided that load-settlement curve shows no sign of failure.

G. Driving Records: Prepare driving records for each test pile, compiled and attested to by a qualified professional engineer. Include same data as required for driving records of permanent piles.

H. Test piles that comply with requirements, including location tolerances, may be used on Project.

3.4 DRIVING PILES

I. General: Continuously drive piles to elevations or penetration resistance indicated or established by static load testing of piles. Establish and maintain axial alignment of leads and pile before and during driving.

J. Predrilling: Refer to Geotechnical report.

K. Pile Splices: Splices will only be allowed between the timber and steel section of pile.

L. Driving Tolerances: Drive piles without pile heads exceeding the following tolerances:

1. Location: 4 inches from location indicated after initial driving, and 6 inches after pile driving is completed.
2. Plumb: Maintain 1 inch in 10 feet from vertical, or a maximum of 4 inches, measured when pile is above ground in leads.
3. Batter Angle: Maximum 1 inch in 10 feet from required angle, measured when pile is above ground in leads.

M. Withdraw damaged or defective piles and piles that exceed driving tolerances and install new piles within driving tolerances. Fill holes left by withdrawn piles as directed by Construction Manager and Architect/Engineer.

1. Rejected piles may be abandoned and cut off as directed by Construction Manger and Architect/Engineer.
2. Leave rejected piles in place and install new piles in locations as directed by Architect/Engineer.
3. Fill holes left by withdrawn piles that will not be filled by new piles gravel-sand mixtures. Place and compact in lifts not exceeding 72 inches.

N. Cutting Off: Cut off butts of driven piles square with pile axis and at elevations indicated.

O. Driving Record: Maintain accurate driving records for each pile, compiled and attested to by a qualified testing laboratory Include the following data:

1. Project name and number.
2. Name of Contractor.
3. Pile species.
4. Pile location in pile group and designation of pile group.
5. Pile dimensions.
6. Final tip and cutoff elevations of pile after driving pile group.
7. Records of redriving.
8. Type, make, model, and rated energy of hammer.
9. Weight and stroke of hammer.
10. Cushion material and thickness.
11. Actual stroke and blow rate of hammer.
12. Record of number of blows for each 12 inches of penetration, and number of blows per 1 inch for the last 6 inches of driving.
13. Record preboring, jetting, or special procedures used.
14. Record of unusual occurrences during pile driving.

3.5 DRIVING PILES

A. General: Continuously drive piles at locations indicated.

1. Maintain center of gravity for each group or cluster of piles to conform to locations shown on drawings.
2. Plumb leads and pile before driving. Take care during driving to prevent, and to correct, any tendency of piles to twist or rotate.

B. Driving Tolerances: Drive piles within following maximum variance:

1. 3 inches from location indicated in not more than 10% of the total number of piles in a cluster.
2. Maintain 1 inch in 10 feet from vertical (or from required alignment if batter piles are required), or a maximum of 4 inches.

C. Corrections for Misdriven Piles: If variations exceed the tolerances specified above, unless limiting and controlling conditions as determined by the Architect make it impossible to maintain positions more accurately, the Contractor shall furnish and drive additional piles and/or modify pile caps, as instructed by the Architect, without additional cost to the Owner.

1. The Contractor shall plot the pile locations in each cluster and submit data to the Architect, who will then issue instructions for corrective action.
2. Additional piles and/or alterations to pile caps to compensate for or rectify failures to achieve proper locations will be the Contractor's responsibility, whether defects are discovered before or after cutting off.

D. Damaged Piles: Damaged piles will not be accepted. Any pile which is damaged, broken or deflected, or which cannot be driven to required penetration because of underground obstructions, shall be rejected.

1. Withdraw piles rejected after driving and replace with new piles at the location directed by the Architect.
2. Piles rejected after driving, which cannot be withdrawn shall be abandoned and cut-off and additional piles driven to replace rejected units at designated locations.
3. Solidly fill spaces left by withdrawn piles that will not be filled by new piles using cohesion less soil material such as gravel, broken stone, and gravel-sand mixtures. Place and compact throughout length of space in lifts not exceeding 6 feet.

E. Over-Driven Piles: Any piles driven too low to permit proper cut-off shall be corrected without additional cost to the Owner, as instructed by the Architect.

END OF SECTION 31 62 00

SECTION 316223 - COMPOSITE PILES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes concrete-filled steel shell piles.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: Show fabrication and installation details for piles, including splices and tip details.

1. Indicate welds by standard AWS symbols, distinguishing between shop and field welds, and show size, length, and type of each weld.
2. Indicate locations, sizes, type, and arrangement of reinforcement.

1.3 INFORMATIONAL SUBMITTALS

A. Welding certificates.

B. Concrete design mixes.

C. Material certificates.

D. Material test reports.

E. Pile-Driving Equipment Data: Include type, make, and rated energy range; weight of striking part of hammer; weight of drive cap; and, type, size, and properties of hammer cushion. Include mandrel type and details.

F. Pile-driving records.

G. Field quality-control reports.

1.4 QUALITY ASSURANCE

A. Comply with requirements in ACI 301, "Specifications for Structural Concrete."

B. Welding Qualifications: Qualify procedures and personnel according to the following:

1. AWS D1.1/D1.1M, "Structural Welding Code - Steel".

2. AWS D1.3, "Structural Welding Code - Sheet Steel."

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Helically Corrugated Pile Shells:

a. CONTECH Construction Products Inc.

2.2 STEEL SHELL PILES

A. Fluted Pile Shells: Manufacturer's standard, vertically fluted pile shells; cold formed from steel sheet; 50,000-psi minimum yield strength after forming. Fabricate watertight, uniformly tapered sections with forged-steel conical nose welded to tip.

1. Constant Diameter Extensions: Fabricate with splice overlap capable of telescoping into tapered section.
2. Taper: 0.14 inch in 12 inches
3. Thickness: 0.276 inch

B. Helically Corrugated Pile Shells: Manufacturer's standard, helically corrugated, uniform-diameter, steel sheet shell piles; of sufficient strength and thickness to remain watertight and resist distortion and buckling due to soil pressure, internal mandrel operation, or redriving. Fabricate in one-piece lengths with 0.276-inch thick, minimum steel-plate boot continuously welded to tip and as follows:

2.3 PILE ACCESSORIES

A. Driving Points: Manufacturer's standard 60-degree conical driving point, with integral reinforcing ribs, to provide full bearing of pipe pile tip. Fabricate from steel castings as follows:

B. Inside Cutting Shoes: Manufacturer's standard, inside-flanged, open-ended cutting shoe, to provide full bearing of pipe pile tip. Fabricate from steel castings as follows:

C. Outside Cutting Shoes: Manufacturer's standard, outside-flanged, open-ended cutting shoe, to provide full bearing of pipe pile tip. Fabricate from steel castings as follows:

D. Splice Coupling: Manufacturer's standard splice coupling, rolled from ASTM A 36/A 36M, carbon-steel bar or cast from heat-treated carbon steel, ASTM A 27/A 27M, Grade 65-35 with interior stop and internally tapered for friction fit driving.

2.4 FABRICATION

A. Fabricate full-length piles to eliminate splicing during driving.

B. Fabricate full-length piles by splicing pile lengths together. Maintain axial alignment of pile lengths. Maintain structural properties of pile across splice.

C. Fit and weld to tip of pile according to manufacturer's written instructions and AWS D1.1/D1.1M for procedures, appearance and quality of welds, and methods used in correcting welding work.

PART 3 - EXECUTION

3.1 DRIVING PILES

A. General: Continuously drive piles to elevations or penetration resistance indicated. Establish and maintain axial alignment of leads and piles before and during driving.

B. Heaved Piles: Redrive heaved piles to tip elevation at least as deep as original tip elevation with a driving resistance at least as great as original driving resistance.

C. Pile Splices: Splice piles during installation and align pile segments concentrically.

D. Driving Tolerances: Drive piles without exceeding the following tolerances, measured at pile heads:

1. Location: 4 inches from location indicated after initial driving, and 6 inches after pile driving is completed.
2. Plumb: Maintain 1 inch in 4 feet from vertical, or a maximum of 4 inches, measured when pile is aboveground in leads.

E. Excavation: Clean out steel pipe pile by removing soil and debris from inside pile before placing steel reinforcement or concrete.

F. Cutting Off: Cut off tops of driven piles square with pile axis and at elevations indicated.

G. Pile-Driving Records: Maintain accurate driving records for each pile.

3.2 FIELD QUALITY CONTROL

A. Special Inspections: Owner will engage a qualified special inspector to perform the following special inspections:

1. Pile foundations.

B. Testing Agency: Owner will engage a qualified independent testing agency to perform tests and inspections.

C. Tests and Inspections:

1. Dynamic Pile Testing: High-strain dynamic monitoring shall be performed and reported according to ASTM D 4945 during initial driving and during restriking on 5 single piles.
2. Low-strain integrity measurement shall be performed and reported for each pile.
3. Weld Testing: In addition to visual inspection, welds shall be tested and inspected according to AWS D1.1/D1.1M.

END OF SECTION 316223

DIVISION 32

SECTION 321443 - POROUS UNIT PAVING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Permeable Concrete Pavers and aggregates
2. Edge restraints.

1.2 ACTION SUBMITTALS

A. Product Data: For materials other than aggregates.

B. Sustainable Design Submittals:

1. <Double click to insert sustainable design text for regional materials.>

C. Sieve Analyses: For aggregate materials, according to ASTM C136.

D. Samples:

1. Full-size units of each type of unit paver indicated.
2. Exposed edge restraints.
3. Aggregate fill.
4. Aggregate setting bed materials.

1.3 QUALITY ASSURANCE

Retain "Installer Qualifications" Paragraph below if required. See Section 014000 "Quality Requirements" for general installer qualifications. Verify availability of qualified personnel in Project area before retaining.

A. Installer Qualifications: A qualified porous unit paving installer. Installer's [**field supervisor**] [**personnel assigned to the Work**] shall have Concrete Paver Installer Certification from the Interlocking Concrete Pavement Institute (ICPI) with PICP (Permeable Interlocking Concrete Pavement) Specialist Designation.

If "Mockups" Paragraph below is retained, indicate location, size, and other details of mockups on Drawings or by inserts. Revise wording if only one mockup is required.

B. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.

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1. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

PART 2 - PRODUCTS

2.1 CONCRETE UNIT PAVERS

A. Basis of Design: Subject to compliance with requirements, provide product indicated on Drawings or comparable product product by one of the following:
1. Unilock Eco-Priora- Chicago
2. Approved equal

B. Concrete Grid Pavers: Grid paving units complying with ASTM C1319, made from normal-weight aggregates.

1. Thickness: [**3-1/8 inches (80 mm)**] [**3-1/2 inches (90 mm)**] [**4 inches (100 mm)**] <**Insert dimension**>.
2. Face Size and Shape: [**As indicated**] <**Insert size and shape**>.
3. Opening Percentage: <**Insert number**>percent.
4. Color: [**As indicated by manufacturer's designations**] [**Match Architect's sample**] [**As selected by Architect from manufacturer's full range**] <**Insert color**>.

C. Solid Concrete Pavers for Porous Paving: Solid interlocking paving units of shapes that provide openings between units, complying with ASTM C936/C936M[**, resistant to freezing and thawing when tested according to ASTM C67**], and made from normal-weight aggregates.

1. Thickness: [**2-3/8 inches (60 mm)**] [**3-1/8 inches (80 mm)**] [**3-1/2 inches (90 mm)**] [**4 inches (100 mm)**] <**Insert dimension**>.
2. Face Size and Shape: [**As indicated**] <**Insert size and shape**>.
3. Opening Percentage: <**Insert number**>percent.
4. Color: [**As indicated by manufacturer's designations**] [**Match Architect's sample**] [**As selected by Architect from manufacturer's full range**] <**Insert color**>.

2.2 EDGE RESTRAINTS

A. Plastic Edge Restraints: Triangular PVC extrusions, [**1-3/4 inches (45 mm) high by 3-1/2 inches (90 mm) wide**] [**3-1/8 inches (80 mm) high by 9-1/2 inches (240 mm) wide**], designed to serve as edge restraints for unit pavers; rigid type for straight edges and flexible type for curved edges, with pipe connectors and 3/8-inch- (9.5-mm-) diameter by 12-inch- (300-mm-) long steel spikes.

1. <Double click here to find, evaluate, and insert list of manufacturers and products.>

B. Steel Edge Restraints: Painted steel edging, [**3/16 inch (4.8 mm) thick by 4 inches (100 mm) high**] [**1/4 inch (6.4 mm) thick by 5 inches (125 mm) high**], with loops pressed from or welded to face to receive stakes at 36 inches (900 mm) o.c., and with steel stakes 15 inches (380 mm) long for each loop.

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1. <Double click here to find, evaluate, and insert list of manufacturers and products.>
2. Color: [**As indicated by manufacturer's designations**] [**Match Architect's sample**] [**As selected by Architect from manufacturer's full range**] <**Insert color**>.

Aluminum edge restraints are generally installed below grade, so color is usually not a concern. Aluminum edging normally has a mill finish.

C. Aluminum Edge Restraints: [**Straight, 1/8 inch (3.2 mm) thick by 4 inches (100 mm) high**] [**Straight, 3/16 inch (4.8 mm) thick by 4 inches (100 mm) high**] [**L-shaped, 1/8 inch (3.2 mm) thick by 1-3/8 inches (35 mm) high**] [**L-shaped, 3/16 inch (4.8 mm) thick by 2-1/4 inches (57 mm) high**] extruded-aluminum edging, with loops pressed from face to receive stakes at 12 inches (300 mm) o.c., and with aluminum stakes 12 inches (300 mm) long for each loop.

1. <Double click here to find, evaluate, and insert list of manufacturers and products.>

2.3 AGGREGATE SETTING-BED MATERIALS

A. <Double click to insert sustainable design text for aggregate and soil.>

B. Graded Aggregate for Subbase: Sound crushed stone or gravel complying with [**ASTM D448 for Size No. 57**] [**ASTM D448 for Size No. 5**] [**ASTM D2940/D2940M, subbase material**] [**requirements in Section 312000 "Earth Moving" for subbase material**].

C. Graded Aggregate for Base Course: Sound crushed stone or gravel complying with [**ASTM D448 for Size No. 8**] [**ASTM D448 for Size No. 57**] [**ASTM D2940/D2940M, base-course material**] [**requirements in Section 312000 "Earth Moving" for base-course material**].

D. Sand for Leveling Course: Sound, sharp, washed, natural sand or crushed stone complying with gradation requirements in ASTM C33/C33M for fine aggregate.

E. Soil Mix for Leveling Course: Sound, sharp, washed, natural sand or crushed stone complying with gradation requirements in ASTM C33/C33M for fine aggregate blended with planting soil <**Insert drawing designation**> according to [**Section 329113 "Soil Preparation."**] [**Section 329115 "Soil Preparation (Performance Specification)."**] Use blend consisting of [**1/2 sand and 1/2 planting soil mix**] [**2/3 sand and 1/3 planting soil mix**] <**Insert proportions**>.

F. Graded Aggregate for Leveling Course: Sound crushed stone or gravel complying with ASTM D448 for Size No. [**8**] [**9**].

G. Drainage Geotextile: Nonwoven needle-punched geotextile, manufactured for subsurface drainage applications, made from polyolefins or polyesters; with elongation greater than 50 percent; complying with AASHTO M 288 and the following, measured according to test methods referenced:

1. Survivability: Class 2; AASHTO M 288.
2. Apparent Opening Size: No. 40 (0.425-mm) sieve, maximum; ASTM D4751.

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3. Permittivity: 0.5 per second, minimum; ASTM D4491.
4. UV Stability: 50 percent after 500 hours' exposure; ASTM D4355.

2.4 FILL MATERIALS

A. Soil Fill for Porous Paving: Planting soil <**Insert drawing designation**> according to [**Section 329113 "Soil Preparation."**] [**Section 329115 "Soil Preparation (Performance Specification)."**]

B. Aggregate Fill for Porous Paving: Graded, sound, crushed stone or gravel complying with ASTM D448 for Size No. [**8**] [**9**].

1. Color: [**As indicated**] [**Match Architect's sample**].

C. Grass Seed: Comply with requirements in Section 329200 "Turf and Grasses."

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Do not use unit pavers with chips, cracks, voids, discolorations, and other defects that might be structurally unsound or visible in finished work.

B. Cut unit pavers with motor-driven masonry saw equipment[**or a block splitter**] to provide clean, sharp, unchipped edges. Cut units to provide pattern indicated and to fit adjoining work neatly. Use full units without cutting where possible. Hammer cutting is not acceptable.

C. Tolerances:

1. Variation in Plane between Adjacent Units (Lipping): Do not exceed 1/16-inch (1.5-mm) unit-to-unit offset from flush.
2. Variation from Level or Indicated Slope: Do not exceed 1/8 inch in 24 inches (3 mm in 600 mm) and 1/4 inch in 10 feet (6 mm in 3 m) or a maximum of 1/2 inch (13 mm).

D. Provide edge restraints as indicated. Install edge restraints before placing unit pavers.

3.2 INSTALLATION OF SETTING-BED

A. Compact subgrade uniformly to at least [**95**] <**Insert number**> percent of [**ASTM D698**] [**ASTM D1557**] laboratory density.

B. Place drainage geotextile over prepared subgrade, overlapping ends and edges at least 12 inches (300 mm).

C. Place aggregate [**subbase**] [**and**] [**base**], compact by tamping with plate vibrator, and screed to depth indicated.

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D. Place aggregate [**subbase**] [**and**] [**base**], compact to [**100**] <**Insert number**> percent of ASTM D1557 maximum laboratory density, and screed to depth indicated.

E. Place drainage geotextile over compacted subbase, overlapping ends and edges at least 12 inches (300 mm).

F. Place drainage geotextile over compacted base course, overlapping ends and edges at least 12 inches (300 mm).

G. Place leveling course, and screed to a thickness of [**1 to 1-1/2 inches (25 to 38 mm)**] [**2 to 2-1/2 inches (50 to 64 mm)**] [**3 inches (76 mm)**] <**Insert dimension**>, taking care that moisture content remains constant and density is loose and constant until pavers are set and compacted.

3.3 INSTALLATION OF PAVERS

A. Set unit pavers on leveling course, being careful not to disturb leveling base. If pavers have lugs or spacer bars to control spacing, place pavers hand tight against lugs or spacer bars. If pavers do not have lugs or spacer bars, place pavers with a 1/16-inch- (1.6-mm-) minimum and 1/8-inch- (3.2-mm-) maximum joint width

B. Compact pavers into leveling course with a low-amplitude plate vibrator capable of a 3500- to 5000-lbf (16- to 22-kN) compaction force at 80 to 90 Hz.

C. Place soil fill immediately after vibrating pavers into leveling course. Spread and screed soil fill level with tops of pavers. Vibrate pavers and add soil fill until porous paving is filled to about 3/4 inch (19 mm) from top surface; remove excess soil fill if any.

D. After filling pavers with soil, sow seed according to Section 329200 "Turf and Grasses," except sow seed at half the rate specified for seeding lawns. Sweep seed from surfaces of pavers into voids and water with fine spray.

E. Place graded aggregate fill immediately after vibrating pavers into leveling course. Spread and screed aggregate fill level with tops of pavers.

F. As work progresses, remove and replace pavers that are loose, chipped, broken, stained, or otherwise damaged or that do not match adjoining units. Provide new units to match adjoining units and install in same manner as original units, with same joint treatment and with no evidence of replacement.

3.4 MAINTENANCE AND PROTECTION

Retain this article if porous paving is planted with grass or ground cover. Retain first paragraph below only if pavers are planted with grass. Maintenance of ground covers after planting is specified in Section 329300 "Plants".

A. Water newly planted grass and keep moist until grass is established. Maintain grass that is planted in paving to comply with requirements in Section 329200 "Turf and Grasses."

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B. Erect barricades and warning signs as required to protect newly planted areas from traffic. Maintain barricades for [**60**] <**Insert number**> days after planting.

END OF SECTION 321443

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321313 CONCRETE PAVING

PART 1 - GENERAL

1.1 SUMMARY

A. All work performed under this section shall be in accordance with Sections 601, 706, 707, 901 and 1005 of the Louisiana Standard Specifications for Roads and Bridges 2016 Edition (and latest revisions) unless herein specified or indicated on the plans. This Section includes Portland Cement Concrete Pavement for the following applications:

1. Pavement, Curbs and Walkways.
2. Joints.
3. Playground Surfacing Substrates

1.2 SUBMITTALS

A. Product Data: For each manufactured material and product indicated.

B. Design Mixes: For each concrete mix indicated.

C. Material certificates.

1.3 QUALITY ASSURANCE

A. Manufacturer Qualifications: Manufacturer of ready-mixed concrete products complying with ASTM C 94 requirements for production facilities and equipment.

B. ACI Publications: Comply with ACI 301, "Specification for Structural Concrete," unless modified by the requirements of the Contract Documents.

PART 2 - PRODUCTS

2.1 STEEL REINFORCEMENT

A. Steel reinforcement shall be in accordance with Sections 806 and 1009 of the Louisiana Standard Specifications for Roads and Bridges 2016 Edition (and latest revisions).

2.2 CONCRETE MATERIALS

A. Concrete Materials shall be in accordance with Sections 901 of the Louisiana Standard Specifications for Roads and Bridges 2016 Edition (and latest revisions).

2.3 TRAFFIC PAINT

A. Traffic paint shall be alkyd-resin ready-mixed complying with AASHTO M 248, Type S.

1. Color: White (Parking)
2. Color: Yellow (Traffic control)
3. Color: Blue (Handicapped)
4. Color: Red (Fire zone and no parking)

PART 3 - EXECUTION

3.1 CURBS

A. Curbs. If slip-formed, the concrete shall have not more than a 1-1/2" slump and an air entraining admixture in accordance with the Standard Specifications referred to above.

3.2 SIDEWALKS

A. The concrete shall be deposited on a moist sub-grade, struck off and compacted to the required thickness. The surface shall be finished with a wood float or steel trowel, provided that the surface is finally brushed in order to leave a slightly rough finish.

B. The sidewalk shall be divided into sections by control joints, spaced 5 no more than feet apart, which shall extend into the concrete for at least 1/4 of the depth and shall be approximately 1/8" wide. Construction joints of 1/4" pre-molded expansion joint shall be installed around all appurtenances; such as manholes, utility poles, etc., extending and through sidewalk. Expansion joints of ½" thick performed joint filler (non-extruding type) or redwood shall be installed every 20 feet or fraction thereof, between intersecting sidewalks, and any fixed structure such as building, bridge or curbing. This expansion joint material shall extend for the full depth of the walk.

C. Wire fabric where required shall conform to ASTM A-185.

3.3 CONCRETE PAVEMENT

A. The P.C.C. Pavement thickness shown on the plans are minimum thickness. There will be no tolerance for thickness deficiencies. The Owner reserves the right to require removal and replacement of all pavement that does not meet the minimum required thickness. There will be no adjustment of payment for pavement exceeding the minimum required thickness. Concrete surface shall be finished with a light to medium broom to leave a slightly rough finish.

3.4 CONCRETE SUBSTRATES

A. Provide and verify substrate conditions per playground manufacturers requirements for installation.

3.5 JOINTS

A. All joints shall be installed in accordance with the details in the plans and using materials in accordance with Section 1005 of the Louisiana Standard Specifications for Roads and Bridges, 2016 Edition

3.6 TESTING

A. All testing and inspection shall be in accordance with Louisiana Standard Specifications for Roads and Bridges, 2016 Edition, and latest revisions.

3.7 REPAIRS AND PROTECTION

A. Remove and replace concrete pavement that is broken, damaged, or defective, or does not meet requirements in this Section.

B. Protect concrete from damage. Exclude traffic from pavement for at least 14 days after placement.

C. Maintain concrete pavement free of stains, discoloration, dirt, and other foreign material. Sweep concrete pavement not more than two days before date scheduled for Substantial Completion inspections.

3.8 TRAFFIC PAINT

A. Traffic Paint: Apply traffic paint for striping and other markings with mechanical equipment to produce uniform straight edges. Apply at manufacturer's recommended rates to provide a 15-mil minimum wet film thickness.

END OF SECTION 32 13 13

SECTION 32 13 73 – PAVEMENT JOINT SEALANTS

PART 1 - GENERAL

1.1 SUMMARY

A. Scope: The work included in this section of the specifications includes all labor, materials, equipment, and services necessary for furnishing and installing pavement joint sealants as indicated on the drawings and as herein specified.

B. This Section includes the following:

1. Expansion and contraction joints within portland cement concrete pavement.
2. Joints between portland cement concrete and asphalt pavement.

C. Related Sections include the following:

1. Division 32 Section "Concrete Paving" for constructing joints between concrete and concrete pavement.

1.2 SUBMITTALS

A. Product Data: For each type and color of joint sealant required. Install joint-sealant samples in 1/2 inch- (13 mm-) wide joints formed between two 6-inch- (150 mm-) long strips of material matching the appearance of exposed surfaces adjacent to joint sealants.

1.3 DELIVERY. STORAGE. AND HANDLING

A. Deliver materials to Project site in original unopened containers or bundles with labels indicating manufacturer, product name and designation, color, expiration date, pot life, curing time, and mixing instructions for multi-component materials.

B. Store and handle materials to comply with manufacturer's written instructions to prevent their deterioration or damage due to moisture, high or low temperatures, contaminants, or other causes.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

A. Compatibility: Provide joint sealants, backing materials, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint sealant m manufacturer based on testing and field experience.

2.2 COLD-APPLIED JOINT SEALANTS

A. Multi-component Jet-Fuel Resistant Sealant for Concrete: Pourable, chemically curing elastomeric formulation complying with the following requirements for formulation and with ASTM C 920 for type, grade, class, and uses indicated:

1. Coal-Tar Modified Polymer Formulation: Type M; Grade P; Class 25; Uses T and, as applicable to joint substrates indicated, O.
2. Product: Dow Corning or Sonneborn.

2.3 HOT-APPLIED JOINT SEALANTS

A. Sealant for Concrete and Asphalt: Single-component formulation complying with ASTM D 3405.

B. Available Products: Subject to compliance with requirements, hot-applied joint sealants that may be incorporated into the Work include, but are not limited to, the following:

1. Sealant for Concrete and Asphalt:

a. ROADSAVER 221; CraDco Inc.
b. Product #9005; Koch Materials Company.
c. Product #9030; Koch Materials Company.
d. SEALTIGHT HI-SPEC; W.R. Meadows, Inc.

2.4 JOINT-SEALANT BACKER MATERIALS

A. General: Provide joint-sealant backer materials that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by joint sealant manufacturer based on field experience and laboratory testing.

B. Backer Strips for Cold- and Hot-Applied Sealants: ASTM D 5249; Type 2; of thickness and width required to control sealant depths, prevent bottom-side adhesion of sealant, and fill remainder of joint opening under sealant.

2.5 PRIMERS:

A. Primers: Product recommended by joint sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint- sealant-substrate tests and field tests.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint-sealant performance.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint sealant manufacturer's written instructions.

B. Joint Priming: Prime joint substrates where indicated or where recommended in writing by joint sealant manufacturer, based on preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.

3.3 INSTALLATION OF JOINT SEALANTS

A. General: Comply with joint sealant manufacturer's written installation instructions applicable to products and applications indicated, unless more stringent requirements apply.

B. Sealant Installation Standard: Comply with recommendations of ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.

C. Install backer materials of type indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.

1. Do not leave gaps between ends of backer materials.
2. Do not stretch, twist, puncture, or tear backer materials.
3. Remove absorbent backer materials that have become wet before sealant application and replace them with dry materials.

D. Install sealants by proven techniques to comply with the following and at the same time backings are installed:

1. Place sealants so they directly contact and fully wet joint substrates.
2. Completely fill recesses provided for each joint configuration.
3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.

E. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.

1. Remove excess sealants from surfaces adjacent to joint.
2. Use tooling agents that are approved in writing by joint sealant manufacturer and that do not discolor sealants or adjacent surfaces.

F. Provide joint configuration to comply with joint sealant manufacturer's written instructions, unless otherwise indicated.

3.4 CLEANING

A. Clean off excess sealants or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved by manufacturers of joint sealants and of products in which joints occur.

3.5 PROTECTION

A. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from the original work.

END OF SECTION 32 13 73

SECTION 321713 - PARKING BUMPERS

TIPS:

To view non-printing **Editor's Notes** that provide guidance for editing, click on MasterWorks/Single-File Formatting/Toggle/Editor's Notes.

To read **detailed research, technical information about products and materials, and coordination checklists**, click on MasterWorks/Supporting Information.

Content Requests:

<Double click here to submit questions, comments, or suggested edits to this Section.>

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Precast concrete wheel stops.
2.

1.2 ACTION SUBMITTALS

A. Product Data:

1. Precast concrete wheel stops.

PART 2 - PRODUCTS

2.1 PARKING BUMPERS

A. Precast Concrete Wheel Stops: Precast, steel-reinforced, air-entrained concrete; 4000-psi (27.6-MPa) minimum compressive strength; manufacturer's standard height and width by 72 inches long. Provide chamfered corners, transverse drainage slots on underside, and a minimum of three factory-formed or -drilled vertical holes through wheel stop for anchoring to substrate.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. American Eagle Precast, LLC.
b. American Precast Concrete Inc.
c. Dura-Crete, Inc.
d. Oldcastle Precast, Inc.

2. Surface Appearance: Smooth, free of pockets, sand streaks, honeycombs, and other obvious defects. Corners shall be uniform, straight, and sharp.
3. Surface Sealer: Manufacturer's standard salt-resistant, clear sealer < applied at precasting location.
4. Mounting Hardware: Galvanized-steel hardware as standard with wheel-stop manufacturer.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Verify that pavement is in suitable condition to begin installation in accordance with manufacturer's written instructions.

B. Install wheel stops in accordance with manufacturer's written instructions unless otherwise indicated.

C. Install wheel stops in bed of adhesive before anchoring to substrate.

D. Securely anchor wheel stops to substrate with hardware in each preformed vertical hole in wheel stop as recommended in writing by manufacturer. Recess head of hardware beneath top of wheel stop.

END OF SECTION 321713

SECTION 321726 - TACTILE WARNING SURFACING

TIPS:

To view non-printing **Editor's Notes** that provide guidance for editing, click on MasterWorks/Single-File Formatting/Toggle/Editor's Notes.

To read **detailed research, technical information about products and materials, and coordination checklists**, click on MasterWorks/Supporting Information.

Content Requests:

<Double click here to submit questions, comments, or suggested edits to this Section.>

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Cast-in-place detectable warning tiles.
2. Surface-applied detectable warning tiles.
3. Detectable warning mats.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Sustainable Design Submittals:

1. <Double click to insert sustainable design text for recycled content.>
2. <Double click to insert sustainable design text for regional materials.>

C. Samples for each type of exposed finish requiring color selection.

PART 2 - PRODUCTS

2.1 TACTILE WARNING SURFACING, GENERAL

A. Accessibility Requirements: Comply with applicable provisions in [**the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines for Buildings and Facilities**] [**and**] [**ICC A117.1**] for tactile warning surfaces.

1. For tactile warning surfaces composed of multiple units, provide units that when installed provide consistent side-to-side and end-to-end dome spacing that complies with requirements.

B. <Double click to insert sustainable design text for recycled content.>

C. <Double click to insert sustainable design text for regional materials.>

2.2 DETECTABLE WARNING TILES

A. Cast-in-Place Detectable Warning Tiles: Accessible truncated-dome detectable warning tiles[**with replaceable surface**] configured for setting flush in new concrete walkway surfaces, with slip-resistant surface treatment on domes and field of tile.

1. <Double click here to find, evaluate, and insert list of manufacturers and products.>
2. Material: [**Cast-fiber-reinforced polymer concrete tile**] [**Molded glass- and carbon-fiber-reinforced polyester**].
3. Color: [**Safety yellow**] [**Red brick**] [**Black**] [**Gray**] [**As selected by Architect from manufacturer's full line**].
4. Shapes and Sizes:
    a. Rectangular panel, [**12 by 12 inches (305 by 305 mm)**] <**Insert dimensions**>.
    b. Radius panel, nominal 24 inches (610 mm) deep by [**6-foot (1829-mm)**] <**Insert dimension**> outside radius.
5. Dome Spacing and Configuration: [**1.67-inch (42.4-mm) spacing**] [**2.35-inch (59.7-mm) spacing**] [**Manufacturer's standard compliant spacing**] <**Insert spacing**>, in [**square**] [**diamond**] [**manufacturer's standard**] pattern.
6. Mounting:
    a. Permanently embedded detectable warning tile wet-set into freshly poured concrete.
    b. Detectable warning tile set into formed recess in concrete and adhered with [**mortar**] [**adhesive**].
    c. Replaceable detectable warning tile wet-set into freshly poured concrete and surface-fastened to permanently embedded anchors.

B. Surface-Applied Detectable Warning Tiles: Accessible truncated-dome detectable warning concrete tiles configured for surface application on existing concrete walkway surfaces, with slip-resistant surface treatment on domes, field of tile, and beveled outside edges.

1. <Double click here to find, evaluate, and insert list of manufacturers and products.>
2. Material: [**Cast-fiber-reinforced polymer concrete tile**] [**Molded glass- and carbon-fiber-reinforced polyester**].
3. Color: [**Safety yellow**] [**Red brick**] [**Black**] [**Gray**] [**As selected by Architect from manufacturer's full line**].
4. Shapes and Sizes:
    a. Rectangular panel, [**12 by 12 inches (305 by 305 mm)**] <**Insert dimensions**>.
    b. Radius panel, nominal 24 inches (610 mm) deep by [**6-foot (1829-mm)**] <**Insert dimension**> outside radius.
5. Dome Spacing and Configuration: [**1.67-inch (42.4-mm) spacing**] [**2.35-inch (59.7-mm) spacing**] [**Manufacturer's standard compliant spacing**] <**Insert spacing**>, in [**square**] [**diamond**] [**manufacturer's standard**] pattern.
6. Mounting: Adhered[**and fastened**] to existing concrete walkway.

2.3 DETECTABLE WARNING MATS

A. Surface-Applied Detectable Warning Mats: Accessible truncated-dome detectable warning resilient mats, UV resistant, manufactured for adhering to existing concrete walkway surfaces, with slip-resistant surface treatment on domes, field of mat, and beveled outside edges.

1. <Double click here to find, evaluate, and insert list of manufacturers and products.>
2. Material: Modified rubber compound, UV resistant.
3. Color: [**As indicated by manufacturer's designations**] [**Match Architect's sample**] [**As selected by Architect from manufacturer's full range**] <**Insert color**>.
4. Shapes and Sizes:

    a. Rectangular panel, [**24 by 36 inches (610 by 914 mm)**] [**24 by 48 inches (610 by 1219 mm)**] [**24 by 60 inches (610 by 1524 mm)**] <**Insert dimensions**>.

5. Dome Spacing and Configuration: [**1.67-inch (42.4-mm) spacing**] [**2.35-inch (59.7-mm) spacing**] [**Manufacturer's standard compliant spacing**] <**Insert spacing**>, in [**square**] [**diamond**] [**manufacturer's standard**] pattern.
6. Mounting: Adhered to pavement surface with adhesive[**and fastened with fasteners**].

2.4 ACCESSORIES

A. Fasteners and Anchors: Manufacturer's standard as required for secure anchorage of tactile warning surfaces, noncorrosive and compatible with each material joined, and complying with the following:

1. Furnish [**Type 304**] [**Type 316**] stainless-steel fasteners for exterior use.
2. Fastener Heads: For nonstructural connections, use flathead or oval countersunk screws and bolts with tamper-resistant heads, colored to match tile.

B. Adhesive: As recommended by manufacturer for adhering tactile warning surfacing unit to pavement.

C. Sealant: As recommended by manufacturer for sealing perimeter of tactile warning surfacing unit.

PART 3 - EXECUTION

3.1 INSTALLATION OF TACTILE WARNING SURFACING

A. General: Prepare substrate and install tactile warning surfacing according to manufacturer's written instructions unless otherwise indicated.

B. Place tactile warning surfacing units in dimensions and orientation indicated. Comply with location requirements of AASHTO MP 12.

C. Cast-in-Place Detectable Warning Tiles: Set each detectable warning tile accurately and firmly in place and completely seat tile back and embedments in wet concrete by tamping or vibrating. Set surface of tile flush with surrounding concrete and adjacent tiles. Remove concrete from tile surfaces and clean using methods recommended in writing by manufacturer.

D. Removable Cast-in-Place Detectable Warning Tiles: Set each detectable warning tile accurately and firmly in place with embedding anchors and fasteners attached, and firmly seat tile back in wet concrete by tamping or vibrating. Set surface of tile flush with surrounding concrete and adjacent tiles. Remove concrete from tile surfaces and clean tiles using methods recommended in writing by manufacturer.

E. Surface-Applied Detectable Warning Tiles: Prepare existing paving surface by grinding and cleaning as recommended by manufacturer. Apply adhesive to back of tiles in amounts and pattern recommended by manufacturer, and set tiles in place. Install anchor devices through face of tiles and into pavement using anchors located as recommended by manufacturer. Apply sealant in continuous bead around perimeter of installation.

F. Surface-Applied Detectable Warning Mats: Prepare existing paving surface by grinding and cleaning as recommended by manufacturer. Apply adhesive to back of mat and set mat in place. Firmly seat mat in adhesive bed. Install anchor devices through face of mat and into pavement using anchors located as recommended by manufacturer. Set heads of anchors flush with mat surface. Apply sealant in continuous bead around perimeter of mat.

G. Remove and replace tactile warning surfacing that is broken or damaged or does not comply with requirements in this Section. Remove in complete sections from joint to joint unless otherwise approved by Architect. Replace using tactile warning surfacing installation methods acceptable to Architect.

H. Protect tactile warning surfacing from damage and maintain free of stains, discoloration, dirt, and other foreign material.

END OF SECTION 321726

SECTION 321816 - PLAYGROUND PROTECTIVE SURFACING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Unitary, seamless surfacing.
2. Unitary, tile surfacing.

B. Related Requirements:
1. Section 321313 “Concrete Paving” for protective surfacing substrates

1.2 DEFINITIONS

A. Critical Height: Standard measure of shock attenuation according to ASTM F2223; same as "critical fall height" in ASTM F1292.

B. Unitary Surfacing: A protective surfacing of one or more material components bound together to form a continuous surface; same as "unitary system" in ASTM F2223.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For each type of protective surfacing.

1. Include plans, sections, placement and penetration details, and attachment to substrates.
2. Include accessories and edge terminations.
3. Include patterns made by varying colors of surfacing

C. Samples: For each exposed product and for each color and texture specified.

1.4 INFORMATIONAL SUBMITTALS

A. Material certificates.

B. Product certificates.

C. Field quality-control reports.

D. Sample warranty.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance data.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.

1.7 WARRANTY

A. Special Warranty: Manufacturer and Installer agree to repair or replace components of protective surfacing that fail in materials or workmanship within specified warranty period.

1. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Impact Attenuation: Critical fall height tested according to ASTM F1292.

B. Accessibility Standard: Minimum surfacing performance according to ASTM F1951.

2.2 UNITARY, SINGLE-DENSITY, SEAMLESS SURFACING

A. Description: Manufacturer's standard, site-mixed and applied, single-layer material in thickness as required, tested for impact attenuation according to ASTM F1292and for accessibility according to ASTM F1951.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

a. GameTime; a PlayCore, Inc. company.
b. No Fault Sport Group, LLC.
c. Play Safe Surfacing, Inc.

2.
3. Critical Height: 7 feet
4. Overall Thickness: Not less than as required for critical height indicated
5. Primer/Adhesive: Manufacturer's standard primer and weather-resistant, moisture-cured polyurethane adhesive suitable for unit, substrate, and location.
6. Color(s): As selected by Architect from manufacturer's full range

B. Leveling and Patching Material: Portland cement-based grout or epoxy- or polyurethane-based formulation suitable for exterior use and approved by protective surfacing manufacturer.

2.3 UNITARY, TILE SURFACING

A. Description: Manufacturer's standard blend of rubber or PVC particles forming an integral wearing and cushioning material, with overall thickness as required, tested for impact attenuation according to ASTM F1292and for accessibility according to ASTM F1951.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

   a. BCI Burke Company, LLC.
   b. GameTime; a PlayCore, Inc. company.
   c. No Fault Sport Group, LLC.
2. Unit Size: 24 by 24 inches Retain "Base Profile" Subparagraph below if this water-draining feature is important; revise to suit Project.
3. Base Profile: Integral ribbed or grid-patterned underside forming channels for water drainage between protective surfacing and substrate.
4. Edging and Corner Units: Tapered, bevel-edged units that transition from top surface of protective surfacing to the adjacent, lower surface; size compatible with field units maintaining layout pattern continuity. Provide edging and corner units where protective surfacing does not abut vertical surfaces.
5. Critical Height: 7 feet
6. Overall Thickness: Not less than as required for critical height indicated [Generally, retain "Primer/Adhesive" or "Anchors" Subparagraph below to suit Project.
7. Primer/Adhesive: Manufacturer's standard primer and weather-resistant, moisture-cured polyurethane adhesive suitable for unit, substrate, and location.
8. Anchors: Manufacturer's standard for unit, substrate, and location.
9. Tile Color(s): As selected by Architect from manufacturer's full range
10. Filler/Sealant: Manufacturer's standard clear silicone or polyurethane filler/sealant suitable for exterior use.

B. Leveling and Patching Material: Portland cement-based grout or epoxy- or polyurethane-based formulation suitable for exterior use and approved by protective surfacing manufacturer.

PART 3 - EXECUTION

3.1 PREPARATION

A. Prepare substrates to receive surfacing products according to protective surfacing manufacturer's written instructions.

1. Repair: Fill holes and depressions in unsatisfactory surfaces with leveling and patching material.
2. Terminal Edges: Saw cut concrete for terminal edges of protective surfacing.

Concrete Substrates: Verify that substrates are dry, free from surface defects, and free of laitance, glaze, efflorescence, curing compounds, form-release agents, hardeners, dust, dirt, loose particles, grease, oil, and other contaminants incompatible with playground surface system or that may interfere with adhesive bond. Determine adhesion, dryness, and acidity characteristics by performing procedures recommended in writing by playground surface system manufacturer.

3.2 INSTALLATION OF SEAMLESS SURFACING

A. Mix and apply components of seamless surfacing according to manufacturer's written instructions to produce uniform, monolithic, and impact-attenuating protective surfacing of required overall thickness.

1. Substrate Primer: Apply over prepared substrate at manufacturer's standard spreading rate for type of substrate.
2. Poured Cushioning Layer: Spread evenly over primed substrate in one continuous operation, with a minimum of cold joints.
3. Intercoat Primer: Over cured cushioning layer, apply primer at manufacturer's standard spreading rate.
4. Wearing Layer: Spread over primed base course in one continuous operation and, except where color changes, with a minimum of cold joints.
5. Edge Treatment: Flush

3.3 INSTALLATION OF TILE SURFACING

A. Apply components of tile surfacing according to manufacturer's written instructions to produce a uniform wearing surface with no unaligned units, raised edges (lipping), or other surface imperfections.

B. Lay out units from center marks established between principal perimeter edges, discounting minor offsets, so units at opposite sides of installation are of equal width. Adjust as necessary to avoid using cut widths that equal less than one-half of a unit.

C. Edging: Maintain fully cushioned thickness required to comply with performance requirements.

D. Filler/Sealant: Mask area surrounding cutouts around playground equipment supports and other obstructions. Apply a full bead of filler/sealant, filling cutouts immediately after laying tile around cutout.

3.4 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests.

B. Perform the following tests with the assistance of a factory-authorized service representative:

1. Perform "Installed Surface Performance Test" according to ASTM F1292 for each protective surfacing type and thickness in each playground area.

C. Playground protective surfacing will be considered defective if it does not pass tests.

D. Prepare test reports.

END OF SECTION 321816.13

SECTION 323115 – WOOD FENCES & GATES

PART 1 – GENERAL

1.1 SECTION INCLUDES

A. Requirements regarding wood fencing and gates at parking lot

1.2 SUBMITTALS

A. Drawings: Indicate plan layout, grid, size and spacing of components, accessories, fittings, anchorage, and post section.

B. Data: Submit manufacturer's installation instructions and procedures, including details of fence and gate installation.

PART 2 – PRODUCTS

2.1 GENERAL

A. All wood materials shall be treated wood, or wood of a natural resistance to decay. Materials shall be free from loose knots, cracks, and other imperfections.

B. Cast-in-place Concrete: Class 3000 minimum, Section 03300.

2.2 WOOD BOARDS OR SLATS

A. Wood boards or slats shall be pine and as indicated in the drawings

2.3 POSTS

A. Fence and Man Gate posts shall be as indicated in the drawings

B. Buried post ends should be treated with an approved wood preservative product.

2.4 GATES

A. Provide additional horizontal, vertical, and diagonal members to ensure proper gate operation and for attachment of wood, hardware and accessories. Consult manufacturer as necessary.

B. Accessibility: Gate stops, latches and locks shall be accessible from either side of gate.

C. Gate designs shall be approved by Architect prior to installation.

2.5 GATE HARDWARE

A. Gate hardware including, but not limited to, latches, hinges, stops and bolts shall be stainless steel, powder coated black, or galvanized.

B. Hinges and Pins shall be heavy duty and sized as per manufacturer's recommendations.

C. Dual access (accessible and lockable from either side) latch and lock systems are required on all gates.

PART 3 – EXECUTION

3.1 INSTALLATION

A. Examine areas and conditions, with Installer present, for compliance with requirements for a verified survey of property lines and legal boundaries, site clearing, earthwork, pavement work, and other conditions affecting performance of the Work.

1. Do not begin installation before final grading is completed unless otherwise permitted by Architect.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

C. Stake locations of fence lines, gates, and terminal posts. Do not exceed intervals of 500 feet or line of sight between stakes. Indicate locations of utilities, lawn sprinkler system, underground structures, benchmarks, and property monuments.

D. Post Excavation: Drill or hand-excavate holes for posts to diameters and spacings indicated, in firm, undisturbed soil.

E. Post Setting: Set posts in concrete at indicated spacing into firm, undisturbed soil.

1. Verify that posts are set plumb, aligned, and at correct height and spacing, and hold in position during setting with concrete or mechanical devices.
2. Concrete Fill: Place concrete around posts to dimensions indicated and vibrate or tamp for consolidation. Protect aboveground portion of posts from concrete splatter.

a. Exposed Concrete: Extend 2 inches above grade; shape and smooth to shed water.

F. Line Posts: Space line posts uniformly at 10 feet o.c.

G. Gates: Adjust gates to operate smoothly, easily, and quietly, free of binding, warp, excessive deflection, distortion, nonalignment, misplacement, disruption, or malfunction, throughout entire operational range. Confirm that latches and locks engage accurately and securely without forcing or binding.

SECTION 323119 - DECORATIVE METAL FENCES AND GATES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Decorative metallic-coated-steel tubular picket fences.
2. Decorative steel fences.
3. Swing gates.

1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For fencing and gates.

1. Include plans, elevations, sections, and attachment details.
2. Include diagrams for power, signal, and control wiring.

C. Samples: For each fence material and for each color specified.

1.4 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

B. Product test reports.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance data.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: Fabricator of products.

2.1 PERFORMANCE REQUIREMENTS

A. Wind Loading: Comply with ASCE/SEI 7 requirements for fence height, wind exposure, design wind speed, and design wind pressure.

2.2 DECORATIVE METALLIC-COATED-STEEL TUBULAR PICKET FENCES

Fences in this article are made from tubular components formed from metallic-coated steel sheet or uncoated steel sheet that is hot-dip galvanized after forming. See the Evaluations.

A. Decorative Metallic-Coated-Steel Tubular Picket Fences: Comply with ASTM F2408 for light-(commercial) application (class) unless otherwise indicated.

1. <Double click here to find, evaluate, and insert list of manufacturers and products.>

B. Post Caps: **Formed from steel sheet and hot-dip galvanized after forming**

C. Pickets: Square tubes.

1. [**Terminate tops of pickets at top rail for flush top appearance**] [**Extend pickets beyond top rail as indicated and terminate with UV-resistant plastic caps**] [**Extend pickets beyond top rail as indicated and terminate with galvanized-steel caps**] [**Extend pickets beyond top rail as indicated and press flat and trim to produce spear point shape**].
2. Picket Spacing: [**6 inches (152.4 mm)**] [**4 inches (101.6 mm)**] [**1-3/4 inches (44 mm)**] <**Insert dimension**> clear, maximum.

D. Metallic-Coated Steel Sheet: Galvanized-steel sheet

E. Finish: [**Organic coating complying with requirements in ASTM F2408**] [**Powder coating**].

2.3 DECORATIVE STEEL FENCES

A. Decorative Steel Fences: Fences made from steel tubing[**bars**] and shapes[**, hot-dip galvanized**].

1. <Double click here to find, evaluate, and insert list of manufacturers and products.>

B. Posts: Square steel tubing. [**2 by 2 inches (51 by 51 mm)**] [**2-1/2 by 2-1/2 inches (64 by 64 mm)**] [**3 by 3 inches (76 by 76 mm)**] <**Insert dimensions**> with [**1/8-inch (3.2-mm)**] [**3/16-inch (4.76-mm)**] <**Insert dimension**> wall thickness.

C. Post Caps: [**Formed from steel sheet**] [**Formed from steel sheet and hot-dip galvanized after forming**]

D. Rails:

1. Steel Tube Rails: Square steel tubing [**2 by 2 inches (51 by 51 mm)**] [**2-1/2 by 2-1/2 inches (64 by 64 mm)**] <**Insert dimensions**> with [**1/8-inch (3.2-mm)**] <**Insert dimension**> wall thickness.
2. Steel Channel Rails: Steel channels [**2 by 1 inch (51 by 25 mm)**] [**1-1/2 by 3/4 inch (38 by 19 mm)**] [**1-1/2 by 1/2 inch (38 by 13 mm)**] <**Insert dimensions**>.

E. Pickets: [**1/2-inch- (13-mm-) square steel bars**] [**3/4-inch- (19-mm-) square steel bars**] [**Decorative steel bars of pattern and size indicated**] [**5/8 inch (16 mm) square by 0.065-inch (1.65-mm) steel tubes**] [**5/8 inch (16 mm) square by 0.083-inch (2.11-mm) steel tubes**] [**3/4 inch (19 mm) square by 0.065-inch (1.65-mm) steel tubes**] [**3/4 inch (19 mm) square by 0.083-inch (2.11-mm) steel tubes**] [**1 inch (25 mm) square by 0.065-inch (1.65-mm) steel tubes**] [**1 inch (25 mm) square by 0.083-inch (2.11-mm) steel tubes**].

1. Picket Spacing: [**6 inches (152.4 mm)**] [**4 inches (101.6 mm)**] [**1-3/4 inches (44 mm)**] <**Insert dimension**> clear, maximum.

F. Infill: Forge-welded-steel bar grating.

Before retaining options in five subparagraphs below, verify availability of resulting design with manufacturers. Other spacings are also available.

1. Perimeter Bars: Steel flat bars [**1 by 1/8 inch (25 by 3.2 mm)**] <**Insert dimensions**>.
2. Vertical Main Bars: Steel flat bars [**1 by 1/8 inch (25 by 3.2 mm)**] [**1-3/16 by 5/32 inch (30 by 4 mm)**] <**Insert dimensions**>.
3. Vertical Main Bar Spacing: [**1-21/32 inches (42 mm)**] [**1-7/8 inches (48 mm)**] [**2-7/16 inches (62 mm)**] <**Insert dimension**> o.c.
4. Horizontal Cross Rods: [**3/16-inch- (4.8-mm-)**] [**1/4-inch- (6.4-mm-)**] diameter, steel rods.
5. Horizontal Cross Rod Spacing: [**1-3/4 inches (45 mm)**] [**2-19/32 inches (66 mm)**] [**5-3/16 inches (132 mm)**] <**Insert dimension**> o.c.

G. Fasteners: Stainless-steel carriage bolts and [**tamperproof**]nuts.

Retain one of two "Fabrication" paragraphs below.

H. Fabrication: Assemble fences into sections by welding pickets to rails.

I. Fabrication: Fabricate bar grating infill into sections of size indicated.

J. Galvanizing: For items other than hardware that are indicated to be galvanized, hot-dip galvanize to comply with ASTM A123/A123M. For hardware items, hot-dip galvanize to comply with ASTM A153/A153M.

1. Hot-dip galvanize posts[**and rails**].
2. Hot-dip galvanize rail and picket assemblies after fabrication.

A & T and Ametco provide hot-dip galvanized gratings; BarnettBates provides ungalvanized gratings.

3. Hot-dip galvanize bar grating infill after fabrication.

Retain one or more of three paragraphs below.

K. Finish for Bar Grating Infill: Powder coating.

L. Finish for Steel Items[**Other Than Bar Grating Infill**]: [**Primed**] [**Shop painted**] [**High-performance coating**].

M. Finish for Metallic-Coated-Steel Items[**Other Than Bar Grating Infill**]: [**High-performance coating**] [**Galvanized finish**].

2.4 SWING GATES

A. Galvanized-Steel Frames and Bracing: Fabricate members from square tubes [**1-1/2 by 1-1/2 inches (38 by 38 mm)**] [**1-3/4 by 1-3/4 inches (45 by 45 mm)**] [**2 by 2 inches (51 by 51 mm)**] [**2-1/2 by 2-1/2 inches (64 by 64 mm)**] formed from 0.108-inch (2.74-mm) nominal-thickness, metallic-coated steel sheet or formed from 0.105-inch (2.66-mm) nominal-thickness steel sheet and hot-dip galvanized after fabrication.

B. Steel Frames and Bracing: Fabricate members from square steel tubing [**1-1/2 by 1-1/2 inches (38 by 38 mm)**] [**2 by 2 inches (51 by 51 mm)**] [**2-1/2 by 2-1/2 inches (64 by 64 mm)**] <**Insert dimensions**> with [**1/8-inch (3.2-mm)**] <**Insert dimension**> wall thickness.[**Hot-dip galvanize frames after fabrication.**]

C. Hardware: Latches permitting operation from both sides of gate, hinges, and keepers for each gate leaf more than 5 feet (1.52 m) wide. Provide [**center gate stops**] [**and**] [**cane bolts**] for pairs of gates.[**Fabricate latches with integral eye openings for padlocking; padlock accessible from both sides of gate.**]

1. <**Insert requirements for padlocks and chains if not Owner furnished**>.

D. Galvanizing: For items other than hardware that are indicated to be galvanized, hot-dip galvanize to comply with ASTM A123/A123M. For hardware items, hot-dip galvanize to comply with ASTM A153/A153M.

E. Metallic-Coated-Steel Finish: [**High-performance coating**] [**Galvanized finish**].

F. Steel Finish: [**Primed**] [**Shop painted**] [**High-performance coating**].

2.5 STEEL AND IRON

A. Plates, Shapes, and Bars: ASTM A36/A36M.

B. Bars (Pickets): Hot-rolled, carbon steel complying with ASTM A29/A29M, Grade 1010.

C. Tubing: ASTM A500/A500M, cold-formed steel tubing.

D. Bar Grating: NAAMM MBG 531.

E. Uncoated Steel Sheet: [**Hot-rolled steel sheet, ASTM A1011/A1011M, Structural Steel, Grade 45 (Grade 310)**] [**or**] [**cold-rolled steel sheet, ASTM A1008/A1008M, Structural Steel, Grade 50 (Grade 340)**].

First option in "Galvanized-Steel Sheet" Paragraph below is specified for industrial and light-industrial (commercial) fences in ASTM F2408; second option is specified for residential fences.

F. Galvanized-Steel Sheet: ASTM A653/A653M, structural quality, Grade 50 (Grade 340), with [**G90 (Z275)**] [**G60 (Z180)**] coating.

2.6 COATING MATERIALS

A. Epoxy Zinc-Rich Primer for Uncoated Steel: Complying with MPI #20 and compatible with coating specified to be applied over it.

B. Epoxy Primer for Galvanized Steel: Epoxy primer recommended in writing by topcoat manufacturer.

C. Intermediate Coat for Uncoated Steel: Epoxy or polyurethane intermediate recommended in writing by primer and topcoat manufacturer.

Retain "Polyurethane(Intermediate Coat and) Topcoat" Paragraph below for high-performance coating on either uncoated or galvanized steel. Retain option only for galvanized steel.

D. Polyurethane[**Intermediate Coat and**] Topcoat: Complying with MPI #72 and compatible with undercoat.

2.7 MISCELLANEOUS MATERIALS

A. Concrete: Normal-weight, air-entrained, ready-mix concrete complying with requirements in Section 033000 "Cast-in-Place Concrete" with a minimum 28-day compressive strength of 3000 psi (20 MPa), 3-inch (75-mm) slump, and 1-inch (25-mm) maximum aggregate size[**or dry, packaged, normal-weight concrete mix complying with ASTM C387/C387M mixed with potable water according to manufacturer's written instructions**].

2.8 GROUNDING MATERIALS

Retain first paragraph below if Section 260526 "Grounding and Bonding for Electrical Systems" will be included in Project. Otherwise, delete paragraph and retain remaining paragraphs in this article. Materials below match those specified in Section 260526.

A. Comply with requirements of Section 260526 "Grounding and Bonding for Electrical Systems."

Retain both paragraphs below to specify grounding for fences and gates. See the Evaluations. Products described may exceed local code requirements.

B. Grounding Conductors: Size as indicated on Drawings. Bare, solid wire for No. 6 AWG and smaller; stranded wire for No. 4 AWG and larger.

1. Material above Finished Grade: [**Copper**]
2. Material on or below Finished Grade: Copper.

C. Grounding Connectors and Grounding Rods: Comply with UL 467.

2.9 STEEL FINISHES

A. Surface Preparation: Clean surfaces according to [**SSPC-SP 5/NACE No. 1, "White Metal Blast Cleaning."**] [**SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."**] After cleaning, apply a conversion coating compatible with the organic coating to be applied over it.

"Powder Coating" Paragraph below may be retained for fences that are specified in "Decorative Steel Fences" Article and that are manufacturers' standard products.

B. Powder Coating: Immediately after cleaning, apply manufacturer's standard two-coat finish consisting of epoxy primer and TGIC polyester topcoat to a minimum total dry film thickness of not less than 8 mils (0.20 mm). Comply with coating manufacturer's written instructions.

1. Color and Gloss: [**As indicated by manufacturer's designations**] [**Match Architect's sample**] [**As selected by Architect from manufacturer's full range**] <**Insert color and gloss**>.

C. Primer Application: Apply zinc-rich epoxy primer immediately after cleaning, to provide a minimum dry film thickness of 2 mils (0.05 mm) per applied coat, to surfaces that are exposed after assembly and installation, and to concealed surfaces.

D. High-Performance Coating: Apply intermediate and polyurethane topcoats to prime-coated surfaces. Comply with coating manufacturer's written instructions and with requirements in SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting. Apply at spreading rates recommended by coating manufacturer.

1. Match approved Samples for color, texture, and coverage. Remove and refinish, or recoat work that does not comply with specified requirements.

For exact finish, insert names of coating manufacturers and products.

2.10 METALLIC-COATED-STEEL FINISHES

Retain "Galvanized Finish" Paragraph below only for uncoated, galvanized-metal finishes.

A. Galvanized Finish: Clean welds, mechanical connections, and abraded areas and repair galvanizing to comply with ASTM A780/A780M.

Retain "Surface Preparation" Paragraph below for galvanized surfaces that are to receive powder coating or high-performance coatings.

B. Surface Preparation: Clean surfaces of oil and other contaminants. Use cleaning methods that do not leave residue. After cleaning, apply a [**zinc-phosphate**]conversion coating compatible with the organic coating to be applied over it. Clean welds, mechanical connections, and abraded areas and apply galvanizing repair paint, complying with SSPC-Paint 20, to comply with ASTM A780/A780M.

First "Powder Coating" Paragraph below may be retained for fences that are specified in "Decorative Steel Fences" Article and that are manufacturers' standard products.

C. Powder Coating: Immediately after cleaning and pretreating, apply manufacturer's standard TGIC polyester powder-coat finish to a minimum dry film thickness of 2 mils (0.05 mm).

1. Color and Gloss: [**As indicated by manufacturer's designations**] [**Match Architect's sample**] [**As selected by Architect from manufacturer's full range**] <**Insert color and gloss**>.

"Powder Coating" Paragraph below may be retained for fences that are specified in "Decorative Metallic-Coated-Steel Tubular Picket Fences" Article.

D. Powder Coating: Immediately after cleaning and pretreating, apply manufacturer's standard two-coat finish consisting of [**zinc-rich**]epoxy prime coat and TGIC polyester topcoat to a minimum dry film thickness of 2 mils (0.05 mm). Comply with coating manufacturer's written instructions to achieve a minimum total dry film thickness of 4 mils (0.10 mm).

1. Color and Gloss: [**As indicated by manufacturer's designations**] [**Match Architect's sample**] [**As selected by Architect from manufacturer's full range**] <**Insert color and gloss**>.

E. High-Performance Coating: Apply epoxy primer, polyurethane intermediate coat, and polyurethane topcoat to prepared surfaces. Comply with coating manufacturer's written instructions and with requirements in SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting. Apply at spreading rates recommended by coating manufacturer.

1. Match approved Samples for color, texture, and coverage. Remove and refinish, or recoat work that does not comply with specified requirements.

For exact finish, insert names of coating manufacturers and products.

PART 3 - EXECUTION

3.1 DECORATIVE FENCE INSTALLATION

Retain one of first two paragraphs below.

A. Install fences according to manufacturer's written instructions.

B. Install fences by setting posts as indicated and fastening [**rails**] [**and**] [**infill panels**] to posts.[**Peen threads of bolts after assembly to prevent removal.**]

Revise "Post Excavation" and "Post Setting" paragraphs below as needed if conditions include unstable or rocky soils.

C. Post Excavation: Drill or hand-excavate holes for posts in firm, undisturbed soil. Excavate holes to a diameter of not less than 4 times post size and a depth of not less than 24 inches (600 mm) plus 3 inches (75 mm) for each foot (300 mm) or fraction of a foot (300 mm) that fence height exceeds 4 feet (1.2 m).

D. Post Setting: Set posts [**in concrete**] [**with mechanical anchors**] [**by mechanically driving into soil**] at indicated spacing into firm, undisturbed soil.

1. Verify that posts are set plumb, aligned, and at correct height and spacing, and hold in position during setting with concrete or mechanical devices.

Retain "Concrete Fill" Subparagraph below for concrete footings.

2. Concrete Fill: Place concrete around [**posts**] [**and**] [**sleeves**] and vibrate or tamp for consolidation. Protect aboveground portion of posts from concrete splatter.
3. Posts Set in Concrete: Extend post to within 6 inches (150 mm) of specified excavation depth, but not closer than 3 inches (75 mm) to bottom of concrete.
4. Mechanically Driven Posts: Drive into soil to depth of [**30 inches (762 mm)**] [**36 inches (914 mm)**] <**Insert dimension**>. Protect post top to prevent distortion.
5. Space posts uniformly at [**6 feet (1.83 m)**] [**8 feet (2.44 m)**] <**Insert dimension**> o.c.

3.2 GATE INSTALLATION

A. Install gates according to manufacturer's written instructions, level, plumb, and secure for full opening without interference. Attach hardware using tamper-resistant or concealed means. Install ground-set items in concrete for anchorage. Adjust hardware for smooth operation and lubricate where necessary.

3.3 GROUNDING AND BONDING

Retain this article if fences and gates require grounding. See the Evaluations for other considerations. Retain first paragraph below if Section 260526 "Grounding and Bonding for Electrical Systems" is included in Project.

A. Comply with Section 260526 "Grounding and Bonding for Electrical Systems."

Retain "Fence Grounding" Paragraph below if Section 260526 is not retained in Project and if fence other than that enclosing electrical distribution equipment is to be grounded. Items specified below are identical to those specified in Section 260526.

B. Fence Grounding: Install at maximum intervals of [**1500 feet (450 m)**] <**Insert a lesser distance if grounding resistance is high**> except as follows:

1. Fences within 100 Feet (30 m) of Buildings, Structures, Walkways, and Roadways: Ground at maximum intervals of [**750 feet (225 m)**] <**Insert a lesser distance if grounding resistance is high**>.

a. Gates and Other Fence Openings: Ground fence on each side of opening.

C. Grounding Method: At each grounding location, drive a grounding rod vertically until the top is 6 inches (150 mm) below finished grade. Connect rod to fence with No. 6 AWG conductor. Connect conductor to each fence component at grounding location.

D. Bonding Method for Gates: Connect bonding jumper between gate post and gate frame.

E. Connections: Make connections so possibility of galvanic action or electrolysis is minimized. Select connectors, connection hardware, conductors, and connection methods so metals in direct contact are galvanically compatible.

Retain "Bonding to Lightning-Protection System" Paragraph below if fencing terminates at a building or other structure equipped with lightning-protection system.

F. Bonding to Lightning-Protection System: If fence terminates at lightning-protected building or structure, ground the fence and bond the fence grounding conductor to lightning-protection down conductor or lightning-protection grounding conductor, complying with NFPA 780.

3.4 FIELD QUALITY CONTROL

A. Testing Agency: [**Owner will engage**] [**Engage**] a qualified testing agency to perform tests and inspections.

1. Grounding-Resistance Tests: Subject completed grounding system to a megger test at each grounding location. Measure grounding resistance not less than two full days after last trace of precipitation, without soil having been moistened by any means other than natural drainage or seepage and without chemical treatment or other artificial means of reducing natural grounding resistance. Perform tests by two-point method according to IEEE 81.

END OF SECTION 323119

SECTION 329200 - TURFGRASSES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:
1. Sodding.
2. Turf Renovation.

B. Related Sections

1. Division 31 Section "Earth Moving" for excavation, filling and backfilling, and rough grading.
2. Division 32 Section "Plants" for border edgings.

1.3 DEFINITIONS

A. Duff Layer: The surface layer of native topsoil that is composed of mostly decayed leaves, twigs, and detritus.

B. Finish Grade: Elevation of finished surface of planting soil.

C. Manufactured Topsoil: Soil produced off-site by homogeneously blending mineral soils or sand with stabilized organic soil amendments to produce topsoil or planting soil.

D. Planting Soil: Standardized topsoil; existing, native surface topsoil; existing, in-place surface soil; imported topsoil; or manufactured topsoil that is modified with soil amendments and perhaps fertilizers to produce a soil mixture best for plant growth.

E. Subgrade: Surface or elevation of subsoil remaining after excavation is complete, or top surface of a fill or backfill before planting soil is placed.

F. Planting Area: Areas to be planted.

G. Subsoil: All soil beneath the topsoil layer of the soil profile, and typified by the lack of organic matter and soil organisms.

H. Surface Soil: Soil that is present at the top layer of the existing soil profile at the Project site. In undisturbed areas, the surface soil is typically topsoil; but in disturbed areas such as urban environments, the surface soil can be subsoil.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated, including soils.

1. Pesticides and Herbicides: Include product label and manufacturer's application instructions specific to the Project.

B. Qualification Data: For qualified landscape Installer. Include list of similar projects completed by Installer demonstrating Installer's capabilities and experience. Include project names, addresses, and year completed, and include names and addresses of owners' contact persons.

C. Product Certificates: For each type of manufactured product, from manufacturer, and complying with the following:

1. Manufacturer's certified analysis of standard products.
2. Analysis of other materials by a recognized laboratory made according to methods established by the Association of Official Analytical Chemists, where applicable.

D. Material Test Reports: For Planting Soil.

E. Maintenance Instructions: Recommended procedures to be established by Owner for maintenance of turfgrass during a calendar year. Submit before start of required maintenance periods.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: A qualified landscape Installer whose work has resulted in successful turf establishment.

1. Experience: Five (5) years' experience as a Landscape Horticulturalist as well as five (5) years experience in landscape installation in addition to requirements in Division 01 Section "Quality Requirements."
2. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on Project site when work is in progress.
3. Personnel Certifications: Installer's field supervisor shall have certification as a Landscape Horticulturalist licensed by the Louisiana Horticulture Commission.
4. Pesticide Applicator: State licensed, commercial.

B. Soil-Testing Laboratory Qualifications: An independent or university laboratory, recognized by the State Department of Agriculture, with the experience and capability to conduct the testing indicated and that specializes in types of tests to be performed. LSU Ag Center Soil Testing Lab shall be the preferred testing facility.

C. Soil Analysis: For each unamended soil type, furnish soil analysis and a written report by a qualified soil-testing laboratory stating percentages of organic matter; gradation of sand, silt, and clay content; cation exchange capacity; deleterious material; pH; and mineral and plant-nutrient content of the soil.

1. Testing methods and written recommendations shall comply with USDA's Handbook No. 60.
2. The soil-testing laboratory shall oversee soil sampling, with depth, location, and number of samples to be taken per instructions from Architect. A minimum of three (3) representative samples shall be taken from varied locations for each soil to be used or amended for planting purposes.
3. Report suitability of tested soil for plant growth.

    a. Based upon the test results, state recommendations for soil treatments and soil amendments to be incorporated. State recommendations in weight per 1000 sq. ft. or volume per cu. yd. for nitrogen, phosphorus, and potash nutrients and soil

amendments to be added to produce satisfactory planting soil suitable for healthy, viable plants.

b. Report presence of problem salts, minerals, or heavy metals, including aluminum, arsenic, barium, cadmium, chromium, cobalt, lead, lithium, and vanadium. If such problem materials are present, provide additional recommendations for corrective action.

D. Preinstallation Conference: Conduct conference at Project site or other location approved by Architect. Contractor to notify Architect of meeting time/location at least seven (7) days in advance.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Seed and Other Packaged Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and indication of conformance with state and federal laws, as applicable.

B. Sod: Harvest, deliver, store, and handle sod according to requirements in "Specifications for Turfgrass Sod Materials" and "Specifications for Turfgrass Sod Transplanting and Installation" in TPI's "Guideline Specifications to Turfgrass Sodding." Deliver sod in time for planting within 24 hours of harvesting. Protect sod from breakage and drying.

C. Bulk Materials:

1. Do not dump or store bulk materials near structures, utilities, walkways and pavements, or on existing turf areas or plants.
2. Provide erosion-control measures to prevent erosion or displacement of bulk materials, discharge of soil-bearing water runoff, and airborne dust reaching adjacent properties, water conveyance systems, or walkways.
3. Accompany each delivery of bulk fertilizers, lime, and soil amendments with appropriate certificates.

1.7 PROJECT CONDITIONS

A. Field Measurements: Verify actual grade elevations, service and utility locations, irrigation system components, and dimensions of plantings and construction contiguous with new turf by field measurements before proceeding with turfgrass work.

B. Planting Restrictions: Plant during the following period. Coordinate planting periods with initial maintenance periods to provide required maintenance from date of Substantial Completion.

1. Planting Season: September 15th – May 1st.

C. Weather Limitations: Proceed with planting only when existing and forecasted weather conditions permit planting to be performed when beneficial and optimum results may be obtained. Apply products during favorable weather conditions according to manufacturer's written instructions.

1.8 MAINTENANCE SERVICE

A. Initial Turf Maintenance Service: Provide full maintenance by skilled employees of landscape Installer. Maintain as required in Part 3. Begin maintenance immediately after each area is

planted and continue until acceptable turf is established but for not less than the following periods:

1. Sodded Turf: Twelve (12) months from date of Substantial Completion.

B. Continuing Maintenance Proposal: From Installer to Owner, in the form of a standard yearly (or other period) maintenance agreement, starting on date initial maintenance service is concluded. State services, obligations, conditions, and terms for agreement period and for future renewal options.

PART 2 - PRODUCTS

1.9 TURFGRASS SOD

A. Turfgrass Sod: Certified and complying with "Specifications for Turfgrass Sod Materials" in TPI's "Guideline Specifications to Turfgrass Sodding." Furnish viable sod of uniform density, color, and texture, strongly rooted, and capable of vigorous growth and development when planted.

B. Turfgrass Species: Bermuda Grass (*Cynodon dactylon*).

1.10 INORGANIC SOIL AMENDMENTS

A. Add necessary inorganic soil amendments as required by the soil test.

1.11 FERTILIZERS

A. All fertilizer shall be a commercial balanced formula with at least 25% organic material, and shall conform to applicable State fertilizer laws. It shall be a slow release formula, “Osmocote”, or equal and shall be used as specified by manufacturer. Fertilizer, unless otherwise specified, shall be delivered mixed as specified, in standard size, unopened containers, showing weight, analysis and name of manufacturer

1.12 PLANTING SOILS

A. Planting Soil: Existing, in-place surface soil within pH range of 5 - 7, topdressed with a 2” layer of pump sand. Verify suitability of existing surface soil to produce viable planting soil. Remove stones, roots, plants, sod, clods, clay lumps, pockets of coarse sand, concrete slurry, concrete layers or chunks, cement, plaster, building debris, and other extraneous materials harmful to plant growth. Mix surface soil with soil amendments as recommended by the LSU Soil Analysis Lab or other approved lab.

1.13 PESTICIDES

A. General: Pesticide registered and approved by EPA, acceptable to authorities having jurisdiction, and of type recommended by manufacturer for each specific problem and as required for Project conditions and application. Do not use restricted pesticides unless authorized in writing by authorities having jurisdiction.

B. Pre-Emergent Herbicide (Selective and Non-Selective): Effective for controlling the germination or growth of weeds within planted areas at the soil level directly below the mulch layer.

C. Post-Emergent Herbicide (Selective and Non-Selective): Effective for controlling weed growth that has already germinated.

PART 3 - EXECUTION

1.14 EXAMINATION

A. Examine areas to be planted for compliance with requirements and other conditions affecting performance.

1. Verify that no foreign or deleterious material or liquid such as paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, or acid has been deposited in soil within a planting area.
2. Do not mix or place soils and soil amendments in frozen, wet, or muddy conditions.
3. Suspend soil spreading, grading, and tilling operations during periods of excessive soil moisture until the moisture content reaches acceptable levels to attain the required results.
4. Uniformly moisten excessively dry soil that is not workable and which is too dusty.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

C. If contamination by foreign or deleterious material or liquid is present in soil within a planting area, remove the soil and contamination as directed by Architect and replace with new planting soil.

1.15 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities and turf areas and existing plants from damage caused by planting operations.

1. Protect grade stakes set by others until directed to remove them.

B. Install erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.

1.16 TURF AREA PREPARATION

A. Limit turf subgrade preparation to areas to be planted.

B. Newly Graded Subgrades: Loosen subgrade to a minimum depth of 4 inches. Remove stones larger than 1 inch in any dimension and sticks, roots, rubbish, and other extraneous matter and legally dispose of them off Owner's property.

1. Apply fertilizer directly to subgrade before loosening.

a. Delay mixing fertilizer with planting soil if planting will not proceed within a few days.
b. Mix lime with dry soil before mixing fertilizer.

2. Spread pump sand to a depth of 2 inches but not less than required to meet finish grades after light rolling and natural settlement. Do not spread if subgrade is frozen, muddy, or excessively wet.

C. Unchanged Subgrades: If turf is to be planted in areas unaltered or undisturbed by excavating, grading, or surface-soil stripping operations, prepare surface soil as follows:

1. Remove existing grass, vegetation, and turf. Do not mix into surface soil.
2. Loosen surface soil to a depth of at least 6 inches. Apply soil amendments and fertilizers according to planting soil mix proportions and mix thoroughly into top 4 inches of soil. Till soil to a homogeneous mixture of fine texture.
3. Spread pump sand to a depth of 2 inches but not less than required to meet finish grades after light rolling and natural settlement. Do not spread if subgrade is frozen, muddy, or excessively wet.
4. Remove stones larger than 1 inch in any dimension and sticks, roots, trash, and other extraneous matter.
5. Legally dispose of waste material, including grass, vegetation, and turf, off Owner's property.

D. Finish Grading: Grade planting areas to a smooth, uniform surface plane with loose, uniformly fine texture. Grade to within plus or minus 1/2 inch of finish elevation. Roll and rake, remove ridges, and fill depressions to meet finish grades. Limit finish grading to areas that can be planted in the immediate future.

E. Moisten prepared area before planting if soil is dry. Water thoroughly and allow surface to dry before planting. Do not create muddy soil.

F. Before planting, obtain Architect's acceptance of finish grading; restore planting areas if eroded or otherwise disturbed after finish grading.

1.17 SODDING

A. Lay sod within 24 hours of harvesting. Do not lay sod if dormant or if ground is frozen or muddy.

B. Lay sod to form a solid mass with tightly fitted joints. Butt ends and sides of sod; do not stretch or overlap. Stagger sod strips or pads to offset joints in adjacent courses. Avoid damage to subgrade or sod during installation. Tamp and roll lightly to ensure contact with subgrade, eliminate air pockets, and form a smooth surface. Work sifted soil or fine sand into minor cracks between pieces of sod; remove excess to avoid smothering sod and adjacent grass.

1. Lay sod across angle of slopes exceeding 1:3 and use sod stakes/staples to hold in place.

C. Saturate sod with fine water spray within two hours of planting. During first week after planting, water daily or more frequently as necessary to maintain moist soil to a minimum depth of 1-1/2 inches (38 mm) below sod.

1.18 TURF RENOVATION

A. Renovate existing turf damaged by Contractor's operations, such as storage of materials or equipment and movement of vehicles.

1. Reestablish turf where settlement or washouts occur or where minor regrading is required.
2. Install new planting soil as required.

B. Remove sod and vegetation from diseased or unsatisfactory turf areas; do not bury in soil.

C. Remove topsoil containing foreign materials such as oil drippings, fuel spills, stones, gravel, and other construction materials resulting from Contractor's operations, and replace with new planting soil.

D. Mow, dethatch, core aerate, and rake existing turf.

E. Water newly planted areas and keep moist until new turf is established.

1.19 TURF MAINTENANCE

A. Maintain and establish turf by watering, fertilizing, weeding, mowing, trimming, replanting, and performing other operations as required to establish healthy, viable turf. Roll, regrade, and replant bare or eroded areas and remulch to produce a uniformly smooth turf. Provide materials and installation the same as those used in the original installation.

1. Fill in as necessary soil subsidence that may occur because of settling or other processes. Replace materials and turf damaged or lost in areas of subsidence.
2. In areas where mulch has been disturbed by wind or maintenance operations, add new mulch and anchor as required to prevent displacement.
3. Apply treatments as required to keep turf and soil free of pests and pathogens or disease. Use integrated pest management practices whenever possible to minimize the use of pesticides and reduce hazards.

B. One-Year Turf Watering: Contractor shall irrigate as required to maintain vigorous and healthy turf growth. Overwatering or flooding shall not be allowed. The Contractor shall furnish any water to ensure adequate irrigation.

C. Mow turf as soon as top growth is tall enough to cut. Repeat mowing to maintain specified height without cutting more than 1/3 of grass height. Remove no more than 1/3 of grass-leaf growth in initial or subsequent mowings. Do not delay mowing until grass blades bend over and become matted. Do not mow when grass is wet. Schedule initial and subsequent mowings to maintain the following grass height:

1. Mow Bermuda grass to a height of 1 to 2 inches.

D. Turf Postfertilization: Apply fertilizer after initial mowing and when grass is dry.

1.20 SATISFACTORY TURF

A. Turf installations shall meet the following criteria as determined by Architect:

1. Satisfactory Seeded Turf: At end of maintenance period, a healthy, uniform, close stand of grass has been established, free of weeds and surface irregularities, with coverage exceeding 90 percent over any 10 sq. ft. and bare spots not exceeding 5 by 5 inches.
2. Satisfactory Sodded Turf: At end of maintenance period, a healthy, well-rooted, even-colored, viable turf has been established, free of weeds, open joints, bare areas, and surface irregularities.

3. Use specified materials to reestablish turf that does not comply with requirements and continue maintenance until turf is satisfactory.

1.21 PESTICIDE APPLICATION

A. Apply pesticides and other chemical products and biological control agents in accordance with requirements of authorities having jurisdiction and manufacturer's written recommendations. Coordinate applications with Owner's operations and others in proximity to the Work. Notify Owner before each application is performed.

B. Post-Emergent Herbicides (Selective and Non-Selective): Apply only as necessary to treat already-germinated weeds and in accordance with manufacturer's written recommendations.

1.22 CLEANUP AND PROTECTION

A. Promptly remove soil and debris created by turf work from paved areas. Clean wheels of vehicles before leaving site to avoid tracking soil onto roads, walks, or other paved areas.

B. Erect temporary fencing or barricades and warning signs as required to protect newly planted areas from traffic. Maintain fencing and barricades throughout initial maintenance period and remove after plantings are established.

C. Remove nondegradable erosion-control measures after grass establishment period.

END OF SECTION 329200

SECTION 329300 - PLANTING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

A. Section Includes:
   1. Plants.
   2. Planting soil.
   3. Mulch.
   4. Tree Stabilization.
   5. Slow Release Watering Bags.

1.03 SUBMITTALS

A. Product Data: For each type of product indicated
   1. Plant Materials: Include quantities, sizes, quality, and sources for plant materials.
   2. Pesticides and Herbicides: Include product label and manufacturer's application instructions specific to the Project.
   3. Plant Photographs: Include color photographs in digital format of each required species and size of plant material as it will be furnished to the Project. Take photographs from an angle depicting true size and condition of the typical plant to be furnished. Include a scale rod or other measuring device in each photograph. For species where more than 20 plants are required, include a minimum of three photographs showing the average plant, the best quality plant, and the worst quality plant to be furnished. Identify each photograph with the full scientific name of the plant, plant size, and name of the growing nursery.
   4. Soils: Include source of materials and photographs of each constituent material.

B. Product Submittals: For the following product:
   1. Soil (Planting and Bioswales): Submit a 1 gallon sample of the soil after mixing to architect for approval.
   2. Mulch: Submit a 1 gallon sample
   3. Tree Stabilization: Tree Stakes; Arbor Ties (All components)

C. Plant Species and Source List: The Contractor shall submit for approval plant species and source list indicating the plant botanical and common name, size, quantity, form, rootball, identification of fall dig hazards, limb height (if applicable), nursery source, including contact information, and Landscape Architect’s seal number
   1. Plant list shall clearly indicate deviations from the specified plant list and any proposed substitutions.
   2. As the project progresses and plants are located and sealed, revise and re-submit the plant list submittal.

D. Photographs of Plants taken at the Nursery Source: Provide representative images of plants prior to scheduling tagging trips and as the basis for the Landscape Architect to select plants.
   1. Contractor shall label each photograph with the plant species botanical name, nursery name, and date of photograph.
   2. Photographs shall include images showing the full range of characteristics of each plant including detailed photographs of the bark, the base of the tree (rootball crown), leaves if present, branching structure, form, and habit.
   3. Images shall include a scale figure or measuring device to indicate true size.
   4. Photographs may be transmitted electronically but the title of electronic files must bear the plant name, nursery, and date.
   5. For container plants, also provide close up photographs of the rootball with the container removed.

E. Qualification Data: For qualified landscape Installer. Include list of similar projects completed by Installer demonstrating Installer's capabilities and experience. Include project names, addresses, and year completed, and include names and addresses of owners' contact persons.

F. Product Certificates: For each type of manufactured product, from manufacturer, and complying with the following:
   1. Manufacturer's certified analysis of standard products.
   2. Analysis of other materials by a recognized laboratory made according to methods established by the Association of Official Analytical Chemists, where applicable.

G. Warranty: Written warranty and maintenance procedures.

1.04 QUALITY ASSURANCE

A. Installer Qualifications: A qualified landscape Installer whose work has resulted in successful establishment of plants.
   1. Professional Membership: Installer shall be a member in good standing of either the Professional Landcare Network or the American Nursery and Landscape Association.
   2. Experience: Five years' experience in landscape installation in addition to requirements in Division 01 Section "Quality Requirements."
   3. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on Project site when work is in progress.
   4. Pesticide Applicator, if applicable: State licensed, commercial.

B. Provide quality, size, genus, species, and variety of plants indicated, complying with applicable requirements in ANSI Z60.1.

C. Measurements: Measure according to ANSI Z60.1. Do not prune to obtain required sizes.
   1. Trees and Shrubs: Measure with branches and trunks or canes in their normal position. Take height measurements from or near the top of the root flare for field-grown stock and container grown stock. Measure main body of tree or shrub for height and spread; do not measure branches or roots tip to tip. Take caliper measurements 6 inches above the root flare for trees up to 4-inch caliper size, and 12 inches above the root flare for larger sizes.
   2. Other Plants: Measure with stems, petioles, and foliage in their normal position.

D. Plant Material Observation: Architect may observe plant material either at place of growth or at site before planting for compliance with requirements for genus, species, variety, cultivar, size, and quality. Architect retains right to observe trees and shrubs further for size and condition of balls and root systems, pests, disease symptoms, injuries, and latent defects and to reject unsatisfactory or defective material at any time during progress of work. Remove rejected trees or shrubs immediately from Project site.

1. Notify Architect of sources of planting materials seven days in advance of delivery to site.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Packaged Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and indication of conformance with state and federal laws if applicable.

B. Bulk Materials:
1. Do not dump or store bulk materials near structures, utilities, walkways and pavements, or on existing turf areas or plants.
2. Provide erosion-control measures to prevent erosion or displacement of bulk materials, discharge of soil-bearing water runoff, and airborne dust reaching adjacent properties, water conveyance systems, or walkways.
3. Accompany each delivery of bulk fertilizers and soil amendments with appropriate certificates.

C. Do not prune trees and shrubs before delivery. Protect bark, branches, and root systems from sun scald, drying, wind burn, sweating, whipping, and other handling and tying damage. Do not bend or bind-tie trees or shrubs in such a manner as to destroy their natural shape. Provide protective covering of plants during shipping and delivery. Do not drop plants during delivery and handling.

D. Handle planting stock by root ball.

E. Store bulbs, rhizomes, corms, and tubers in a dry place at 60 to 65 deg F until planting.

F. Deliver plants after preparations for planting have been completed, and install immediately. If planting is delayed more than six hours after delivery, set plants and trees in their appropriate aspect (sun, filtered sun, or shade), protect from weather and mechanical damage, and keep roots moist.
1. Set balled stock on ground and cover ball with soil, peat moss, sawdust, or other acceptable material.
2. Do not remove container-grown stock from containers before time of planting.
3. Water root systems of plants stored on-site deeply and thoroughly with a fine-mist spray. Water as often as necessary to maintain root systems in a moist, but not overly-wet condition.

1.06 PROJECT CONDITIONS

A. Field Measurements: Verify actual grade elevations, service and utility locations, irrigation system components, and dimensions of plantings and construction contiguous with new plantings by field measurements before proceeding with planting work.

B. Interruption of Existing Services or Utilities: Do not interrupt services or utilities to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary services or utilities according to requirements indicated:
1. Notify Architect no fewer than seven days in advance of proposed interruption of each service or utility.
2. Do not proceed with interruption of services or utilities without Architect’s written permission.

C. Planting Restrictions: Plant during the following period unless temporary irrigation is installed, calibrated, operated and maintained by the contractor for a period of 6 months from planting date. Coordinate planting periods with maintenance periods to provide required maintenance from date of Substantial Completion.
   1. Planting Season: September 15th – May 1st

D. Weather Limitations: Proceed with planting only when existing and forecasted weather conditions permit planting to be performed when beneficial and optimum results may be obtained. Apply products during favorable weather conditions according to manufacturer's written instructions and warranty requirements.

E. Coordination with Turf Areas (Lawns): Plant trees, shrubs, and other plants after finish grades are established and before planting turf areas unless otherwise indicated.
   1. When planting trees, shrubs, and other plants after planting turf areas, protect turf areas, and promptly repair damage caused by planting operations.

1.07 WARRANTY

A. Warranty: Installer agrees to repair or replace plantings and accessories that fail in materials, workmanship, or growth within specified warranty period.
   1. Failures include, but are not limited to, the following:
      a. Death and unsatisfactory growth, except for defects resulting from abuse, lack of adequate maintenance, or neglect by Owner, or incidents that are beyond Contractor's control.
      b. Structural failures including plantings falling or blowing over.
      c. Faulty performance of tree stabilization.
      d. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
   2. Warranty Periods from Date of Substantial Completion of Project.
      a. Trees, Shrubs, Vines, and Ornamental Grasses: 12 months.
      b. Ground Covers, Biennials, Perennials, and Other Plants: 12 months.
   3. Include the following remedial actions as a minimum:
      a. Immediately remove dead plants and replace unless required to plant in the succeeding planting season.
      b. Replace plants that are more than 25 percent dead or in an unhealthy condition at end of warranty period.
      c. A limit of one replacement of each plant will be required except for losses or replacements due to failure to comply with requirements.
      d. Provide extended warranty for period equal to original warranty period, for replaced plant material.

1.08 MAINTENANCE SERVICE

A. Initial Maintenance Service for Trees and Shrubs: Provide maintenance by skilled employees of landscape Installer. Maintain as required in Part 3. Begin maintenance immediately after plants are installed and continue until plantings are acceptably healthy and well established but for not less than maintenance period below.
   1. Maintenance Period: 12 months from date of Substantial Completion of Project.

B. Initial Maintenance Service for Ground Cover and Other Plants: Provide maintenance by skilled employees of landscape Installer. Maintain as required in Part 3. Begin maintenance immediately after plants are installed and continue until plantings are acceptably healthy and well established but for not less than maintenance period below.

1. Maintenance Period: 12 months from date of Substantial Completion of Project.

C. Continuing Maintenance Proposal: From Installer to Owner, in the form of a standard yearly (or other period) maintenance agreement, starting on date initial maintenance service is concluded. State services, obligations, conditions, and terms for agreement period and for future renewal options.

PART 2 - PRODUCTS

2.01 PLANT MATERIAL

A. General: Furnish nursery-grown plants true to genus, species, variety, cultivar, stem form, shearing, and other features indicated in Plant Schedule or Plant Legend shown on Drawings and complying with ANSI Z60.1; and with healthy root systems developed by transplanting or root pruning. Provide well-shaped, fully branched, healthy, vigorous stock, densely foliated when in leaf and free of disease, pests, eggs, larvae, and defects such as knots, sun scald, injuries, abrasions, and disfigurement.
   1. Trees with damaged, crooked, or multiple leaders; tight vertical branches where bark is squeezed between two branches or between branch and trunk ("included bark"); crossing trunks; cut-off limbs more than 3/4 inch in diameter; with lichen, moss or other living substances growing on the bark; with cuts in the bark, whether healed or fresh; or with stem girdling roots will be rejected.
   2. Collected Stock: Do not use plants harvested from the wild, from native stands, from an established landscape planting, or not grown in a nursery unless otherwise indicated.

B. Provide plants of sizes, grades, and ball or container sizes complying with ANSI Z60.1 for types and form of plants required. Plants of a larger size may be used if acceptable to Architect, with a proportionate increase in size of roots or balls.

C. Root-Ball Depth: Furnish trees and shrubs with root balls measured from top of root ball, which shall begin at root flare according to ANSI Z60.1. Root flare shall be visible before planting.

2.02 PLANTING SOILS

A. Planting Soil: ASTM D 5268 topsoil, with pH range of 5.5 to 7, a minimum of 4 percent organic material content; free of stones one half inch (½") or larger in any dimension and other extraneous materials harmful to plant growth. Obtain topsoil displaced from naturally well-drained construction or mining sites where topsoil occurs at least 4 inches deep; do not obtain from agricultural land, bogs or marshes. Test soil for pH levels after mixing. Soil source to be approved in writing by Landscape Architect.

   1. Mix the following quantities of materials to produce Planting Soil:
      a. 1/3 Manufactured Topsoil.
      b. 1/3 Black Bark Mulch.
      c. 1/3 Course Sand.
      d. Weight of 8-8-8 Slow-Release Fertilizer per 1000 Sq. Ft.: 8 lbs.

   2. Mix the following quantities of materials to produce Rain Garden Soil Mix:
      a. 40% Existing Soil from Site.
      b. 20% Black Bark Mulch.
      c. 40% Course Sand.
      d. Weight of 8-8-8 Slow-Release Fertilizer per 1000 Sq. Ft.: 8 lbs.

2.03 MULCH

A. Organic Mulch: Free from deleterious materials and suitable as a top dressing of trees and shrubs, consisting of the following:
   1. Type: Pine Needles in bales with long needles, not crushed or chopped.
   2. Depth: Three (3) inches.
   3. Cypress Mulch will not be accepted.

B. Mulch must not be placed within three (3) inches of a tree trunk.

C. The Contractor shall be responsible for the replacement of mulch during the one-year warranty and maintenance period.

2.04 TREE STABILIZATION

A. Tree Staking
   1. Wood Stakes: 2” Ø unpeeled stakes, 8’-0” min. length, Eastern Redcedar (Juniperus virginiana) or approved equivalent. Provide three (3) stakes per tree or as otherwise indicated in the Drawings.
   2. Guying straps: ¾” wide “ArborTie” flat polypropylene strap with break strength of 900lbs (min). Color: dark green or black. As manufactured by, or approved equal.
   3. Manufacturer: Deep Root Partners, L.P., 81 Langton St., San Francisco, CA 94103, Phone: 800-458-7668, Website: www.deeproot.com
   4. Or Approved Equal

2.05 SLOW RELEASE WATERING BAGS

A. Slow Release Watering Bags: Shall be minimum twenty (20) gallon slow release by Treegator or equivalent.

B. Manufacturer: Spectrum Products, Inc., Phone: (866) 873-3428, Website: www.treegator.com

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine areas to receive plants for compliance with requirements and conditions affecting installation and performance.
   1. Verify that no foreign or deleterious material or liquid such as paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, or acid has been deposited in soil within a planting area.
   2. Do not mix or place soils and soil amendments in frozen, wet, or muddy conditions.
   3. Suspend soil spreading, grading, and tilling operations during periods of excessive soil moisture until the moisture content reaches acceptable levels to attain the required results.
   4. Uniformly moisten excessively dry soil that is not workable and which is too dusty.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

C. If contamination by foreign or deleterious material or liquid is present in soil within a planting area, remove the soil and contamination as directed by Architect and replace with new planting soil.

3.02 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities and turf areas and existing plants from damage caused by planting operations.

B. Install erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.

3.03 PLANTING AREA ESTABLISHMENT

A. Loosen subgrade of planting areas to a minimum depth of 12 inches. Remove stones larger than 1 inch in any dimension and sticks, roots, rubbish, and other extraneous matter and legally dispose of them off Owner's property.
   1. Spread planting soil to a depth of 12 inches but not less than required to meet finish grades after natural settlement. Do not spread if planting soil or subgrade is frozen, muddy, or excessively wet.

B. Finish Grading: Grade planting areas to a smooth, uniform surface plane with loose, uniformly fine texture. Roll and rake, remove ridges, and fill depressions to meet finish grades.

C. Before planting, obtain Architect's acceptance of finish grading; restore planting areas if eroded or otherwise disturbed after finish grading.

3.04 EXCAVATION FOR TREES AND SHRUBS

A. Planting Pits and Trenches: Excavate circular planting pits with sides sloping inward at a 45-degree angle. Excavations with vertical sides are not acceptable. Trim perimeter of bottom leaving center area of bottom raised slightly to support root ball and assist in drainage away from center. Do not further disturb base. Ensure that root ball will sit on undisturbed base soil to prevent settling. Scarify sides of planting pit smeared or smoothed during excavation.
   1. Excavate approximately three times as wide as ball diameter for balled and burlapped stock.
   2. Excavate at least 12 inches wider than root spread and deep enough to accommodate vertical roots for bare-root stock.
   3. Do not excavate deeper than depth of the root ball, measured from the root flare to the bottom of the root ball.
   4. If area under the plant was initially dug too deep, add soil to raise it to the correct level and thoroughly tamp the added soil to prevent settling.
   5. Maintain required angles of repose of adjacent materials as shown on the Drawings. Do not excavate subgrades of adjacent paving, structures, hardscapes, or other new or existing improvements.
   6. Maintain supervision of excavations during working hours.
   7. Keep excavations covered or otherwise protected when unattended by Installer’s personnel.

B. Subsoil and topsoil removed from excavations may not be used as planting soil.

C. Obstructions: Notify Architect if unexpected rock or obstructions detrimental to trees or shrubs are encountered in excavations.

D. Drainage: Notify Architect if subsoil conditions evidence unexpected water seepage or retention in tree or shrub planting pits.

3.05 TREE, SHRUB, AND VINE PLANTING

A. Before planting, verify that root flare is visible at top of root ball according to ANSI Z60.1. If root flare is not visible, remove soil in a level manner from the root ball to where the top-most root emerges from the trunk. After soil removal to expose the root flare, verify that root ball still meets size requirements.

B. Remove stem girdling roots and kinked roots. Remove injured roots by cutting cleanly; do not break.

C. Set balled and burlapped stock plumb and in center of planting pit or trench with root flare 2 inches above finish grades.
   1. Use planting soil for backfill.
   2. After placing some backfill around root ball to stabilize plant, carefully cut and remove burlap, rope, and wire baskets from tops of root balls and from sides, but do not remove from under root balls. Remove pallets, if any, before setting. Do not use planting stock if root ball is cracked or broken before or during planting operation.
   3. Backfill around root ball in layers, tamping to settle soil and eliminate voids and air pockets. When planting pit is approximately one-half filled, water thoroughly before placing remainder of backfill. Repeat watering until no more water is absorbed.
   4. Place planting tablets in each planting pit when pit is approximately one-half filled; in amounts recommended in soil reports from soil-testing laboratory. Place tablets beside the root ball about 1 inch from root tips; do not place tablets in bottom of the hole.
   5. Continue backfilling process. Water again after placing and tamping final layer of soil.

3.06 TREE, SHRUB, AND VINE PRUNING

A. Remove only dead, dying, or broken branches. Do not prune for shape.

B. Do not apply pruning paint to wounds.

3.07 GROUND COVER AND PLANT PLANTING

A. Set out and space ground cover and plants other than trees, shrubs, and vines as indicated in drawings in even rows with triangular spacing.

B. Use planting soil for backfill.

C. Dig holes large enough to allow spreading of roots.

D. For rooted cutting plants supplied in flats, plant each in a manner that will minimally disturb the root system but to a depth not less than two nodes.

E. Work soil around roots to eliminate air pockets and leave a slight saucer indentation around plants to hold water.

F. Water thoroughly after planting, taking care not to cover plant crowns with wet soil.

G. Protect plants from hot sun and wind; remove protection if plants show evidence of recovery from transplanting shock.

3.08 PLANTING AREA MULCHING

A. Mulch surfaces of planting areas and other areas indicated with Pine Straw Mulch only to a depth of 3”.

B. Trees without the specified depth of mulch at the end of the Warranty and Maintenance period shall be rejected.

3.09 MAINTENANCE

A. Trees and Shrubs: Contractor shall irrigate as required to maintain vigorous and healthy plant growth. Overwatering or flooding shall not be allowed. The Contractor shall furnish any water to ensure adequate irrigation.

B. Maintain plantings by pruning, cultivating, watering, weeding, fertilizing, mulching, restoring planting saucers, adjusting and repairing tree-stabilization devices, resetting to proper grades or vertical position and performing other operations as required to establish healthy, viable plantings. Spray or treat as required to keep trees and shrubs free of insects and disease.

C. Stake Removal: At the end of the Warranty and Maintenance period, the Contractor shall be responsible for removing any above ground stakes from all trees planted under this contract.

D. Documentation
1. Provide a monthly check-list in writing of maintenance tasks performed.
2. Provide monthly photos of maintenance performance.

3.010 CLEANUP AND PROTECTION

A. During planting, keep adjacent paving, construction, and work area in an orderly condition.

B. Protect plants from damage due to landscape operations and operations of other contractors and trades. Maintain protection during installation and maintenance periods. Treat, repair, or replace damaged plantings.

C. After installation and before Substantial Completion of Project remove nursery tags, nursery stakes, tie tape, labels, wire, burlap, and other debris from plant material, planting areas, and Project site.

3.011 DISPOSAL

A. Remove surplus soil and waste material including excess subsoil, unsuitable soil, trash, and debris and legally dispose of them off Owner's property.

END OF SECTION 329300

APPENDIX

EXHIBIT A

LETTER

SPACKMAN MOSSOP AND MICHAELS

1824 SOPHIE WRIGHT PLACE
NEW ORLEANS, LA 70130
(504) 218-8991

DATE NOV 15, 2018
REFERENCE 18102

REVISED 00

Existing Storm Drainage Conditions

A. Size and Location of Site and Description of Adjacent Properties
The property located at 601 S. Jefferson Davis Parkway, New Orleans 70119, is a developed site of 34,587 square feet. The property is bordered to the south by commercial use. S. Jefferson Davis Parkway runs along the East side of the property with a right-of-way of 226 feet, a 6' sidewalk, and two mature Live Oak trees. D'Hemecourt Street runs along the North side of the property with a right-of-way of 53 feet, a 5' sidewalk and two street trees. S. Clark Street runs along the West side of the property with a right-of-way of 53 feet, a 5' sidewalk and no street trees.

B. Existing Structures
There are no existing structures on the property.

C. Above Ground and Subsurface Infrastructure
Two 8" sewer lines cross the middle of the site running North/South.

D. Existing Topography
Currently, the high points on site exist in the center of the site at the private alley and slope to the East and West of the site.

E. Landcover Type
58 percent of the site has pervious cover of gravel and lawn which was previously used as vehicular parking, 33 percent of the site has cover of gravel and lawn which was previously a commercial building, and 9% of the site has impervious cover of concrete.

F. USDA NRCS Soil Type
According to the USDA NRCS, the site is defined as Schriever Clay (*Sk*). Runoff in this area is considered high.

G. Existing Drainage Infrastructure
There is no existing drainage infrastructure on the site.

H. Receiving Drainage Catch Basin
One catch basin exists mid-block at S. Jefferson Davis Pkwy, and one exists at the East side of D'Hemecourt Street. Water that flows to the East of the site drains to these two catch basin structures.

One drop inlet structure exists mid-block at S. Clark Street, and one exists at the West side of D'Hemecourt Street. Water that flows to the West of the site drains to these two catch basin structures.

Infiltration Test

Infiltration tests were not performed for this project. The BMPs do not rely on infiltration and the project assumes zero infiltration on the site.

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DATE NOV 15, 2018
REFERENCE 18102
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REVISED 00

Proposed Storm Drainage Conditions

A. Size and Location of Site and Description of Adjacent Properties

The property located at 601 S. Jefferson Davis Parkway, New Orleans 70119, is a developed site of 34,587 square feet. The property is bordered to the south by commercial use. S. Jefferson Davis Parkway runs along the East side of the property with a right-of-way of 226 feet, the 6' sidewalk will remain, the two mature Live Oak trees will remain and one new Live Oak is proposed. D'Hemecourt Street runs along the North side of the property with a right-of-way of 53 feet, the existing 5' sidewalk will remain and ten new street trees are proposed. S. Clark Street runs along the West side of the property with a right-of-way of 53 feet, the existing 5' sidewalk will remain and four street trees are proposed.

B. Proposed Structures

There are two proposed structures for the site, the main building will have a footprint of 10,401 square feet and will be used as a YWCA. The additional structure will have a footprint of 493 square feet and will be used for storage.

C. Above Ground and Subsurface Infrastructure

New water lines, electrical connections, and sanitary sewer connections will be provided to the building.

D. Proposed Topography and Grading

The site will be regraded to drain into the proposed BMPs and meet the building FFE.

E. Landcover Type

68 percent of the proposed site has impervious cover, including the rooftop and pedestrian and vehicular use areas. 32 percent of the site is pervious, which includes pervious BMP surfacing and planting areas.

F. Landscaping Elements

The site will be planted with planting beds containing trees, shrubs, and groundcover including the required parking lot landscaping.

G. USDA NRCS Soil Type

According to the USDA NRCS, the site is defined as Schriever Clay (*Sk*). Runoff in this area is considered high and is handled by site-specific drainage configurations where soil infiltration does not occur.

H. Proposed Drainage Infrastructure

There are 4 BMPs proposed for the site. Two BMPs will be permeable pavers with profile type A which has a depth of 25.8" and storage volume of 1,678 CF. The other two BMPs will be permeable pavers with profile type B which has a depth of 11.8" and proposed storage volume of 672 CF. Please refer to attached Nola GI Calculator for additional information. The proposed total amount of water stored is 2,349 CF, which is 132 CF over the 2,217 CF of storage required.

There are 2 proposed drainage areas. All water from Drainage Area 1 will drain into the BMPs. All water from Drainage Area 2 will bypass the stormwater system.

In Drainage Area 1, water from the roof is routed through booted downspouts into subsurface piping which connects to the first two BMPs. The playground, lawn, and driveway slopes to

EXHIBIT A

flow into drain inlets and also connect to the first two BMPs. The subsurface piping from the booted downspouts and drain inlets connect to 8" perforated pipes in the first two BMPs allowing water to enter the gravel detention areas. Water which falls onto the parking lot drive aisles and parking stalls will flow into all four BMPs through the permeable paving surface. A 4" underdrain runs under each BMP to allow water to slowly drain. Four drain inlets are located at the low points within the permealbe paving BMPs to act as emergency overflows. These inlets and the 4" underdrain connect to 12" piping which connects to the outfall point. The 12" outfall pipe will connect to the existing catch basin at the corner of D'Hemecourt and S Clark streets.

The BMPs are sized according to the worst case scenario infiltration rates. The BMPs are sized for detention of the first 1.25 inches of a 10 yr 24 hr storm.

I. Receiving Drainage Catch Basin
The existing catch basin on the the West side of D'Hemecourt Street near S Clark Street will serve as the outfall for the proposed BMPs and will receive water from 95% of the site. The 5% of the site to bypass the BMPs will drain to the existing catch basins on S Jefferson Davis and the East side of D'Hemecourt Street.

J. Description of Safeguards to Prevent Short-circuiting of Stormwater BMPs
The Maintenance Plan will call for annual inspection of the BMPs for performance.

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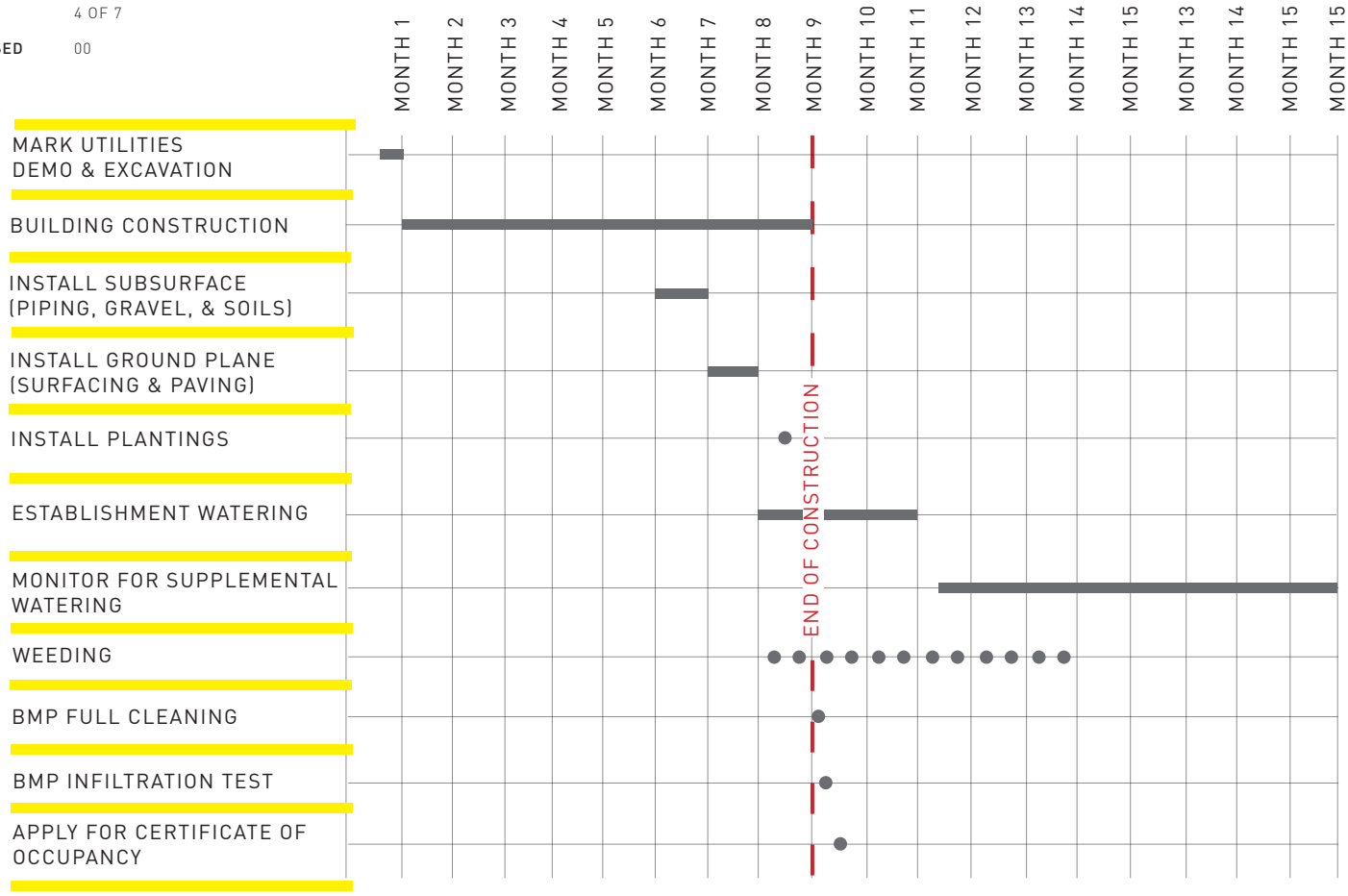
Implementation & Establishment Timeline



Construction Methods

Prior to construction, silt fencing will be installed in all required locations to prevent sediment and pollutants from leaving the site or building up in catch basins or drain lines.

Estimated Drainage Infrastructure Costs

Pipe:	$10,948	Booted Downspouts:	$7,500
Gravel:	$32,575	Catch Basin Tie-In:	$1,000
Permeable Pavers:	$46,010		

Total Installation Costs:	$100,333
Design Contingency (15%):	$15,050
Contractor Overhead (10%):	$10,033
Total Stormwater Management Cost:	$125,416
Anticipated Bond Value (25%):	$31,354
Anticipated Bond Payment (5%):	$1,568
Maintenance Costs for 2 yrs:	$2,400

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Stormwater System - Required Maintenance Standards

The Owner is required to monitor and maintain the installed Stormwater System in a way that ensures full performance. The following shall items shall be follow in order to ensure full performance:

- Immediately following the end of building construction, the Stormwater System shall undergo a full system inspection and clean before applying for Certificate of Occupancy.
- One time per year following completion, the Owner shall perform a full system inspection. Any hindrances to the full performance of the Stormwater System shall be rectified. If sediment, debris, or other materials hinder the flow of water within the system it shall be removed.
- The Owner shall follow the following Indications of Failure and Required Maintenance requirements.

Stormwater System - Indications of Failure and Required Maintenance

If any of the following defects or failures are found on site, the Owner is responsible to perform the rectification to the system in order to restore the full performance of the Stormwater System.

Stormwater System Component	DEFECT OR FAILURE	INDICATOR	RECTIFICATION
Total System	Partial or Complete Blockage of Drainage System	BMPs are not draining within 48 hours.	Manually remove and flush out all debris and sediment from the downspouts, drains, catch basins, and pipes.
Permeable Gravel Paver	Permeable Paver Gravel is Clogged by Sediment in Gravel	Water ponding on Surface Immediately Following Rain Event	Test surface infiltration rate using ASTM C1701. Vacuum to remove top layer of clogged gravel, refill pavers with clean gravel and test infiltration rate per C1701 to achieve a minimum permeability increase of 50%.
Permeable Gravel Paver	Weed Growth Clogging Permeable Gravel Pavers	Weeds are visibly causing water ponding on Surface Immediately Following Rain Event	Weeds must be removed from permeable paving monthly. Remove weeds with a weed flamer or by hand to avoid introducing pesticides into the groundwater.
Permeable Gravel Paver	Localized surface depressions and mosquitos	Shallow ponding water, mosquitoses or mosquito larvae visible.	Maintenance responses include: Employ local mosquito sprayers, Remove clogged gravel material, Repair system to remove surface depressions,
Overflow Drains in Parking Lot Islands and Area Drains	Partial or Complete Blockage of Drains	Drains are not receiving water	Manually remove debris or sediment from drain grate or cover, Manually remove debris and sediment from inside area drain sump and connecting pipes.
Pipes, Drains, Downspouts	Physical Damage	Evidence of trampling, vandalism, or other types of physical damage	Minor physical damage shall require repairs or replacement of impacted drainage element. Severe damage will require further investigation.

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Overall Site - Operations and Maintenance Plan

1. Vegetation Establishment - New plantings will require additional watering during the first 90 days of establishment. The need for supplemental watering will continue to be monitored for an additional 15 months to identify extreme drought conditions. New plantings will have a protective 3" covering of pine straw mulch.

2. Weed Control - New plantings will be monitored for invasive weeds monthly for the first year. Weeds will be removed by hand. As new plantings become established, weeding will be reduced, and will become a component of a common landscape maintenance plan.

3. Plant Maintenance - Woody plants (trees and shrubs) will require regular plant maintenance for good health and appearance. This includes monitoring for insect and disease infestations, as well as proper pruning to remove dead or diseased growth. Herbaceous plants (perennials) will go through a period of senescence during winter months, and may go dormant. Brown dormant leaves will be pruned and removed from herbaceous plants seasonally.

4. Lawn Care - Lawn areas should be mown 1 time a month from October to February and 2 times a month from March to September.

5. Post Storm Inspection - Immediately following a significant storm event, the entire system will be inspected for sediment and debris build up. Debris removal and necessary repairs will be made to emulate pre-event conditions.

6. BMP Surfacing Maintenance
To evaluate the permeability of the BMP surfacing immediately after construction perform ASTM C1701 – Standard Test Method for Infiltration. Perform the test in 2 locations to establish a benchmark, and re-test at similar locations after a year to evaluate the rate of clogging with time. Check infiltration annually. When rate has decreased by 50%, remove necessary clogged elements and restore to original infiltration rate.

7. Permeable Paving Maintenance
If there is water ponding on the surface immediately after a storm, test surface infiltration rate using ASTM C1701. Vacuum clean to remove surface sediment and soiled aggregate, refill pavers with clean aggregate and test infiltration rate per C1701 to minimum 50% increase. Weeds must be removed from pervious paving monthly. Remove weeds with a weed flamer or by hand to avoid introducing pesticides into the groundwater. Inspect surface annually, adjusting vacuuming schedule per sediment loading. Use Elgin Whirlwind for annual or semiannual vacuuming.

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Overall Site - Annual Maintenance By Frequency

January	Weed (1x per month) Mow (1x per month)
February	Weed (1x per month) Mow (1x per month)
March	Weed (1x per month) Mow (2x per month)
April	Weed (1x per month) Mow (2x per month) Remove brown leaves from herbaceous plants (2x per year) Replace pine straw (2x per year) Permable Surface BMPs - Inspect permeable gravel pavers and adopt necessary vacuum and weeding schedule (1x per year)
May	Weed (2x per month) Mow (2x per month)
June	Weed (2x per month) Mow (2x per month) Prune woody plants (2x per year)
July	Weed (2x per month) Mow (2x per month)
August	Weed (2x per month) Mow (2x per month)
September	Weed (2x per month) Mow (2x per month)
October	Weed (1x per month) Mow (1x per month) Remove brown leaves from herbaceous plants (2x per year) Prune woody plants (2x per year) Replace pine straw (2x per year) Inspect BMPs and Perform Necessary Cleaning (1x per year)
November	Weed (1x per month) Mow (1x per month)
December	Weed (1x per month) Mow (1x per month)

Contact Information

Owner
Young Women's Christian Association
601 S. Jefferson Davis Pkwy.
New Orleans, LA 70119

Architect
Trapolin-Peer Architects
639 Julia St.
New Orleans, LA 70130
504.523.2772

EXHIBIT B

EUSTIS ENGINEERING SERVICES, L.L.C.
3011 28TH STREET
METAIRIE, LOUISIANA 70002-6019
PN 504-834-0157 | FN 504-834-0354
EMAIL: INFO@EUSTISENG.COM | SITE: WWW.EUSTISENG.COM

30 November 2011

Trapolin-Peer Architects, APC
539 Julia Street
New Orleans, Louisiana 70130

Attention Ms. Gabriel Virdure

Ladies and Gentlemen:

Geotechnical Investigation
YWCA of New Orleans
601-605 South Jefferson Davis Parkway and
600 South Clark Street
New Orleans, Louisiana
Eustis Engineering Project No. 21576

Transmitted are three copies (two bound and one unbound) of our engineering report covering a geotechnical investigation for the subject project. Electronic copies are also being provided to you and Kyle Associates, LLC, to the attention of Mr. Michael Bailey, P.E.

Thank you for asking us to perform these services.

Yours very truly,

EUSTIS ENGINEERING SERVICES, L.L.C.

GWENDOLYN P. SANDERS, P.E.

STATE OF LOUISIANA
GWENDOLYN P. SANDERS
REG NO. 27104
PROFESSIONAL ENGINEER
IN
CIVIL ENGINEERING

J. M. Gisclair:aln/jdd

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GEOTECHNICAL INVESTIGATION

YWCA OF NEW ORLEANS

601-605 SOUTH JEFFERSON DAVIS PARKWAY AND

600 SOUTH CLARK STREET

NEW ORLEANS, LOUISIANA

EUSTIS ENGINEERING PROJECT NO. 21576

FOR
TRAPOLIN-PEER ARCHITECTS, APC
NEW ORLEANS, LOUISIANA

By
Eustis Engineering Services, L.L.C.
Metairie, Louisiana

30 NOVEMBER 2011

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YWCA OF NEW ORLEANS
601-605 SOUTH JEFFERSON DAVIS PARKWAY
AND 600 SOUTH CLARK STREET
NEW ORLEANS (ORLEANS PARISH), LOUISIANA
EUSTIS ENGINEERING PROJECT NO. 21576

INTRODUCTION

1. This report contains the results of a geotechnical investigation performed for the YWCA of New Orleans to be located between South Jefferson Davis Parkway and South Clark Street at Tulane Avenue in New Orleans, Louisiana. The work was performed in general accordance with the scope outlined in Eustis Engineering Services, L.L.C.'s proposal dated 11 November 2010. Authorization to proceed with the investigation was given by signed acceptance of our proposal by Ms. Gabriel Virdure representing Trapolin-Peer Architects, APC, of New Orleans, Louisiana, on 3 October 2011. Kyle Associates, LLC, is the structural engineer of record.

2. This report has been prepared in accordance with generally accepted geotechnical engineering practice for the exclusive use of Trapolin-Peer Architects for specific application to the subject site. In the event of any changes in the nature, design, or location of the proposed structures, the conclusions and recommendations contained in this report shall not be considered valid unless the changes are reviewed and the conclusions of this report are modified and verified in writing. Should these data be used by anyone other than Trapolin-Peer Architects, they should contact Eustis Engineering for interpretation of data and to secure any other information pertinent to this project.

3. Further note, the analyses and recommendations contained in this report are based, in part, on data obtained from the soil borings. The individual boring logs are considered representative of subsurface conditions at the boring locations on the

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dates completed. No warranty is given that the boring logs are representative of subsurface conditions at other locations or times. The nature and extent of variations in subsurface conditions between and away from the boring locations may not become evident until construction. If such variations then appear, it will be necessary to reevaluate the recommendations contained in this report.

4. Recommendations and conclusions contained in this report are to some degree subjective having partial basis in engineering judgment and experience particular to the design engineer. For this reason, this report should not be included in the contract plans and specifications.

SCOPE

5. The investigation included the drilling of soil test borings to evaluate subsoil conditions and stratification, and to obtain samples of the various substrata. Soil mechanics laboratory tests, performed on samples obtained from the borings, were used to evaluate the physical properties of the subsoils. Engineering analyses, based on the soil borings and laboratory test results, were made to determine recommendations regarding site preparation, drainage, placement and compaction of fill, pile foundations, and components and thicknesses for flexible and rigid pavements.

SOIL BORINGS

6. Six soil test borings were made at the site on 12 through 14 October 2011. Undisturbed borings, B-1 through B-4, were each made to the 80-ft depth below the existing ground surface. Auger Borings, A-1 and A-2, were each made to the 10-ft depth below the existing ground surface. The approximate locations of the borings are shown on Figure 1. These locations were furnished with AIA Document G602-1993 provided with the original proposed request. Note, demolition operations were

performed at the site prior to drilling and the background image provided on Figure 1 is not up to date. Detailed descriptive logs of the borings and laboratory tests are shown in both tabular and graphical form in the Appendix. Upon completion of drilling the borings, the holes were backfilled in accordance with current regulatory requirements.

Undisturbed Borings

7. The undisturbed borings were made with a truck mounted rotary type drill rig. Samples of cohesive or semi-cohesive subsoils were obtained at close intervals or changes in stratum using a 3-in. diameter thinwall Shelby tube sampling barrel. The samples were immediately extruded from the sampling barrel, inspected, and visually classified by Eustis Engineering's soil technician. Pocket penetrometer tests were performed on the soil samples to give a general indication of their shear strength or consistency. The results of these tests are shown on the boring logs under the column heading "PP." Representative portions were then promptly placed in moisture proof containers and sealed for preservation of their natural moisture content.

8. Samples of cohesionless and semi-cohesive materials were obtained during the performance of in situ Standard Penetration Tests. This test consists of driving a 2-in. diameter sampler 1 foot into the soil after first seating it 6 inches. A 140-lb weight dropped 30 inches is used to advance the sampler. The number of blows required to drive the sampler is indicative of the relative density of cohesionless soils and the consistency of cohesive soils. The samples were retained in moisture proof containers for preservation of their natural moisture content. The results of the Standard Penetration Tests are shown on the boring logs under the column heading “SPT.”

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Auger Borings

9. The auger borings were made with an auger attached to the rear of the drill rig. The subsoils were sampled directly from the auger blades at close intervals or changes in strata. These samples were sealed in plastic bags to preserve their natural moisture content.

LABORATORY TESTS

10. Soil mechanics laboratory tests, consisting of natural water content, unit weight, unconfined compression shear (UC), and unconsolidated undrained triaxial compression shear (OB), were performed on samples obtained from the borings. The results of the laboratory tests are summarized on the boring logs in the Appendix.

DESCRIPTION OF SITE CONDITIONS

Site Conditions

11. As previously noted, demolition operations were performed prior to our field investigation. We understand some grading was performed subsequent to the demolition. However, it is not apparent if grades were changed by the operations. The site comprises Lot Z-2 on South Jefferson Davis Parkway (Borings 3 and 4) and Lot Z-4 along South Clark Street (Borings 1 and 2 and A-1 and A-2). The lots are generally level, although detailed topographic survey data have not been furnished for points within the lots. Lot Z-2 is at a lower existing grade than Lot Z-4. Lot Z-4 is currently being used as parking and large potholes were observed.

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Geology and Stratigraphy

12. The borings encountered Holocene deposits overlying Pleistocene deposits. The Holocene unit consists of swamp/marsh deposits over interdistributary deposits which, in turn, overlie marine deposits. The Pleistocene soils are undifferentiated. Our interpretation of the stratigraphy at each of the boring locations is shown on the individual boring logs in the Appendix.

13. Approximately 1 to 2 feet of sand fill was encountered at the auger borings and at Borings 1 and 4. Fill materials are also present within the upper soft to stiff gray, brown, and black clay and sandy clay and consist of brick and shell fragments and gravel. The fill materials were present to depths up to 7 feet below the existing ground surface. The swamp/marsh deposits are extremely soft to very soft gray and dark gray organic clay, clay, and peat with layers of wood, decayed wood, and roots. These deposits continue to the termination of the auger borings at the 10-ft depth and to approximately 12 feet below grade at the undisturbed borings. Beneath the swamp/marsh deposits, the interdistributary deposits are initially medium dense gray clayey sand and silty sand, loose gray clayey silt, and very soft to medium stiff gray clay and silty clay that extend to depths of 16 to 22 feet below existing grades. These deposits are underlain by very soft to soft gray clay with sand and silt pocket and lenses to the approximate 46-ft depth.

14. Below the 46-ft depth, marine deposits were encountered. At Boring 1 and 2, the marine deposits are very loose gray clayey sand and soft gray sandy clay to the 50-ft depth followed by loose to very dense gray fine sand that continues to depths of 56 to 61 feet. At Borings 3 and 4, loose to medium dense gray clayey sand and extremely soft to soft gray sandy clay continue to the 53 to 58-ft depths. These marine deposits at all four undisturbed borings contain shell fragments.

15. The Pleistocene interface at the site appears to be located at the approximate 66-ft depth below existing grade. Just above the Pleistocene interface, the marine sands, clayey sands, and sandy clays are underlain by soft to stiff gray and tan clay. From the 66-ft depth, the upper Pleistocene soils appear to be reworked and include very soft to medium stiff gray and greenish-gray clay and silty clay that continue to depths of 71 to 77 feet below grade. Boring 1 is terminated in a stratum of stiff greenish-gray clay. Boring 4 is terminated in a stratum of stiff light gray sandy clay. Borings 2 and 3 are terminated in strata of loose to very dense gray silty sand. All of the undisturbed borings were made to the 80-ft depth.

Ground Water

16. In order to determine the ground water conditions at the time of the field investigation, observations were made during the drilling of Boring A-2. This boring was advanced without the addition of water to a depth of 10 feet below existing grade. Ground water was initially observed at a depth of 9 feet below grade during drilling. After an observation period of approximately 24 hours, the depth to ground water was measured to be 6 feet below the existing ground surface in Boring A-2. The depth to ground water will vary with climatic conditions, drainage improvements, and other factors. The depth to ground water should be determined by those persons responsible for construction immediately prior to beginning work.

ENGINEERING ANALYSES

Furnished Information

17. A survey of Lots Z-2 and Z-4 performed by Gandolfo Kuhn, LLC, on 8 July 2011 was provided. The survey includes topographic information along the perimeter of the lots, although it appears building demolition was complete at the time of the survey. Existing grades shown on the survey generally vary between el 15 and el

EXHIBIT B

17 Cairo Datum. The proposed finished floor elevation and site grades were not available for preparation of this report. Fill heights will vary across the site but are anticipated to be less than 3 feet in any one area. The amount of site grading fill placed after demolition operations is not known.

18. Lot Z-2 will be developed first. The improvements will consist of a two-story structural steel building with parking on the roof. Future improvements would consist of a building on Lot Z-4 and grade level parking. A site plan of the proposed current and future building locations, including their plan dimensions, was not available for preparation of this report.

19. Information provided by Mr. Michael Bailey of Kyle Associates, indicates the new structure will be supported on piles. Small pile caps consisting of two to three piles each are anticipated. Loads per cap for the metal building will be relatively light, approximately 20 to 40 kips each. Pile types being considered include small timber composite piles and larger timber piles.

Foundation Recommendations

20. Soil bearing values have not been considered due to the nature of the soils present at the site. The New Orleans Building Code requires a minimum pile tip embedment of 30 feet below grade. Deeper embedments will be required for this site depending on the fill heights planned. All structural loads (floors, walls, and columns) should be supported on piles having the same approximate tip embedment below the existing ground surface to minimize differential settlement. However, for pile embedments over 46 feet, foundation conditions vary between the two lots investigated. Thus, a comprehensive test pile program should be implemented to verify installation requirements and capacities for each of the proposed structures. A discussion of pile foundations follows in this report. Once site grading plans are finalized, Eustis Engineering should be contacted to verify our assumptions.

Site Preparation

21. Drainage. The initial step to prepare the site for construction should be to establish adequate temporary and permanent drainage to prevent ponding of water and ensure immediate runoff of all rainfall. We recommend the contractor maintain adequate surface drainage away from all foundations during and after construction. This may be accomplished by setting grades to ensure positive drainage of water away from the foundation areas and providing adequate surface and subsurface drainage structures as required. All gutters draining rainfall from the structure should be connected to downspouts which discharge away from the foundation or into a drainage system. Water should not be allowed to collect near the foundation or pavements.

22. Clearing and Stripping. The existing ground surface at the site should be stripped of any vegetation, loose topsoil, debris, stumps, organic matter, loose fill, and any other deleterious materials. Stripping should be to the minimum depth necessary to remove any vegetation and roots. Deeper excavations may be required in the vicinity of stumps or demolition debris. The exact depth of stripping should be determined during construction.

23. Demolition. We understand previous structures have been demolished and removed from the site. Provisions should be made to locate any abandoned underground utilities and foundations which could impact new construction. Existing footings or abandoned pipes should be excavated and removed from the site. These structures could impact the performance of new foundations if not properly removed, proofrolled, and backfilled with structural fill material. Existing piles, if applicable, should not be incorporated into the new structure. In general, these features should not be removed but should be cut off 5 feet below the existing ground surface or grade beams, whichever is greater. Removal and relocation of structures and obstructions should also conform to the requirements outlined in

EXHIBIT B

Section 202 of the Louisiana Standard Specifications for Roads and Bridges, 2000 edition (LSSRB).

24. Subgrade Preparation. After the stripping and clearing, the exposed surface should be proofrolled with a bulldozer or tracked vehicle exerting a ground pressure between 10 and 15 psi. The vibratory system on the compactor, if present, should not be used during proofrolling. Alternative proofrolling techniques may be proposed, but these methods should be approved by Eustis Engineering prior to their use at the site. Any depressions, stump holes, or weak areas identified should be thoroughly cleaned out to the surface of firm undisturbed soil and backfilled with a select structural fill material placed and compacted under controlled conditions. All clearing and compaction operations should only be performed during periods of dry weather.

25. Structural Fill. A select granular material, such as locally available sand (AASHTO A-3), should be used as backfill and/or fill required to reach design grade. Sand fill should be non-plastic (plasticity index = 0) and free of roots, clay lumps, and other deleterious materials with no more than 10% by weight of material passing a U.S. Standard No. 200 mesh sieve. The maximum organic content should not exceed 5% by weight. Prior to transporting structural fill on site, a sample should be tested to verify its conformance to these recommendations.

26. Compaction. Structural fill beneath the pile supported structure should be placed in lifts of 8 to 10 inches and compacted to at least 95% of its maximum dry density near optimum moisture in accordance with ASTM D 698. Fill beneath pavements should be placed in 6 to 8-in. lifts and compacted to at least 95% of its maximum dry density in accordance with ASTM D 1557. Select fill or general fill used for non-structural grading should be spread in loose lifts of 10 to 12 inches and compacted by several passes of a bulldozer.

27. Fill Settlement. We understand the site will require no more than 3 feet of fill to reach finished grade. Estimates of settlement of the ground surface, due to the placement of new fill (weighing 120 pcf) and covering an area approximately 120' x 300' in plan dimensions were made for this site. The results of these analyses are provided in Table 1 for fill heights of 1 to 3 feet.

TABLE 1: ESTIMATED FILL SETTLEMENT

FILL HEIGHT IN FEET	ESTIMATED SETTLEMENT IN INCHES
1	2¾ to 4
2	5 to 7
3	7½ to 11

These estimates of settlement are at the center of the filled area. The corners and edges of the filled area should be anticipated to settle approximately 25% and 50%, respectively, of the maximum settlement at the center of the filled area. Similar magnitudes of settlement were computed for fill areas of 120' x 120' or 120' x 160' for the individual lots. Our estimates of settlement do not include settlement due to existing fill, improperly compacted fill, or poor quality fill.

28. Placement of fill will also affect pile foundations as discussed subsequently in this report. Also, fill settlement may result in differential settlement between grade supported structures, such as pavements, and the pile supported building. Your design should recognize this potential. If more than 3 feet of fill is required to raise grades at the site, or if a larger fill area is required, Eustis Engineering should be contacted to reevaluate settlement. Once site grading plans are finalized, Eustis Engineering should be contacted to verify our assumptions.

29. Areal Subsidence. The project area is being affected by ongoing areal subsidence that is the result of past filling, drawdown of ground water levels due to drainage improvements, and biodegradation of near surface organic soils subsequent to

ground water drawdown. The amount of future subsidence cannot be estimated from information developed for our report. Settlement of surface founded structures and pavements due to subsidence can be several inches and differential over short lengths with respect to pile supported structures.

Pile Foundations

30. Estimated Pile Load Capacities. We have performed analyses to estimate the allowable compressive and tensile capacities for treated ASTM D 25 quality timber piles and small timber composite piles for support of the proposed building. However, as previously noted, variations in the subsoil conditions within the marine deposits below the 46-ft depth have been identified by the borings. The allowable pile load capacities, based upon Borings 1 and 2, where medium dense to very dense sand deposits are present, are provided on Figure 2. For conditions at Borings 3 and 4, the allowable pile load capacities are provided on Figure 3. ***The borings do not identify the transition between these two stratigraphies which may not be confined to a particular lot or structure***. Thus, a comprehensive test pile program is recommended for each site to verify installation conditions and allowable capacities. Further, the selection of pile tip embedment should consider settlement potential due to filling as discussed subsequently.

31. Our estimated capacities neglect the skin friction along the top 2 feet of the pile for embedment within the pile cap and assume the piles are driven vertically. Our estimates contain an estimated factor of safety of 2 against failure of a single pile through the soil. Use of this factor of safety assumes a static load test will be performed.

32. Timber Piles. We recommend the treatment of timber piles meet the current American Wood Preservers Association Standards as outlined in Section 1014 of the LSSRB for both preservative and quality assurance. Treatment should also

follow Section 812.06 where applicable. Furthermore, we recommend the timber piles meet the quality (clean peeled, straightness, etc.) requirements outlined in ASTM D 25 and size requirements outlined in Table X1.5 of ASTM D 25 for minimum pile tips. The pile dimensions assumed in our analyses are shown on Figures 2 and 3.

33. Small Timber Composite Piles. We recommend composite piles consist of an untreated ASTM D 25 quality timber pile having a minimum 6-in. tip and 8-in. butt lower section and a nominal 8-in. diameter concrete filled metal shell upper section. Alternate to this corrugated metal section, open end steel pipe piles having an outer diameter of 6⅝ inches have also been used as the upper metal shell. The metal shell upper section should extend a minimum distance of 10 feet below the existing ground surface to protect the untreated timber section. The metal shell section should be of sufficient thickness to withstand handling stresses and soil and water pressures. We recommend a maximum shell length of 15 feet. A mandrel impacting the timber pile butt should be used to install the metal shell. Prior to placing concrete, the metal shell should be inspected to ensure it is free of water. Concrete placed in the metal shell should have a minimum compressive strength of 2,500 psi or as dictated by structural requirements. ***Timber composite piles should not be used to resist lateral or tensile loads. We do not recommend the use of timber-timber composite piles or other non-mandrel driven composite sections.***

34. Structural Capacity. Analyses for pile capacities are based only on a soil-pile relationship. Therefore, the structural capacity of the piles and their connections to transmit these loads should be determined by a structural engineer. In particular, composite pile connections should be designed to handle driving stresses as well as permanent loads.

EXHIBIT B

35. Pile Group Capacity and Spacing. The estimated allowable single pile load capacities described in this report will derive the majority of their compressive capacity through skin friction. Therefore, consideration of group effects is required. In this regard, the supporting value of the piles driven in groups should be investigated on the basis of the group perimeter shear by the formula shown on Figure 4. The minimum spacing between individual timber piles should be at least 3 feet or 5% of the embedment, whichever is greater. This relationship is also shown on Figure 4. The minimum spacing between rows or groups of piles should also meet the requirements outlined below regarding settlement.

36. Estimated Settlement due to Structural Loads. If piles are used in small isolated groups or rows, we estimate settlement of pile foundations due to sustained structural loads supported on vertical piles will be ½ inch or less for pile embedments of 40 feet or more. This estimate is based on the assumptions that the largest group dimension will be no greater than 20% of the pile embedment, the center to center spacing between groups will be no closer than twice the largest group dimension, and the center to center spacing between rows of piles will be no closer than 8 feet.

37. These estimates do not include elastic deformation of the piles which should be added to the settlement estimates. Elastic settlement of the piles may be estimated as 75% of the static column strain of a pile acting as a column. These estimates of settlement are only due to structural loads and are additive to settlement due to filling as addressed subsequently.

38. All piles for the building should be driven to the same approximate tip elevation, and concrete for the pile caps should be structurally integrated with the concrete for the grade beams. These recommendations are made to minimize the potential for differential movements. Eustis Engineering should be contacted to reevaluate pile settlement if any of our assumptions are not met.

39. Effects of Fill Placement on Piles. As the fill settles from consolidation of the underlying subsoils, negative skin friction (drag loads) are induced on the piles as the soil settles along the pile. These drag loads may result in additional pile settlement and/or an increase in the load applied to the pile. Our estimates of the additional settlement of piles due to the placement of fill is provided in Table 2.

TABLE 2: ESTIMATED SETTLEMENT OF PILES DUE TO FILLING

PILE EMBEDMENT IN FEET	ESTIMATED SETTLEMENT IN INCHES DUE TO FILLING	
	2 FEET	3 FEET
40	1¾ to 2¼	2¾ to 3½
50 (Borings 1 and 2)	½ to ¾*	¾ to 1*
50 (Borings 3 and 4)	1½ to 2	2½ to 3
60	¾ to 1¼	1½ to 1¾
70	½ to ¾	¾ to 1

*For piles firmly embedded in sand strata.

These estimates of settlement are only due to new fill placement and should be added to settlements due to structural loads and existing fill. Eustis Engineering should be contacted to verify our assumptions once site grading plans are finalized. The magnitude of drag load settlement can be reduced by preloading the site prior to pile installations or reducing fill heights/loads.

40. End bearing piles firmly embedded in the medium dense to very dense sand strata encountered in Borings 1 and 2 at the approximate 51 to 55-ft depths will have an additional compressive load imposed upon them due to the negative skin friction (drag loads) forces on the surface of the piles caused by the fill placement. The estimated additional load due to fill placement imposed on the piles is 7½ tons for the small timber composite piles and 9¾ tons for the larger timber piles. These piles should also be evaluated for their structural adequacy. This evaluation should consider the additional compressive loads presented above. These loads should

be added to the applied load (long term, sustained) at the pile butt. Short term live loads need not be included in the applied load by this assessment. This load should be used to evaluate the fiber stresses for timber piles near the pile tip, but not to reduce the allowable capacities provided in this report.

41. Differential Settlement. Your design should recognize the potential for differential settlement between pile supported features and grade supported features, including pavements. Therefore, appropriate architectural or structural features should be incorporated in your design to accommodate differential settlement. We recommend flexible type connections be specified for all piping and utilities going to and from the proposed structure supported by pile foundations.

42. Utilities. We recommend flexible type connections be specified for all piping and utilities going to and from the proposed pile supported structure. These connections should be designed to accommodate the settlement associated with filling and areal subsidence.

Installation of Driven Piles

43. Quality Control. All pile driving operations should be supervised by experienced personnel to ensure proper procedures are followed and accurate records are kept during all pile driving operations. The driving records should include the date, type of pile, pile tip and butt diameters, overall pile length, hammer model, driving energy, and number of blows per foot of penetration for the full embedment of the pile. An accurate driving record is especially important to verify piles are installed to the required tip embedment and to give an indication of any unusual driving characteristics which may include pile breakage. We recommend Eustis Engineering be retained to observe, record, and evaluate all pile driving operations with respect to our recommendations presented in this report.

44. Hammers. Small treated ASTM D 25 quality timber piles and timber composite piles with minimum tip diameters of 6 inches may be driven with a drop hammer or a single acting air hammer having a manufacturer's rated energy of approximately 7,250 ft-lbs per blow. If a drop hammer is used, the ram weight should not exceed 2,500 pounds and the drop should not exceed 3 feet. Larger treated ASTM D 25 quality timber piles with minimum tip diameters of 7 inches may be driven with a single acting air hammer having a rated energy of 15,000 ft-lbs per blow.

45. Pile Refusal. Refusal criteria for the timber piles may be taken as 25 blows per foot with the recommended hammers. If the piles are driven with the aid of a follower, or if the pile driving helmet is allowed to impact the ground surface, Eustis Engineering should be consulted to adjust this refusal criteria. If piles do not achieve their intended embedments, Eustis Engineering should be contacted.

46. Predrilling. For pile embedments above 50 feet, predrilling of fill materials, wood, and silty sand or clayey sand deposits may be necessary to avoid damage to timber piles and minimize vibrations. This predrilling should extend no deeper than 22 feet below grade. For pile embedments over 50 feet, refusal of piles within the marine sand deposits may occur. In the vicinity of Borings 1 and 2, refusal within the sands may be desired and would provide a substantial end bearing component for the piles' capacity. At Borings 3 and 4, the thickness of the sand deposits are not sufficient to increase the allowable pile capacity. However, refusal could occur during driving at areas away from the boring locations. As a result, predrilling to the 55-ft depth may be necessary in the vicinity of Borings 3 and 4 for piles longer than 55 feet. If pile embedments below the sands are desired at Borings 1 and 2, predrilling should be planned and may extend to 60 feet. Predrilling, when required, should be made using a bit no larger than 75% of the tip diameter of timber piles. Predrilling should be by wet rotary methods using a fishtail bit. Requirements should be determined during the test pile program. Piles not achieving their design tip embedment should be evaluated.

Probe Piles and Load Tests

47. Eustis Engineering considers a test pile program and load test as an extension of our geotechnical investigation. Therefore, Eustis Engineering should be retained to perform these services. We recommend a comprehensive test pile program be planned for the site. Depending on the pile embedment selected and final building dimensions, we anticipate at least three probe piles be installed within the footprint of each of the proposed structures. Additional probe piles may be needed depending on the number of piles planned for the project, selected embedments and loads, and on the findings of the program. The probe piles may be installed at job pile locations.

48. The probe piles should be the same type and embedment anticipated for the job piles and installed with the same equipment and techniques proposed for the job piles. The probe piles can be used to evaluate installation methods. A driven probe pile will provide more definitive information regarding the anticipated driving resistance, need for predrilling, and vibrations from pile driving. At least one probe pile should be selected for testing. The test pile should be allowed to set for 14 days subsequent to installation of the reaction system. The test pile should then be load tested to failure in accordance with ASTM D 1143 and the New Orleans Building Code. Results should be evaluated by Eustis Engineering to verify the estimated pile load capacities presented in this report.

Vibrations

49. Pile driving, as well as other construction activities, has the potential to generate vibrations that may affect nearby structures, pavements, and underground utilities. Eustis Engineering recommends vibrations be monitored during the test pile program and during subsequent construction activities of concern. This monitoring should evaluate peak particle velocities during pile driving at critical structures with

a seismograph, as well as other construction activities generating vibrations (hauling fill, moving heavy equipment, etc.). The record of peak particle velocities will provide information in assessing potential damage and the need for changes in construction operations.

50. Peak particle velocities (measured at a structure) exceeding 0.5 in./sec may induce damage to the structure, particularly when this structure has been previously stressed by settlement or other movements. Peak particle velocities between 0.25 and 0.5 in./sec may be sensed as being detrimental by human perception. In addition, sustained peak particle velocities of 0.25 in./sec have been documented to densify cohesionless materials. Deposits of this nature exist at the site. Such densification can result in settlement of structures, pavements, and utilities founded over or in these deposits. Therefore, if sustained vibration levels of 0.25 in./sec are measured at a structure, pavement, or utility of concern, Eustis Engineering should be notified, the construction operations generating these vibrations suspended, and consideration given to altering these procedures.

Pavement Recommendations

51. Traffic. We have assumed the parking area will experience 30 automobiles per day and 25 vans and pickup trucks per day. We have assumed driveways and serviceways, will experience twice this amount of traffic along with two sanitation trucks per week and three delivery trucks per week. Our assumed axle weights are provided in Table 3.

TABLE 3: TRAFFIC LOAD ASSUMPTIONS

VEHICLE	AXLE LOAD IN KIPS	
	FRONT	REAR
Automobiles	2 (S)	2 (S)
Vans or Pickup Trucks	2 (S)	5 (S)
Sanitation Truck	20 (S)	40 (T)
Delivery Truck	12 (S)	20 (S) / 34 (T)

(S) = Single; (T) = Tandem

Pavement components were estimated for both flexible and rigid pavements. A 20-year design life and a terminal serviceability index (P_t) of 2.0 were used for the analyses.

52. The assumed traffic was converted to equivalent 18-kip single axle loads (E_{18}) using AASHTO equivalency factors for flexible and rigid pavements. Assumed traffic loadings and applications should be verified prior to implementation of design. If traffic conditions are significantly different than those presented, Eustis Engineering should be contacted to reevaluate the pavement recommendations contained in this report.

53. Method of Analysis. The pavement components and thicknesses were determined using methods presented in the 1986 AASHTO Guide for Design of Pavement Structures. In addition, the resilient soil modulus (M_r) of the subgrade was estimated based on the type of soil, probable drainage conditions, and engineering experience. For these estimates, we have assumed the subgrade is prepared as recommended in this report. In particular, proper drainage during construction and adequate permanent drainage should be provided so the subgrade is not allowed to become saturated. Prolonged saturation of the pavement components will result in a reduced service life.

54. Flexible Pavement. Our analyses assume all paving materials will conform to the LSSRB. For the parking areas, we recommend 3 inches of hot mix asphaltic surface course consisting of at least 1.5 inches of Type 3 wearing course and 1.5 inches of Type 3 binder course. In addition, we recommend 6 inches of stone base course and 8 inches of sand subbase. For the driveways and serviceways, we recommend 4 inches of hot mix asphaltic surface course consisting of at least 1.5 inches of Type 3 wearing course and 2.5 inches of Type 3 binder course. In addition, we recommend 8 inches of stone base course and 12 inches of sand subbase.

55. The asphaltic surface course should conform with Section 501 of the LSSRB. The material for the crushed stone base course should conform to the material requirements of Section 1003.03(d) of the LSSRB. The stone base course should be placed and compacted in accordance with Section 302 of the LSSRB for a Class II base course. Sand subbase should meet the material requirements given in "Structural Fill" of this report. Structural fill used as subbase should be placed in 6 to 8-in. loose lifts and compacted to at least 95% of its maximum dry density in accordance with ASTM D 1557.

56. Grades should provide for adequate drainage to prevent saturation of the subgrade and base course materials. Otherwise, adequate subsurface drainage or edge drains should be provided to maintain drainage. If the type and thickness for pavement components are changed, Eustis Engineering should be consulted to determine the suitability of these materials and the structural number of the pavement.

57. Rigid Pavement. Using the same soil and traffic conditions, Eustis Engineering recommends rigid pavement for the parking areas comprise 5 inches of Portland Cement Concrete. For the driveways and serviceways, we recommend the rigid pavement consist of at least 7 inches of Portland Concrete Cement. We

recommend trash container pads be at least 8 inches thick. Portland Cement Concrete should conform to the material requirements for pavement Type B concrete as specified in Section 901 of the LSSRB. The concrete should have a specified 28-day compressive strength of 4,000 psi to give the pavement adequate flexural strength. The concrete pavement design should consider the need for reinforcement against temperature and shrinkage. The pavement should be constructed in accordance with the provisions of the LSSRB, Section 601. The concrete should be underlain by at least 6 inches of compacted sand fill. The sand fill should conform to the material requirements given in "Structural Fill." The sand subbase should be compacted to at least 95% of its maximum dry density near optimum water content using ASTM D 1557.

58. Grades should provide for adequate drainage to prevent saturation of sand fill beneath the pavement. Otherwise, adequate subsurface drainage or edge drains should be provided to maintain drainage. All joints should be sealed to prevent infiltration of water. All pavement details, such as reinforcement, dowels, joints, curbs, etc., should be designed by a pavement design engineer.

GEOTECHNICAL SERVICES DURING CONSTRUCTION

59. In order to provide continuity among the investigation, design, and construction phases, Eustis Engineering should be retained to review plans and specifications developed for the project. Eustis Engineering can provide additional geotechnical services which may include consultation during design and construction. We can also provide steel, concrete, and asphalt inspection services, and compaction and inplace density determinations on fill materials. We can perform appropriate laboratory tests to determine the gradation and quality of material proposed as structural fill or backfill. Eustis Engineering can also log the installation of test piles and job piles, perform and evaluate pile load tests, and monitor vibrations.

EXHIBIT B

60. Eustis Engineering should be retained to monitor the geotechnical related work performed by the contractor. This permits the geotechnical engineer that prepared the report to be on hand and quickly evaluate unanticipated conditions, conduct additional tests if required, and, when necessary, recommend alternative solutions to problems. This is recommended to avoid major construction cost overruns or contractual disputes on the project.

EXHIBIT B

YWCA OF NEW ORLEANS
601-605 SOUTH JEFFERSON DAVIS PARKWAY
AND 600 SOUTH CLARK STREET
NEW ORLEANS, LOUISIANA
EUSTIS ENGINEERING PROJECT NO. 21576

ESTIMATED ALLOWABLE SINGLE PILE LOAD CAPACITIES
TREATED ASTM D 25 QUALITY TIMBER PILES
AND TIMBER COMPOSITE PILES
BASED ON SOIL BORINGS 1 AND 2

PILE DIAMETER	ESTIMATED PILE TIP EMBEDMENT BELOW EXISTING GROUND SURFACE	ESTIMATED ALLOWABLE SINGLE PILE LOAD CAPACITIES IN TONS[1] FACTOR OF SAFETY ≈ 2[2]	
		COMPRESSION	TENSION
6-In. Tip, 8-In. Butt	30 35 40	4 4½ 5½	2½ 3 3½
6-In. Tip, 8-In. Butt Composite[3]	45 50 51 - 55[4]	6 7½ 15	N/A[3] N/A[3] N/A[3]
8-In. Tip, 12-In. Butt	30 35	5½ 6½	3½ 4½
7-In. Tip, 12-In. Butt	40 45 50 51 - 55[4]	7 8½ 10 25[4]	5 5½ 6½ 10
7-In. Tip, 13-In. Butt	70	24	16

[1] These estimated capacities do not include limitations on structural capacity or imposed by some building codes.

[2] Use of a factor of safety of 2 assumes a static pile load test is performed.

[3] Timber composite piles should not be used to resist tensile or lateral loads. Timber composite piles should meet the size and installation requirements given in the report.

[4] Assumes piles firmly embedded in medium dense to very dense sand strata as indicated by penetration resistance.

EXHIBIT B

YWCA OF NEW ORLEANS
601-605 SOUTH JEFFERSON DAVIS PARKWAY
AND 600 SOUTH CLARK STREET
NEW ORLEANS, LOUISIANA
EUSTIS ENGINEERING PROJECT NO. 21576

ESTIMATED ALLOWABLE SINGLE PILE LOAD CAPACITIES
TREATED ASTM D 25 QUALITY TIMBER PILES
AND TIMBER COMPOSITE PILES
BASED ON SOIL BORINGS 3 AND 4

PILE DIAMETER	ESTIMATED PILE TIP EMBEDMENT BELOW EXISTING GROUND SURFACE	ESTIMATED ALLOWABLE SINGLE PILE LOAD CAPACITIES IN TONS[1] FACTOR OF SAFETY ≈ 2[2]	
		COMPRESSION	TENSION
6-In. Tip, 8-In. Butt	30 35 40	3½ 4½ 5½	2½ 3 3½
6-In. Tip, 8-In. Butt Composite[3]	45 50 55	6 7½ 9½	N/A[3] N/A[3] N/A[3]
8-In. Tip, 12-In. Butt	30 35	5 6½	3½ 4
7-In. Tip, 12-In. Butt	40 45 50 55[4]	7 8 10 12½	4½ 5½ 6½ 8½
7-In. Tip, 13-In. Butt	60[4] 65 70	15 17 20	10 11½ 14

[1] These estimated capacities do not include limitations on structural capacity or imposed by some building codes.

[2] Use of a factor of safety of 2 assumes a static pile load test is performed.

[3] Timber composite piles should not be used to resist tensile or lateral loads. Timber composite piles should meet the size and installation requirements given in the report.

[4] Should predrilling to the 55-ft depth be necessary, these embedments should not be used.

EXHIBIT B

CAPACITY OF PILE GROUPS

The maximum load carrying capacity of a pile group is no greater than the sum of the single pile load capacities, but may be limited to a lower value if so indicated by the result of the following formula.

Q_{group} = Perimeter shear + End bearing

Perimeter Shear = $2 (B_g + L_g) D c_{ave}$

End Bearing = $N_c C_b L_g B_g$

Where:

Q_{group}	=	Ultimate group capacity
B_g	=	Width of pile group
L_g	=	Length of pile group
D	=	Depth of pile group
c_{ave}	=	Weighted average of undrained shear strength over the depth of pile embedments. c_{ave} should be reduced by alpha (α) from Figure 4-5 of EM 1110-2-2906.
C_b	=	Undrained shear strength at the base of the pile group
N_c	=	$5(1+\frac{D}{5B_g})\quad(1+\frac{B_g}{5L_g}) \leq 9$

A minimum factor of safety of 2 and 3 should be applied to the computed ultimate perimeter shear and end bearing, respectively.

Note: See pages 4-21 and 4-22 of EM 1110-2-2906 for complete discussion of pile group capacity.

SPACING WITHIN PILE GROUPS

SPAC = $0.05 (L_1) + 0.025 (L_2) + 0.0125 (L_3)$

In Which:

SPAC	=	Center to center of piles, feet
L_1	=	Pile penetration up to 100 feet
L_2	=	Pile penetration from 101 to 200 feet
L_3	=	Pile penetration beyond 200 feet

NOTE: Minimum pile spacing = 3 feet or 3 pile diameters, whichever is greater

EXHIBIT B

APPENDIX

EXHIBIT B

LEGEND AND NOTES FOR
LOG OF BORING AND TEST RESULTS

PP Pocket penetrometer: Resistance in tons per square foot

SPT Standard Penetration Test: Number of blows of a 140-lb hammer dropped 30 inches required to drive 2-in. O.D., 1.4-in. I.D. sampler a distance of 1 foot into the soil after first seating it 6 inches

SPLR Type of Sampling Shelby SPT Auger No sample

SYMBOL Clay Silt Sand Peat/Humus Shells Stone/Gravel

Predominant type shown heavy; Modifying type shown light

USC Unified Soil Classification

DENSITY Unit weight in pounds per cubic foot

SHEAR TESTS

TYPE

- UC Unconfined compression shear
- OB Unconsolidated undrained triaxial compression shear on one specimen confined at the approximate overburden pressure
- UU Unconsolidated undrained triaxial compression shear
- CU Consolidated undrained triaxial compression shear
- DS Direct shear

Ø Angle of internal friction in degrees

c Cohesion in pounds per square foot

ATTERBERG LIMITS

- LL Liquid Limit
- PL Plastic Limit
- PI Plasticity Index

OTHER TESTS

- CON Consolidation
- PD Particle size distribution (sieve and/or hydrometer)
- k Coefficient of permeability in centimeters per second
- SP Swelling pressure in pounds per square foot

Other laboratory test results reported on separate figures

GENERAL NOTES

(1) If a ground water depth is shown on the boring log, these observations were made at the time of drilling and were measured below the existing ground surface. These observations are shown on the boring logs. However, ground water levels may vary due to seasonal fluctuations and other factors. If important to construction, the depth to ground water should be determined by those persons responsible for construction immediately prior to beginning work.

(2) While the individual logs of borings are considered to be representative of subsurface conditions at their respective locations on the dates shown, it is not warranted that they are representative of subsurface conditions at other locations and times.

EUSTIS ENGINEERING

LOG OF BORING AND TEST RESULTS

YWCA OF NEW ORLEANS
601-605 SOUTH JEFFERSON DAVIS PARKWAY AND 600 SOUTH CLARK STREET
NEW ORLEANS, LOUISIANA

(Sheet 1 of 2)

EXHIBIT B

Ground Elev.: **Datum:** **Gr. Water Depth:** **Job No.:** 21576 **Date Drilled:** 10/13/11 **Boring:** 1 Refer to "Legends & Notes"

Scale In Feet	PP	SPT	SPLR	Symbol	Visual Classification	USC	Sample Number	Depth In Feet	Water Content Percent	Density Dry	Density Wet	Shear Tests Type	Shear Tests ø	Shear Tests C	Atterberg Limits LL	Atterberg Limits PL	Atterberg Limits PI		Other Tests
0					Loose gray & brown silty sand w/shell fragments & clay pockets	SM	1	0-0.5	6										
	0.50				Soft dark gray & brown sandy clay w/organic matter, roots, & shell fragments	CL	2	2-3	50	58	86	UC	--	211					
					Very soft dark gray silty clay w/wood & humus	CL	3	5-6											
					Wood	Wd	4	6-7											
10					Extremely soft gray organic clay w/wood & roots	OH	5	8-9	146	30	75	UC	--	100					
							6	11-12											
					Medium dense gray clayey sand w/decayed wood	SC	7	14-15	29	92	119	UC	--	729					
20							8	18-19											
					Soft gray clay w/fine sand pockets & lenses	CH	9	23-24	51	69	105	UC	--	173					
30							10	28-29											
							11	33-34	60	63	101	UC	--	326					
40							12	38-39											
							13	43-44	69	59	99	UC	--	377					
	0.50				Soft gray sandy clay w/clay layers & shell fragments	CL	14	48-49	41	78	110	UC	--	449					
50																			

Comments: Latitude: 29° 57.972' N
Longitude: 90° 05.948' W

EUSTIS ENGINEERING

LOG OF BORING AND TEST RESULTS

YWCA OF NEW ORLEANS
601-605 SOUTH JEFFERSON DAVIS PARKWAY AND 600 SOUTH CLARK STREET
NEW ORLEANS, LOUISIANA

EXHIBIT B

Ground Elev.: **Datum:** **Gr. Water Depth:** **Job No.:** 21576 **Date Drilled:** 10/13/11 **Boring:** 1 **Refer to "Legends & Notes"**

Scale In Feet	PP	SPT	SPLR	Symbol	Visual Classification	USC	Sample Number	Depth In Feet	Water Content Percent	Density Dry	Density Wet	Shear Tests Type	Shear Tests ø	Shear Tests C	Atterberg Limits LL	Atterberg Limits PL	Atterberg Limits PI		Other Tests
50		23			Medium dense gray fine sand w/shells & clay pockets	SP	15	51-52											
		23					16	54-55	23										
60							17	58-59	29	85	110	UC	--	879					
	0.50				Stiff gray & tan clay w/shell fragments & fine sand pockets	CH	18	63-64											
	0.50						19	68-69	60	64	103	UC	--	1246					
70					Very soft gray silty clay w/wood (disturbed)	CL	20	73-74											
	0.50				Stiff greenish-gray clay w/fine sand pockets	CH	21	78-79	43	80	114	UC	--	1448					
80																			
90																			
100																			

Comments: Latitude: 29° 57.972' N
Longitude: 90° 05.948' W

EUSTIS ENGINEERING

LOG OF BORING AND TEST RESULTS

YWCA OF NEW ORLEANS
601-605 SOUTH JEFFERSON DAVIS PARKWAY AND 600 SOUTH CLARK STREET
NEW ORLEANS, LOUISIANA

EXHIBIT B

Ground Elev.: **Datum:** **Gr. Water Depth:** **Job No.:** 21576 **Date Drilled:** 10/14/11 **Boring:** 2 Refer to "Legends & Notes"

Scale In Feet	PP	SPT	S P L R	Symbol	Visual Classification	USC	Sample Number	Depth In Feet	Water Content Percent	Density Dry	Density Wet	Shear Tests Type	Shear Tests ø	Shear Tests C	Atterberg Limits LL	Atterberg Limits PL	Atterberg Limits PI		Other Tests
0		21			Medium stiff gray clay w/shell fragments, brick fragments, silty sand pockets, & roots	CH	1	0-1.5	56										
	0.50						2	1.5-3											
	0.25						3	4-5	60										
					Extremely soft to very soft gray & dark gray organic clay w/roots	OH	4	7-8											
10							5	10-11	183	28	79	UC	--	44					
					Very soft gray clay w/sandy silt pockets & decayed wood	CH	6	13-14	63	63	102	UC	--	197					
	0.50				Medium dense gray silty sand w/clay pockets	SM	7	18-19	33	92	122	OB	0	532					
20					Very soft to soft gray clay w/silt & silty sand pockets & lenses	CH	8	23-24											
							9	28-29	60	65	104	UC	--	278					
30							10	33-34											
							11	38-39	69	59	100	UC	--	318					
40							12	43-44											
					Very loose gray clayey sand w/shell fragments	SC													
	0.25						13	48-49	28	94	120	UC	--	107					
50																			

Comments: Latitude: 29° 57.983' N
Longitude: 90° 05.942' W

EUSTIS ENGINEERING

LOG OF BORING AND TEST RESULTS

YWCA OF NEW ORLEANS
601-605 SOUTH JEFFERSON DAVIS PARKWAY AND 600 SOUTH CLARK STREET
NEW ORLEANS, LOUISIANA

EXHIBIT B

Ground Elev.: **Datum:** **Gr. Water Depth:** **Job No.:** 21576 **Date Drilled:** 10/14/11 **Boring:** 2 Refer to "Legends & Notes"

Scale In Feet	PP	SPT	S P L R	Symbol	Visual Classification	USC	Sample Number	Depth In Feet	Water Content Percent	Density Dry	Density Wet	Shear Tests Type	Shear Tests ø	Shear Tests C	Atterberg Limits LL	Atterberg Limits PL	Atterberg Limits PI		Other Tests
50		25			Medium dense gray fine sand w/shell fragments	SP	14	50.5-52	21										
		51			Very dense gray fine sand w/silty sand	SP	15	53.5-55											
	0.25				Soft gray clay w/silty sand pockets & lenses & shell fragments	CH	16	58-59	57	68	106	UC	--	393					
60	0.25						17	63-64											
	2.00				Medium stiff greenish-gray & tan clay w/silt pockets	CH	18	68-69	46	78	113	UC	--	828					
70	1.75						19	73-74	49	74	110	UC	--	869					
					Loose gray silty sand	SM	20	78-79											
80																			
90																			
100																			

Comments: Latitude: 29° 57.983' N
Longitude: 90° 05.942' W

EUSTIS ENGINEERING

LOG OF BORING AND TEST RESULTS

YWCA OF NEW ORLEANS
601-605 SOUTH JEFFERSON DAVIS PARKWAY AND 600 SOUTH CLARK STREET
NEW ORLEANS, LOUISIANA

EXHIBIT B

Ground Elev.: **Datum:** **Gr. Water Depth:** **Job No.:** 21576 **Date Drilled:** 10/12/11 **Boring:** 3 Refer to "Legends & Notes"

Scale In Feet	PP	SPT	S P L R	Symbol	Visual Classification	USC	Sample Number	Depth In Feet	Water Content Percent	Density Dry	Density Wet	Shear Tests Type	Shear Tests ø	Shear Tests C	Atterberg Limits LL	Atterberg Limits PL	Atterberg Limits PI		Other Tests
0	1.00				Stiff black sandy clay w/brick & rock	CL	1	1-2											
					Extremely soft dark brown humus w/clay layers, roots, & wood	Pt	2	5-6	185	27	76	UC	--	91					
10					Very soft brown humus w/gray clay & trace of wood	Pt	3	8-9	271	18	68	UC	--	121					
					Very soft gray clay w/wood	CH	4	10-11											
	0.50				Medium dense gray silty sand w/wood & roots	SM	5	13-14	30	93	120	OB	0	714					
	0.50				Medium stiff gray silty clay	CL	6	18-19											
20					Very soft to soft gray clay w/silt & fine sand pockets & lenses	CH	7	23-24	52	69	105	UC	--	302					
30							8	28-29											
							9	33-34	58	66	104	UC	--	295					
	0.25						10	38-39											
40							11	43-44	75	55	96	UC	--	386					
					Loose to medium dense gray clayey sand w/shell fragments	SC													
50							12	49-50											

Comments:

EUSTIS ENGINEERING

LOG OF BORING AND TEST RESULTS

YWCA OF NEW ORLEANS
601-605 SOUTH JEFFERSON DAVIS PARKWAY AND 600 SOUTH CLARK STREET
NEW ORLEANS, LOUISIANA

EXHIBIT B

Ground Elev.: **Datum:** **Gr. Water Depth:** **Job No.:** 21576 **Date Drilled:** 10/12/11 **Boring:** 3 **Refer to "Legends & Notes"**

Scale In Feet	PP	SPT	S P L R	Symbol	Visual Classification	USC	Sample Number	Depth In Feet	Water Content Percent	Density Dry	Density Wet	Shear Tests Type	Shear Tests ø	Shear Tests C	Atterberg Limits LL	Atterberg Limits PL	Atterberg Limits PI		Other Tests
50		24			Loose to medium dense gray clayey sand w/shell fragments	SC	13	50.5-52	27										
		4			Soft gray sandy clay w/clay & trace of shell fragments	CL	14	53.5-55											
	0.25				Soft gray clay w/sandy silt pockets & layers	CH	15	58-59	60	65	103	UC	--	423					
60	0.50				Medium stiff light gray clay w/silt lenses & pockets	CH	16	63-64											
	1.75						17	69-70	46	73	107	UC	--	846					
70					Loose gray silty sand	SM	18	72-73											
		35			Dense gray silty sand	SM	19	73.5-75	25										
		64			Very dense gray silty sand	SM	20	76-77.5											
		57					21	78.5-80	27										
80																			
90																			
100																			

Comments:

EUSTIS ENGINEERING

LOG OF BORING AND TEST RESULTS

YWCA OF NEW ORLEANS
601-605 SOUTH JEFFERSON DAVIS PARKWAY AND 600 SOUTH CLARK STREET
NEW ORLEANS, LOUISIANA

(Sheet 1 of 2)

EXHIBIT B

Ground Elev.: **Datum:** **Gr. Water Depth:** **Job No.:** 21576 **Date Drilled:** 10/12-13/11 **Boring:** 4 Refer to "Legends & Notes"

Scale In Feet	PP	SPT	S P L R	Symbol	Visual Classification	USC	Sample Number	Depth In Feet	Water Content Percent	Density Dry	Density Wet	Shear Tests Type	Shear Tests ø	Shear Tests C	Atterberg Limits LL	Atterberg Limits PL	Atterberg Limits PI		Other Tests
0					Loose tan sand (fill)	SP	1	1-2											
					Soft gray & brown clay w/decayed wood	CH													
	0.25						2	4-5	80	53	95	UC	--	358					
					Very soft gray & brown organic clay w/wood	OH	3	7-8	129	36	83	UC	--	182					
10							4	10-11											
					Loose gray clayey silt	ML													
	0.25						5	13-14	37	84	115	OB	0	342					
					Very soft gray clay w/silt & sandy silt pockets & lenses	CH													
							6	18-19	57	67	106	UC	--	190					
20							7	23-24											
							8	28-29	54	68	105	UC	--	218					
30							9	33-34											
					Very soft to soft gray clay w/silt pockets & lenses	CH													
							10	38-39	70	58	98	UC	--	309					
40							11	43-44											
					Extremely soft gray sandy clay w/shell fragments	CL													
50							12	48-49	36	84	114	UC	--	80					

Comments: Latitude: 29° 57.960' N
Longitude: 90° 05.901' W

EUSTIS ENGINEERING

LOG OF BORING AND TEST RESULTS

YWCA OF NEW ORLEANS
601-605 SOUTH JEFFERSON DAVIS PARKWAY AND 600 SOUTH CLARK STREET
NEW ORLEANS, LOUISIANA

(Sheet 2 of 2)

EXHIBIT B

Ground Elev.: **Datum:** **Gr. Water Depth:** **Job No.:** 21576 **Date Drilled:** 10/12-13/11 **Boring:** 4 Refer to "Legends & Notes"

Scale In Feet	PP	SPT	S P L R	Symbol	Visual Classification	USC	Sample Number	Depth In Feet	Water Content Percent	Density Dry	Density Wet	Shear Tests Type	Shear Tests ø	Shear Tests C	Atterberg Limits LL	Atterberg Limits PL	Atterberg Limits PI		Other Tests
50		17			Medium dense gray clayey sand w/trace of shell fragments	SC	13	51-52	26										
		6			Soft gray clay	CH	14	54-55											
	0.50				Medium stiff gray clay w/silt pockets & lenses, & shell fragments	CH	15	58-59	66	60	100	UC	--	536					
60	0.50						16	63-64											
	2.50				Medium stiff greenish-gray clay w/silt pockets	CH	17	68-69	36	83	113	UC	--	879					
70	2.00						18	73-74											
	2.00				Stiff light gray sandy clay	CL	19	78-79	22	104	126	UC	--	1246					
80																			
90																			
100																			

Comments: Latitude: 29° 57.960' N
Longitude: 90° 05.901' W

EUSTIS ENGINEERING

LOG OF BORING AND TEST RESULTS

YWCA OF NEW ORLEANS
601-605 SOUTH JEFFERSON DAVIS PARKWAY AND 600 SOUTH CLARK STREET
NEW ORLEANS, LOUISIANA

(Sheet 1 of 1)

EXHIBIT B

Ground Elev.: **Datum:** **Gr. Water Depth:** **Job No.:** 21576 **Date Drilled:** 10/14/11 **Boring:** A-1 **Refer to "Legends & Notes"**

Scale In Feet	PP	SPT	S P L R	Symbol	Visual Classification	USC	Sample Number	Depth In Feet	Water Content Percent	Density		Shear Tests			Atterberg Limits				Other Tests
										Dry	Wet	Type	ø	C	LL	PL	PI		
0					½" Shell fragments (fill)	SP	NS	0-0.05											
					Loose tan fine sand w/shell fragments (fill)		1	0.05-1	5										
	0.75				Soft to medium stiff dark gray & black sandy clay w/shell fragments & gravel	CL	2	1-2	23										
	0.25						3	3-4	24										
5	0.25				Very soft to soft gray & dark gray clay w/shell fragments & gravel	CH	4	5-6	76										
					Very soft brown & gray organic clay w/decayed wood & roots	OH	5	7-8											
10							6	9-10	233										
15																			
20																			
25																			

Comments: Latitude: 29° 54.962' N
Longitude: 90° 05.934' W

EUSTIS ENGINEERING

LOG OF BORING AND TEST RESULTS

YWCA OF NEW ORLEANS
601-605 SOUTH JEFFERSON DAVIS PARKWAY AND 600 SOUTH CLARK STREET
NEW ORLEANS, LOUISIANA

(Sheet 1 of 1)

EXHIBIT B

Ground Elev.: **Datum:** **Gr. Water Depth:** **Job No.:** 21576 **Date Drilled:** 10/12/11 **Boring:** A-2 **Refer to "Legends & Notes"**

Scale In Feet	PP	SPT	S P L R	Symbol	Visual Classification	USC	Sample Number	Depth In Feet	Water Content Percent	Density Dry	Density Wet	Shear Tests Type	Shear Tests ø	Shear Tests C	Atterberg Limits LL	Atterberg Limits PL	Atterberg Limits PI		Other Tests
0					Loose gray fine sand w/shell fragments & gravel	SP	1	0-0.5	4										
							2	0.5-1	4										
	0.50				Medium stiff gray clay w/decayed wood, sandy silt pockets, & shell fragments	CH	3	1-2	53										
	0.50						4	3-4	59										
5					Very soft gray clay w/sandy silt pockets, roots, & shell fargments	CH	5	5-6	80										
					Very soft brown & gray organic clay w/decayed wood & roots	OH	6	7-8	201										
					Very soft gray clay w/organic matter, roots, & decayed wood	CH	7	9-10	124										
10																			
15																			
20																			
25																			

Comments: Latitude: 29° 57.962' N
Longitude: 90° 05.927' W

EXHIBIT C

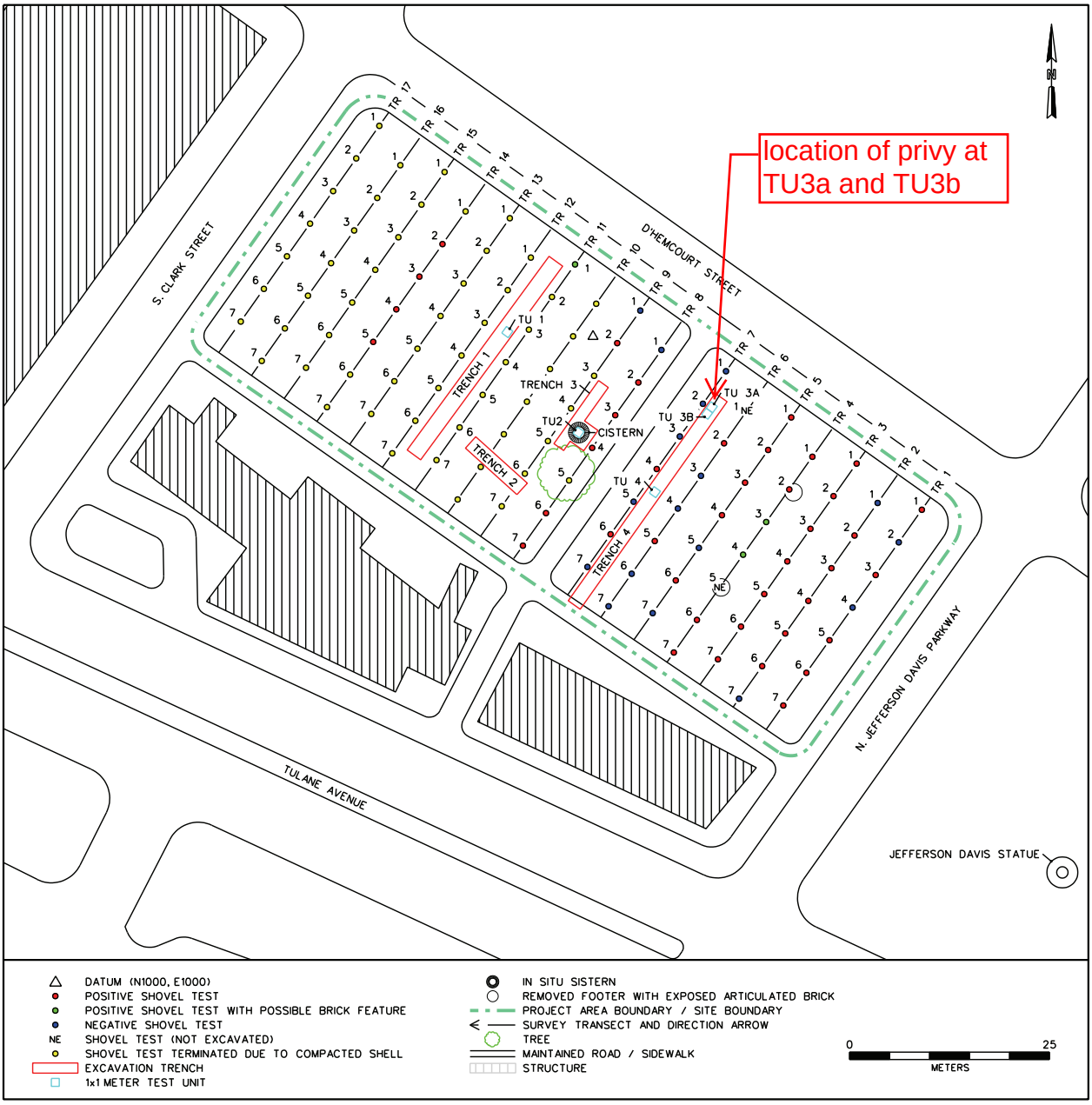
location of privy at TU3a and TU3b
S. CLARK STREET
D'HEMCOURT STREET
N. JEFFERSON DAVIS PARKWAY
TULANE AVENUE
JEFFERSON DAVIS STATUE
TU 1
TU 2
TU 3A
TU 3B
TU 4
CISTERN
TRENCH 1
TRENCH 2
TRENCH 3
TRENCH 4
DATUM (N1000, E1000)
POSITIVE SHOVEL TEST
POSITIVE SHOVEL TEST WITH POSSIBLE BRICK FEATURE
NEGATIVE SHOVEL TEST
SHOVEL TEST (NOT EXCAVATED)
SHOVEL TEST TERMINATED DUE TO COMPACTED SHELL
EXCAVATION TRENCH
1x1 METER TEST UNIT
IN SITU SISTERN
REMOVED FOOTER WITH EXPOSED ARTICULATED BRICK
PROJECT AREA BOUNDARY / SITE BOUNDARY
SURVEY TRANSECT AND DIRECTION ARROW
TREE
MAINTAINED ROAD / SIDEWALK
STRUCTURE
0
25
METERS

EXHIBIT C

EXHIBIT C

EXHIBIT D

STRATUM ENGINEERING, LLC

Transmittal of Pile Load Test Report

Client: YWCA Greater New Orleans
Mr. Christopher Chimento
c/o Trapolin-Peer Architects
850 Tchoupitoulas Street
New Orleans, LA 70130

Project: Test Pile Program - YWCA Day Care, Education & Counseling Bldg., 601-605 S. Jefferson Davis, New Orleans, LA

Work Order Date: 12/30/2019 **Project No:** C19-079

Report Date: 01/02/2020 **Work Order No:** 38700 **Report No:** 001

Please find attached a copy of our Pile Load Test Report for the referenced project. We appreciate the opportunity to provide our services. If you should have any questions, please give us a call.

Respectfully Submitted,
Stratum Engineering, LLC

Gregory J. Richards, Senior Project Manager

1-ec YWCA Greater New Orleans
Attn: Mr. Christopher Chimento
1-cc Laboratory

THIS REPORT APPLIES ONLY TO THE STANDARDS OR PROCEDURES INDICATED AND TO THE SAMPLE(S) TESTED AND/OR OBSERVED AND ARE NOT NECESSARILY INDICATIVE OF THE QUALITIES OF APPARENTLY IDENTICAL OR SIMILAR PRODUCTS OR PROCEDURES, NOR DO THEY REPRESENT AN ONGOING QUALITY ASSURANCE PROGRAM UNLESS SO NOTED. THESE REPORTS ARE FOR THE EXCLUSIVE USE OF THE ADDRESSED CLIENT AND ARE NOT TO BE REPRODUCED WITHOUT WRITTEN PERMISSION.

EXHIBIT D

STRATUM
ENGINEERING, LLC

EXHIBIT D

REPORT OF PILE LOAD TEST
FOR PILES UNDER STATIC AXIAL
COMPRESSIVE LOAD

FOR
YWCA DAY CARE, EDUCATION, & COUSELING BUILDING
NEW ORLEANS, LOUISIANA

TESTED FOR
YWCA GREATER NEW ORLEANS
C/O
TRAPOLIN-PEER ARCHITECTS
850 TCHOUPITOULAS STREET
NEW ORLEANS, LOUISIANA 70130

ATTN: MR. CHRISTOPHER CHIMENTO

REPORT NO: C19-079-001

DECEMBER 30, 2019

EXHIBIT D

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Scope of Work 1
Load Test Procedure 1
Pile Driving Data 2
Vibration Monitoring 3
Loading Schedule and Record of Settlement 4
Summary and Conclusion 7

APPENDIX:
Test Pile Location Plan
Load versus Settlement Curve
Vibration Monitoring Report
Vibration Monitoring Location Plan
Calibration of Jacking Set

EXHIBIT D

PROJECT INFORMATION

Stratum Engineering, LLC (SE) was authorized to perform one (1) pile load test for the YWCA Day Care, Education & Counseling Building in New Orleans, Louisiana. Authorization to perform the pile load test was provided by Mr. Loyce Wright of YWCA Greater New Orleans. The work was performed in accordance with SE's Test Pile Program Proposal C19-059, dated May 28, 2019.

SCOPE OF WORK

The scope of work included monitoring the driving of two (2) large treated timber piles (TP-1 and TP-2) and loading the pile which exhibited the least resistance to driving to 3 times the design load or to failure, whichever occurs first in accordance with ASTM D1143 Standard Procedure. In addition, our scope of services included vibration monitoring during pile driving to document the level of vibration recorded at nearby structures. The purpose of the load test was to verify the design capacity of the proposed pile estimated to be 25 tons.

LOAD TEST PROCEDURE

One (1) static axial compressive load test was performed on a large timber test pile TP-2 selected by the structural engineer. The pile was driven within the building footprint at a non-permanent location to a depth of about 55 feet below the existing ground surface. The pile was load tested after a set up period of 14 days. The load was applied to the test pile with a calibrated hydraulic jack placed on the test pile and jacked against a steel beam extending over the top of the test pile. The steel beam was secured in place by six (6) reaction piles. The load was applied in 2 ton increments up to failure in general accordance with ASTM D1143, "Quick Load Method". The load was then removed in four (4) equal decrements and the settlement after rebound was monitored for 5 minutes.

Settlement of the pile was determined by securing readings with an engineer's level trained on scales calibrated in 100ths of an inch. A second measuring system consisted of a piano wire, a mirror and a scale calibrated to 100ths of an inch set on one side of the pile and conforming to the requirements of the governing standard. A benchmark was also established for the test pile, which was verified each time the pile settlement was checked. Records of the pile settlement are included in subsequent sections of the report. The pile load versus settlement curve is included in the appendix.

EXHIBIT D

PILE DRIVING DATA

A total of eight (8) piles were driven by Crescent Foundations, LLC including two (2) large treated timber test piles and six (6) reaction piles. The test piles were inspected at the site prior to driving. The piles were driven in the building footprint at non-permanent locations on December 9, 2019. They were advanced using a Vulcan 01 air activated hammer delivering 15,000 ft.-lbs. of energy per blow. The dimensions and penetration resistance are tabulated below:

Pile No.	TP-1	TP-2	RP-1	RP-2	RP-3	RP-4	RP-5	RP-6
Tip Diameter, in.	7 ¼"	7 ½"	8	8 ½	8	7 ½	7 ½	8
Butt Diameter, in.	15	14 ½	14 ½	15	14 ½	12 ½	13 ½	12 ½
Length, ft.	60	60	60	60	60	60	60	60
Penetration Depth, ft.	53	55	53	52	51	53	52	50
0	WOH	WOH	WOH	WOH	WOH	WOH	WOH	WOH
1								
2								
3								
4								
5								
6								
7				1	1			
8				1	1			
9				1	1			
10			1	2	1			
11			1	2	2			
12			2	2	2	1	1	
13		2	2	3	2	1	1	
14	2	2	2	3	2	1	2	
15	1	2	4	4	2	3	3	4
16	2	1	3	3	2	3	3	2
17	2	2	2	2	2	2	2	2
18	2	3	2	2	2	2	3	2
19	2	2	4	5	3	3	7	2
20	4	2	3	5	2	5	4	2
21	3	3	2	6	2	4	3	2
22	2	2	3	4	3	4	3	2
23	2	3	4	5	3	3	4	2
24	2	2	3	4	4	4	4	2
25	2	2	3	4	2	4	3	3
26	2	2	3	4	2	5	4	2
27	2	2	3	4	3	4	4	2
28	2	2	4	4	2	4	4	4
29	3	2	4	5	3	6	4	5
30	3	2	5	4	3	6	5	3
31	3	2	3	3	2	4	6	5
32	3	3	3	4	4	6	6	6
33	4	2	4	5	3	6	5	4

WOH – Weight of Hammer

EXHIBIT D

PILE DRIVING DATA (Continued)

Pile No.	TP-1	TP-2	RP-1	RP-2	RP-3	RP-4	RP-5	RP-6
Tip Diameter, in.	7 ¼"	7 ½"	8	8 ½	8	7 ½	7 ½	8
Butt Diameter, in.	15	14 ½	14 ½	15	14 ½	12 ½	13 ½	12 ½
Length, ft.	60	60	60	60	60	60	60	60
Penetration Depth, ft.	53	55	53	52	51	53	52	50
34	3	2	4	6	3	6	5	5
35	3	3	6	6	4	6	5	6
36	3	3	4	7	4	7	4	4
37	3	3	5	7	5	6	4	5
38	4	3	4	6	4	6	5	7
39	3	3	5	6	6	6	6	8
40	6	2	4	6	6	9	4	8
41	4	4	5	6	6	8	6	6
42	5	3	6	6	5	9	4	7
43	6	3	4	9	6	8	7	8
44	5	4	6	7	6	10	7	6
45	5	3	8	10	6	10	6	7
46	4	3	6	8	6	8	8	6
47	5	3	7	8	5	8	7	8
48	6	5	9	7	6	7	13	12
49	12	10	6	8	11	6	16	24
50	23	15	6	15	18	9	24	37 @ 9
51	24	18	13	20	23	15	24	
52	23	18	19	13 @ 9		22	29	
53	28	22	14 @ 9			12 @ 6		
54		12						
55		11						

VIBRATION MONITORING

Vibration was monitored during installation of the piles. Pile driving induced vibrations were measured using Mini-Seis Seismograph, serial number 5605. The monitor was placed at the east corner of Russel's Cleaning Services building located about 60 to 115 feet from the rig. A maximum peak particle velocity of 0.100 inch per second (ips) was recorded at that location. Detailed records of vibration are included in the Appendix.

EXHIBIT D

LOADING SCHEDULE AND RECORD OF SETTLEMENT

TEST PILE NO: TP-2 **DATE TESTED: December 23, 2019**

TIME, HOURS	ELAPSED TIME, MIN	LOAD, TONS	SETTLEMENT IN INCHES		REMARKS
			ENGINEER'S LEVEL	PIANO WIRE	
9:15 am	0	0	0.00	0.00	
					Increment 1
9:16 am	1	2	0.00	0.00	
9:18 am	3	2	0.00	0.00	
9:20 am	5	2	0.00	0.00	
					Increment 2
9:21 am	1	4	0.00	0.00	
9:23 am	3	4	0.00	0.00	
9:25 am	5	4	0.00	0.00	
					Increment 3
9:26 am	1	6	0.01	0.01	
9:28 am	3	6	0.01	0.01	
9:30 am	5	6	0.01	0.01	
					Increment 4
9:31 am	1	8	0.01	0.01	
9:33 am	3	8	0.01	0.01	
9:35 am	5	8	0.01	0.01	
					Increment 5
9:36 am	1	10	0.02	0.02	
9:38 am	3	10	0.02	0.02	
9:40 am	5	10	0.02	0.02	
					Increment 6
9:41 am	1	12	0.02	0.02	
9:43 am	3	12	0.02	0.02	
9:45 am	5	12	0.02	0.02	
					Increment 7
9:46 am	1	14	0.03	0.03	
9:48 am	3	14	0.03	0.03	
9:50 am	5	14	0.03	0.03	
					Increment 8
9:51 am	1	16	0.05	0.05	
9:53 am	3	16	0.05	0.05	
9:55 am	5	16	0.05	0.05	
					Increment 9
9:56 am	1	18	0.06	0.06	
9:58 am	3	18	0.06	0.06	
10:00 am	5	18	0.06	0.06	
					Increment 10
10:01 am	1	20	0.08	0.07	
10:03 am	3	20	0.08	0.07	
10:05 am	5	20	0.08	0.07	

EXHIBIT D

LOADING SCHEDULE AND RECORD OF SETTLEMENT (Continued)

TEST PILE NO: TP-2 **DATE TESTED: December 23, 2019**

TIME, HOURS	ELAPSED TIME, MIN	LOAD, TONS	SETTLEMENT IN INCHES		REMARKS
			ENGINEER'S LEVEL	PIANO WIRE	
					Increment 11
10:06 am	1	22	0.09	0.09	
10:08 am	3	22	0.09	0.09	
10:10 am	5	22	0.09	0.09	
					Increment 12
10:11 am	1	24	0.10	0.10	
10:13 am	3	24	0.10	0.10	
10:15 am	5	24	0.10	0.10	
					Increment 13
10:16 am	1	26	0.12	0.12	
10:18 am	3	26	0.12	0.12	
10:20 am	5	26	0.12	0.12	
					Increment 14
10:21 am	1	28	0.14	0.14	
10:23 am	3	28	0.14	0.14	
10:25 am	5	28	0.14	0.14	
					Increment 15
10:26 am	1	30	0.15	0.15	
10:28 am	3	30	0.15	0.15	
10:30 am	5	30	0.15	0.15	
					Increment 16
10:31 am	1	32	0.16	0.16	
10:33 am	3	32	0.16	0.16	
10:35 am	5	32	0.16	0.16	
					Increment 17
10:36 am	1	34	0.19	0.19	
10:38 am	3	34	0.19	0.19	
10:40 am	5	34	0.19	0.19	
					Increment 18
10:41 am	1	36	0.20	0.20	
10:43 am	3	36	0.20	0.20	
10:45 am	5	36	0.20	0.20	
					Increment 19
10:46 am	1	38	0.23	0.23	
10:48 am	3	38	0.23	0.23	
10:50 am	5	38	0.23	0.23	
					Increment 20
10:51 am	1	40	0.27	0.26	
10:53 am	3	40	0.27	0.26	
10:55 am	5	40	0.27	0.26	

EXHIBIT D

LOADING SCHEDULE AND RECORD OF SETTLEMENT (Continued)

TEST PILE NO: TP-2 **DATE TESTED: December 23, 2019**

TIME, HOURS	ELAPSED TIME, MIN	LOAD, TONS	SETTLEMENT IN INCHES		REMARKS
			ENGINEER'S LEVEL	PIANO WIRE	
					Increment 21
10:56 am	1	42	0.32	0.31	
10:58 am	3	42	0.35	0.34	
11:00 am	5	42	0.35	0.34	
					Increment 22
11:01 am	1	44	0.40	0.40	
11:03 am	3	44	0.40	0.40	
11:05 am	5	44	0.55	0.55	
					Increment 23
11:06 am	1	44	1.09	1.09	
11:08 am	3	44	1.21	1.20	
11:10 am	5	44	1.90	1.90	
11:11 am	6	44	2.14	2.14	
					Decrement 1
11:11 am	1	33	2.12	2.12	
11:13 am	3	33	2.12	2.12	
11:15 am	5	33	2.12	2.12	
					Decrement 2
11:16 am	1	22	2.07	2.08	
11:18 am	3	22	2.07	2.08	
11:20 am	5	22	2.07	2.08	
					Decrement 3
11:21 am	1	11	1.99	1.99	
11:23 am	3	11	1.99	1.99	
11:25 am	5	11	1.99	1.99	
					Decrement 4
11:26 am	1	0	1.87	1.86	
11:28 am	3	0	1.87	1.86	
11:30 am	5	0	1.87	1.86	

EXHIBIT D

SUMMARY AND CONCLUSION

Test Pile TP-2 was driven on December 9, 2019 and loaded on December 23, 2019 after a fourteen (14) day set up period. The test pile was installed within the building footprint at a non-permanent location.

The large treated timber test pile TP-2 was loaded in 2 ton increments to failure. The pile maintained each load increment up to and including 40 tons with little or no movement after the initial application of each load increment. Beyond 40 tons, the pile movement accelerated and the pile eventually failed at about 44 tons where the load could not be maintained. A total of 2.14 inches of settlement was recorded at failure. The test load was then removed in four equal decrements, and the settlement was monitored for 5 minutes. The net settlement measured after the rebound period was 1.86 inches.

Based on the test results, the ultimate load capacity of the large timber test pile TP-2 is estimated at about 40 tons corresponding to an allowable capacity of 20 tons including a factor of safety of 2.0. Consequently, the pile does not meet the design load of 25 tons.

If you should have any questions, please do not hesitate to call.

Respectfully Submitted,
STRATUM ENGINEERING, LLC

Scott A. McLean
Project Manager

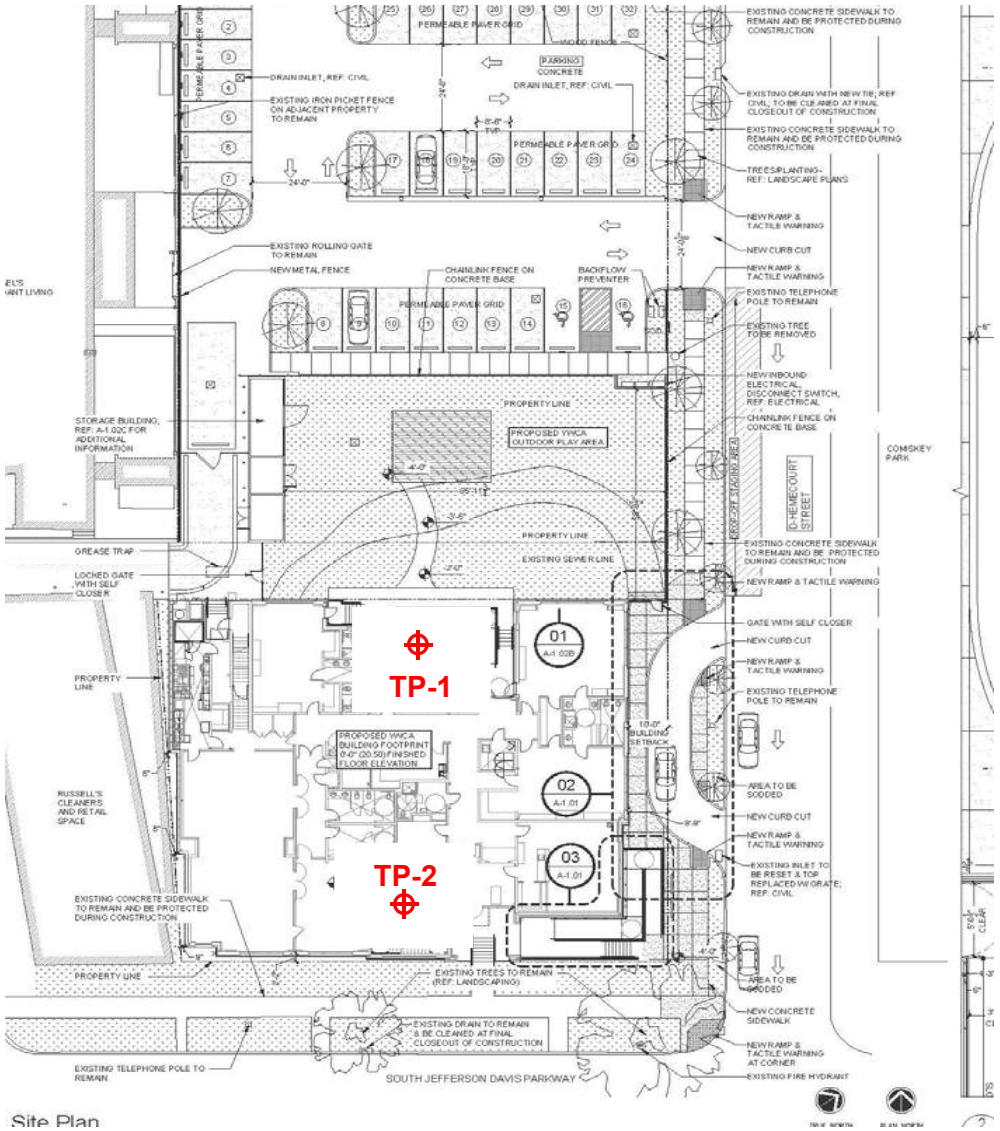
Tony Y. Maroun, P.E.
Principal

EXHIBIT D

APPENDIX

STRATUM ENGINEERING, LLC

EXHIBIT D



Site Plan

⌖ - Test Pile Locations

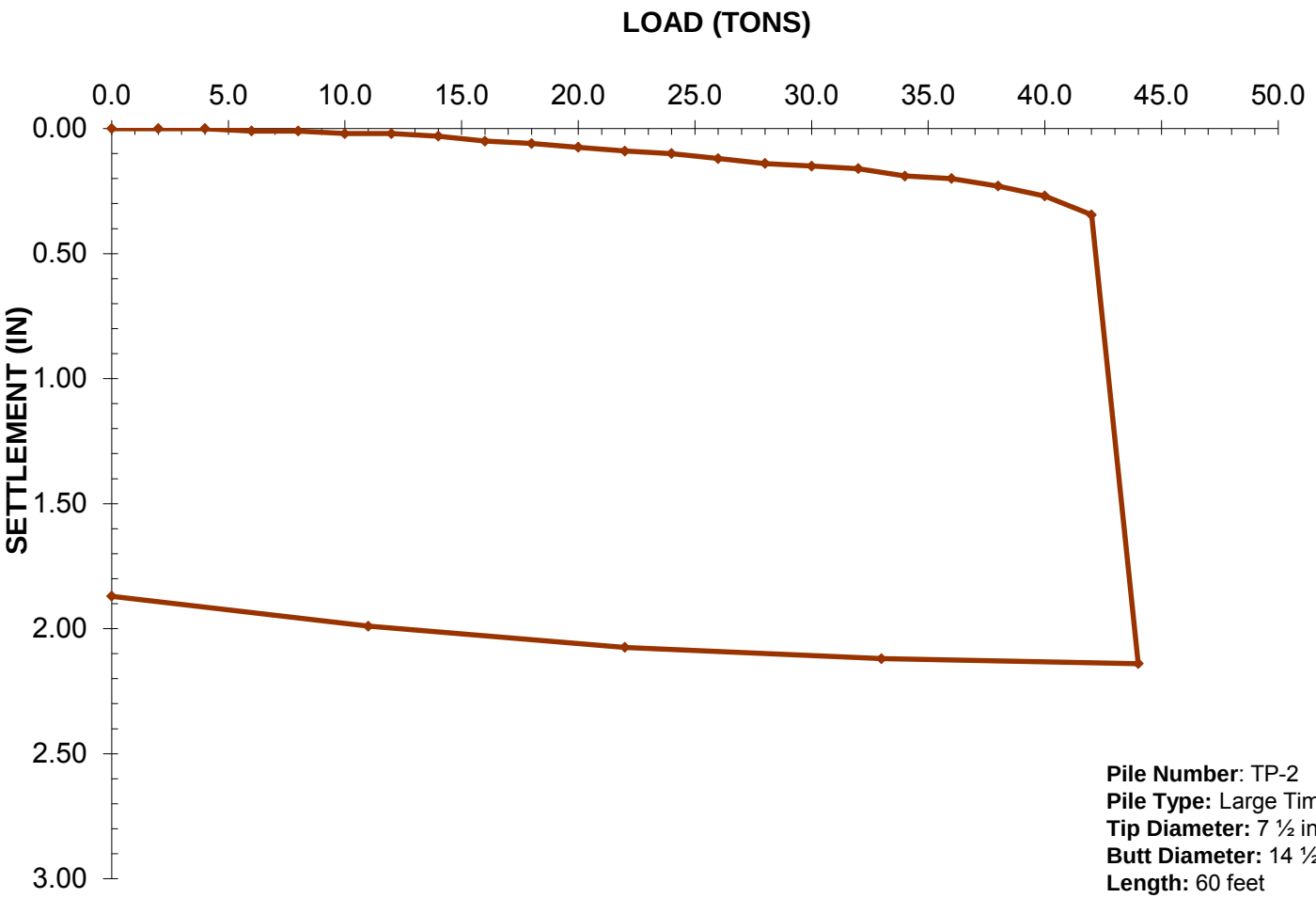
STRATUM ENGINEERING, LLC

TEST PILE LOCATON PLAN

SE PROJECT NO: C19-079

PILE LOAD TEST PROGRAM
YWCA DAY CARE, EDUCATION & COUNSELING BUILDING
NEW ORLEANS, LOUISIANA

EXHIBIT D



Pile Number: TP-2
Pile Type: Large Timber Pile
Tip Diameter: 7 ½ inches
Butt Diameter: 14 ½ inches
Length: 60 feet
Penetration Depth: 55 feet
Date Installed: December 9, 2019
Date Tested: December 23, 2019

STRATUM ENGINEERING, LLC

LOAD vs. SETTLEMENT CURVE

SE PROJECT NO: C19-079

PILE LOAD TEST PROGRAM
YWCA DAY CARE, EDUCATION & COUNSELING BUILDING
NEW ORLEANS, LOUISIANA

EXHIBIT D

STRATUM ENGINEERING, LLC

585 JOHNNY F. SMITH AVENUE SLIDELL, LOUISIANA 70460

VIBRATION MONITORING REPORT

TESTED FOR: YWCA Greater New Orleans	**PROJECT: YWCA Day Care, Education, and Counseling Building**	SCALE: 0 TO 2.5 IPS
DATE: December 9, 2019	PROJECT NO. C19-079	
TECHNICIAN: Cole Craddock	MONITOR NUMBER: 5605	WORK ORDER NO. 38,427

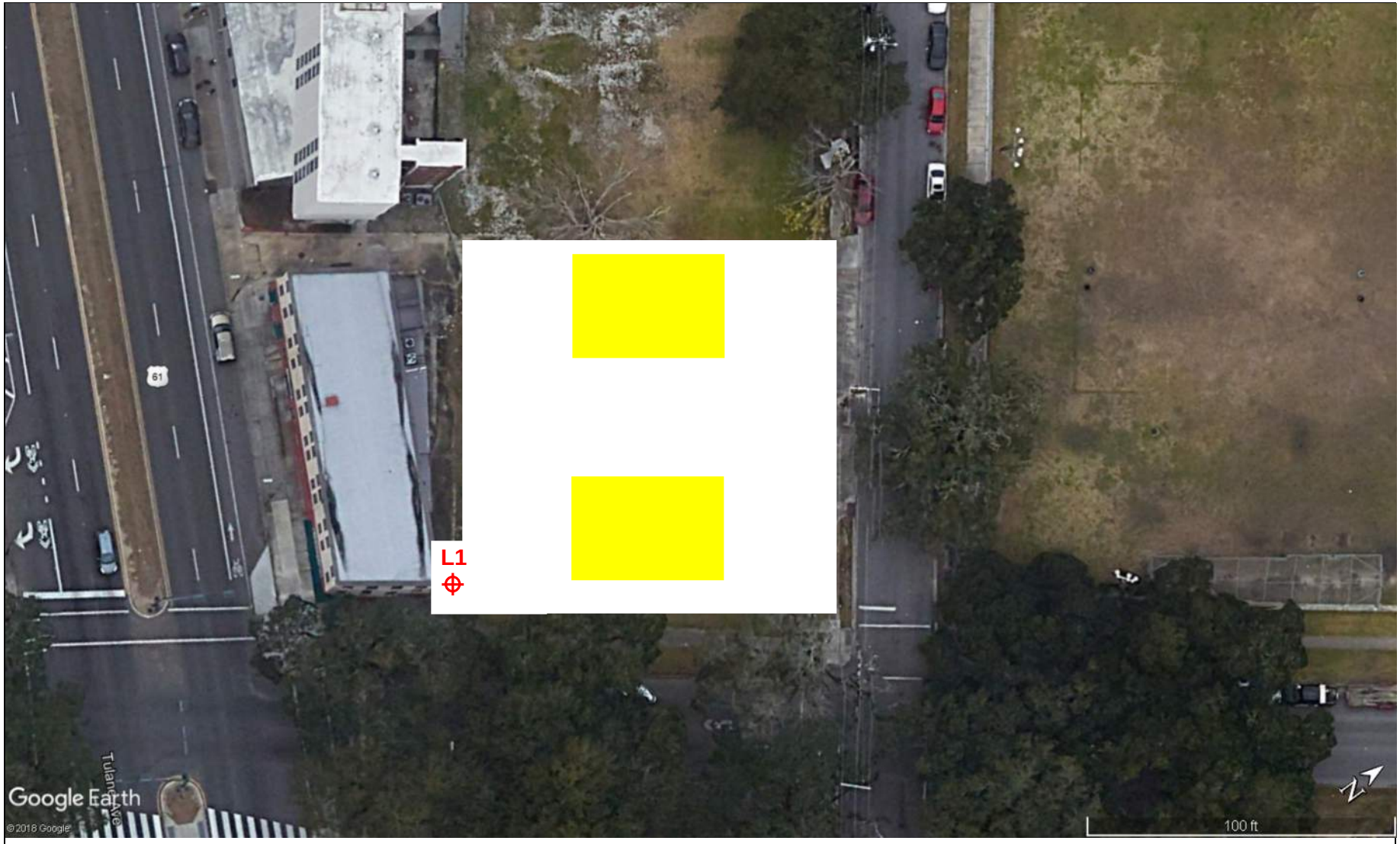
TIME		LOCATION NO.	DISTANCE FROM SOURCE	MAXIMUM PPV (IN/SEC)	DESCRIPTION OF WORK
8:00 AM	10:00 AM	L1	From 60' to 100'	0.065	Driving 60' timber piles
10:00 AM	12:00 PM	L1	From 60' to 100'	0.100	Driving 60' timber piles
12:00 PM	12:10 PM	L1	From 60' to 100'	0.055	Driving 60' timber piles

VIBRATION SOURCE: Vulcan 01 air activated hammer delivering 15,000 ft.-lbs. of energy per blow.

NOTIFICATION: No readings in excess of 0.25 IPS recorded on this date.

MONITOR LOCATION: E corner of Russel's Cleaning Services Building.

EXHIBIT D



- Vibration Monitor Location

- Vibration Source/Work Area

STRATUM ENGINEERING, LLC

VIBRATION MONITOR LOCATION PLAN

SE PROJECT NO: C19-079

PILE LOAD TEST PROGRAM
YWCA DAY CARE, EDUCATION & COUNSELING BUILDING
NEW ORLEANS, LOUISIANA

EXHIBIT D

Beerman Precision, Inc.
4206 Howard Avenue, New Orleans, LA 70125
504-207-6023 Fax: 504-207-6070

JACK CALIBRATION REPORT

CUSTOMER: STRATUM ENGINEERING
PROJECT: 75 TON RAM
ORDER NO: 1575175
DATE: December 13, 2019

CYLINDER: RC756, 75 TON 6in STROKE
SERIAL NO: A4212K
GAUGE: WIKA 10,000 PSI, 6in FACE
SERIAL NO: 1104HOMR

This report covers the results of Calibration for the above Hydraulic Cylinder. Calibration was performed utilizing our 500-Ton Master Load Cell, S/N 9403, with a RL-480 digital readout indicator, S/N 000010989. The Master Load Cell was recently calibrated on January 23, 2019 in accordance with ASTM E4 and is within a 1% tolerance. Results of current calibration are shown on the following pages:

Temperature during test 62 Degrees Fahrenheit

By:

Date: December 13, 2019

BEERMAN PRECISION, INC.

EXHIBIT D

Beerman Precision, Inc.

4206 Howard Avenue, New Orleans, LA 70125
504-207-6023 Fax: 504-207-6070

PRESSURE GAUGE CERTIFICATION

CUSTOMER: STRATUM ENGINEERING

PROJECT: 75 TON RAM

ORDER NO: 1575175

DATE: December 13, 2019

GAUGE: WIKA 10,000 PSI, 6in FACE

SERIAL NO: 1104HOMR

We certify the above hydraulic pressure gauge has been tested against our primary standard, an Amthor Dead Weight Tester and found to be within an accuracy of +/- 1/2% of full scale. The Amthor Tester was last certified on June 17, 2019 to 0.1% accuracy and traceable to the National Institute of Standards and Technology (NIST).

Standard Pressure (PSI)	Your Pressure Gauge (PSI)
0	0
1000	950
2000	1950
3000	2950
4000	3975
5000	5000
6000	6000
7000	7000
8000	7975
9000	8975
10,000	9,950

By:

Date: December 13, 2019

BEERMAN PRECISION, INC.

EXHIBIT D

Beerman Precision, Inc.
4206 Howard Avenue New Orleans, LA 70125
504-207-6023 Fax: 504-207-6070

JACK CALIBRATION REPORT

CUSTOMER: STRATUM ENGINEERING

PROJECT: 75 TON RAM

ORDER NO: 1575175

DATE: December 13, 2019

CYLINDER: RC756, 75 TON 6in STROKE

SERIAL NO: A4212K

GAUGE: WIKA 10,000 PSI, 6in FACE

SERIAL NO: 1104HOMR

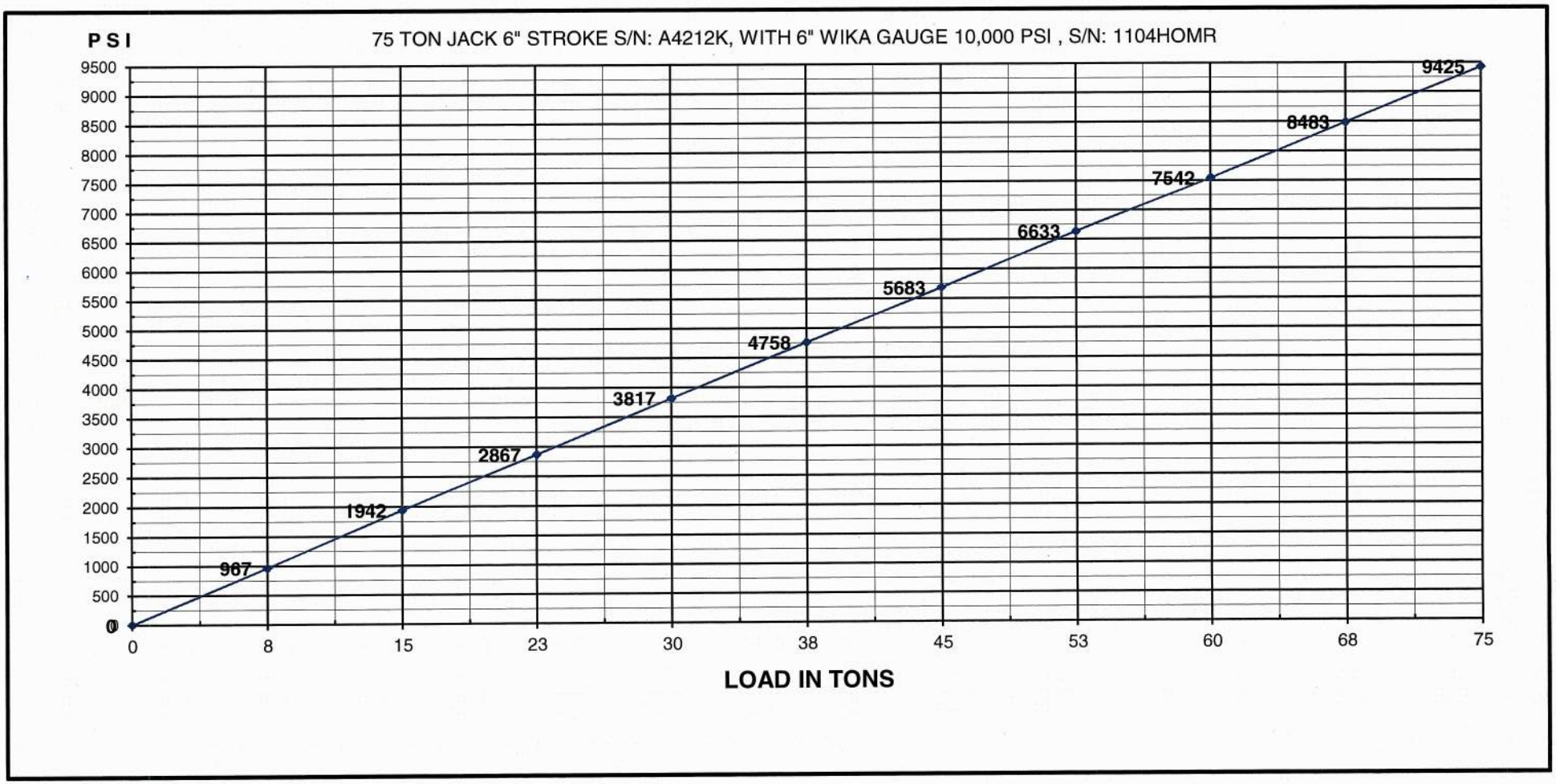
STANDARD LOAD (TONS)	GAUGE READINGS IN PSI AT PISTON EXTENSION OF						AVE GAUGE PRESSURE
	1.0	INCHES	**3.0**	INCHES	**5.0**	INCHES	
7.5	950		975		975		967
15.0	1925		1950		1950		1942
22.5	2900		2850		2850		2867
30.0	3800		3850		3800		3817
37.5	4800		4725		4750		4758
45.0	5700		5700		5650		5683
52.5	6650		6650		6600		6633
60.0	7575		7550		7500		7542
67.5	8500		8500		8450		8483
75.0	9500		9425		9350		9425

BY: _____

DATE: December 13, 2019

EXHIBIT D

Beerman Precision, Inc.
4206 Howard Ave. New Orleans, LA 70125
504-207-6023



Calibrated on 12/13/19

REPORT# 1575175

Date of Printing: 12/16/2019

EXHIBIT E

HOOD INFORMATION – Job#1687156

HOOD NO.	MODEL	LENGTH	MAX. COOKING TEMP.	EXHAUST PLENUM					TOTAL SUPPLY CFM	HOOD CONSTRUCTION	HOOD CONFIG.	
				TOTAL EXH. CFM	RISER(S)						END TO END	ROW
					WIDTH	LENG.	DIA.	CFM	S.P.			
1	4824 ND-2-PSP-F	8' 0.00"	600 Deg.	1600	10"	15"		1600	-0.566"	1280	430 SS Where Exposed	ALONE	ALONE

HOOD INFORMATION

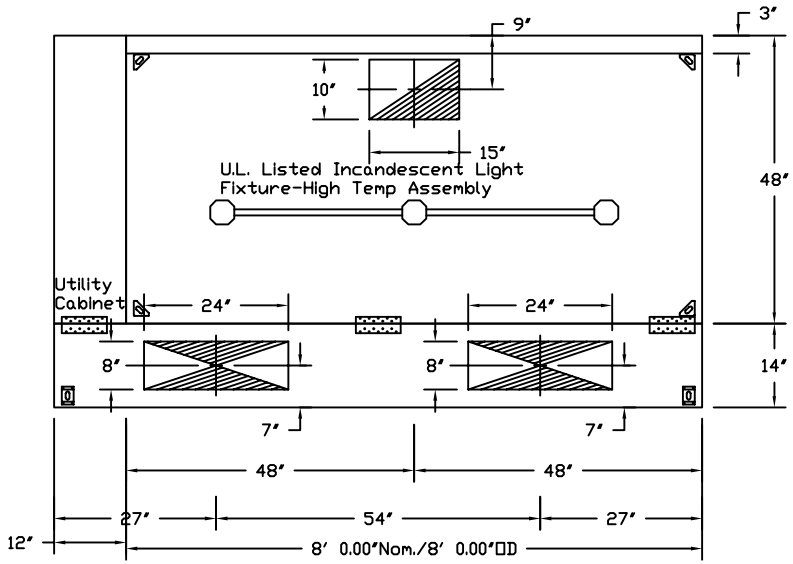
HOOD NO.	FILTER(S)				LIGHT(S)			UTILITY CABINET(S)					FIRE SYSTEM PIPING	HOOD HANGING WGHT
	TYPE	QTY.	HEIGHT	LENGTH	QTY.	TYPE	WIRE GUARD	LOCATION	FIRE SYSTEM TYPE	FIRE SYSTEM SIZE	ELECTRICAL MODEL #	SWITCHES QUANTITY		
1	Captrate Solo Filter w/	1	20"	16"	3	Incandescent Light Fixt	NO	Left	Ansul R102	3.0	EMS11102	1 Light 1 Fan 1 Other	YES	592 LBS
		4	20"	20"										

HOOD OPTIONS

HOOD NO.	OPTION
1	FIELD WRAPPER 18.00" High Front, Left, Right
	BACKSPLASH 80.00" High X 108.00" Long 430 SS

PERFORATED SUPPLY PLENUM(S)

HOOD NO.	POS.	LENGTH	WIDTH	HEIGHT	TYPE	RISER(S)				
						WIDTH	LENG.	DIA.	CFM	S.P.
1	Front	108"	14"	6"	MUA	8"	24"		640	0.274"
					MUA	8"	24"		640	0.274"



PLAN VIEW – Hood #1
8' 0.00" LONG 4824ND-2-PSP-F

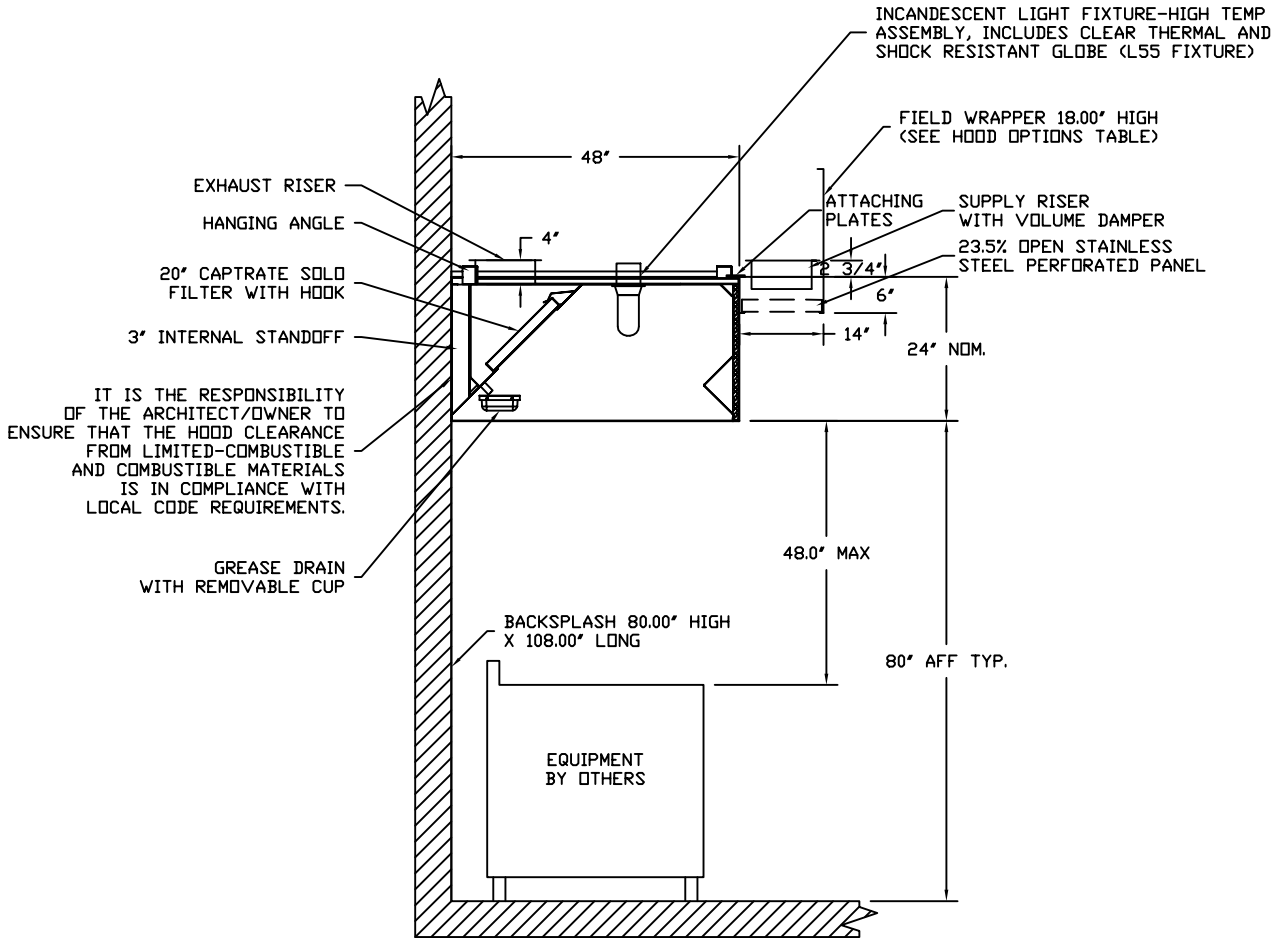
CUSTOMER APPROVAL TO MANUFACTURE:

Approved as Noted ☐
Approved with NO Exception Taken ☐
Revise and Resubmit ☐
SIGNATURE _____
Your Title _____ Date _____

CAPTIVE-AIRE

JOB	
LOCATION	MERIDIAN, MS
DATE 12/21/2012	JOB # 1687156
DWG # 1	DRAWN BY ASE
REV.	SCALE 3/8" = 1'-0"

EXHIBIT E



SECTION VIEW – MODEL 4824ND-2-PSP-F

CUSTOMER APPROVAL TO MANUFACTURE:

Approved as Noted	☐
Approved with NO Exception Taken	☐
Revise and Resubmit	☐

SIGNATURE _____

Your Title _____ Date _____

CAPTIVE-AIRE

JOB		
LOCATION	MERIDIAN, MS	
DATE	12/21/2012	JOB # 1687156
DWG #	2	DRAWN BY ASE
REV.		SCALE 3/8" = 1'-0"

EXHIBIT E

EXHAUST FAN INFORMATION – Job#1687156

FAN UNIT NO.	FAN UNIT MODEL #	MODEL	TAG	CFM	ESP.	RPM	H.P.	ø	VOLT	FLA	WEIGHT (LBS.)	SONES
1	NCA14FA	NCA14FA		1600	1.000	1157	0.500	3	208	1.8	114.14	12.6

MUA FAN INFORMATION – Job#1687156

FAN UNIT NO.	FAN UNIT MODEL #	BLOWER	HOUSING	TAG	CFM	ESP.	RPM	H.P.	ø	VOLT	FLA	WEIGHT (LBS.)	SONES
2	A1-G10	G10	A1		1280	0.500	702	0.500	3	208	1.8	225.99	11.8

FAN OPTIONS

FAN UNIT NO.	OPTION (Qty. - Descr.)
1	1 - Grease Box

FAN ACCESSORIES

FAN UNIT NO.	FAN UNIT TAG	EXHAUST			SUPPLY			
		GREASE CUP	GRAVITY DAMPER	WALL MOUNT	SIDE DISCHARGE	GRAVITY DAMPER	MOTORIZED DAMPER	WALL MOUNT
1		YES						

CURB ASSEMBLIES

NO.	ON FAN	WEIGHT	ITEM	SIZE
1	# 1	36 LBS	Curb	23.000"W x 23.000"L x 20.000"H 3.000:12.000 Pitch Vented Hinged
2	# 2	29 LBS	Curb	21.000"W x 21.000"L x 12.000"H 3.000:12.000 Pitch

CUSTOMER APPROVAL TO MANUFACTURE:

Approved as Noted ☐

Approved with NO Exception Taken ☐

Revise and Resubmit ☐

SIGNATURE _____

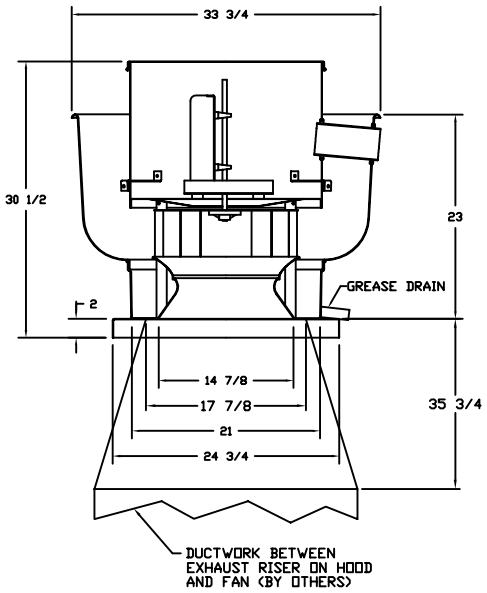
Your Title _____ Date _____

CAPTIVE-AIRE

JOB	
LOCATION MERIDIAN, MS	
DATE 12/21/2012	JOB # 1687156
DWG # 3	DRAWN BY ASE
REV.	SCALE 3/8" = 1'-0"

EXHIBIT E

FAN #1 NCA14FA - EXHAUST FAN



FEATURES:

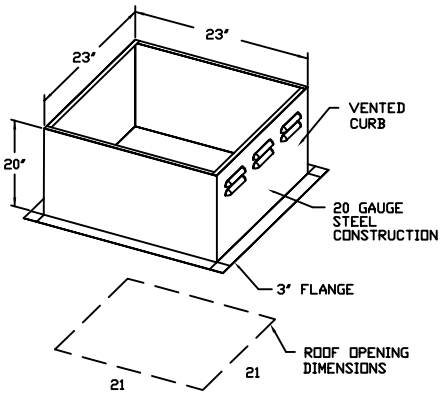
- ROOF MOUNTED FANS
- RESTAURANT MODEL
- UL705 AND UL762
- AMCA SOUND AND AIR CERTIFIED
- WIRING FROM MOTOR TO DISCONNECT SWITCH
- WEATHERPROOF DISCONNECT
- HIGH HEAT OPERATION 300°F (149°C)
- GREASE CLASSIFICATION TESTING

NORMAL TEMPERATURE TEST
EXHAUST FAN MUST OPERATE CONTINUOUSLY WHILE EXHAUSTING AIR AT 300°F (149°C) UNTIL ALL FAN PARTS HAVE REACHED THERMAL EQUILIBRIUM, AND WITHOUT ANY DETERIORATING EFFECTS TO THE FAN WHICH WOULD CAUSE UNSAFE OPERATION.

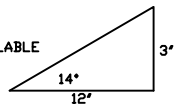
ABNORMAL FLARE-UP TEST
EXHAUST FAN MUST OPERATE CONTINUOUSLY WHILE EXHAUSTING BURNING GREASE VAPORS AT 600°F (316°C) FOR A PERIOD OF 15 MINUTES WITHOUT THE FAN BECOMING DAMAGED TO ANY EXTENT THAT COULD CAUSE AN UNSAFE CONDITION.

OPTIONS

GREASE BOX



PITCHED CURBS ARE AVAILABLE FOR PITCHED ROOFS.



SPECIFY PITCH:
EXAMPLE: 7/12 PITCH = 30° SLOPE

CUSTOMER APPROVAL TO MANUFACTURE:

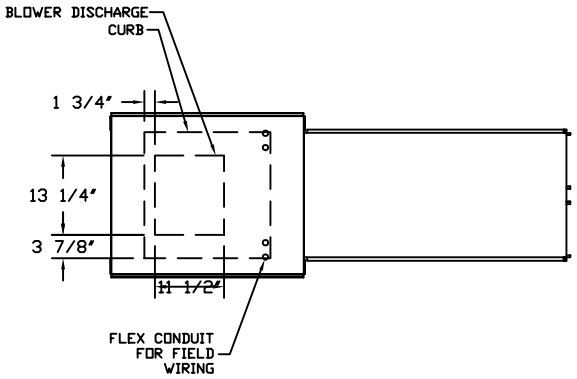
Approved as Noted ☐
Approved with NO Exception Taken ☐
Revise and Resubmit ☐
SIGNATURE _____
Your Title _____ Date _____

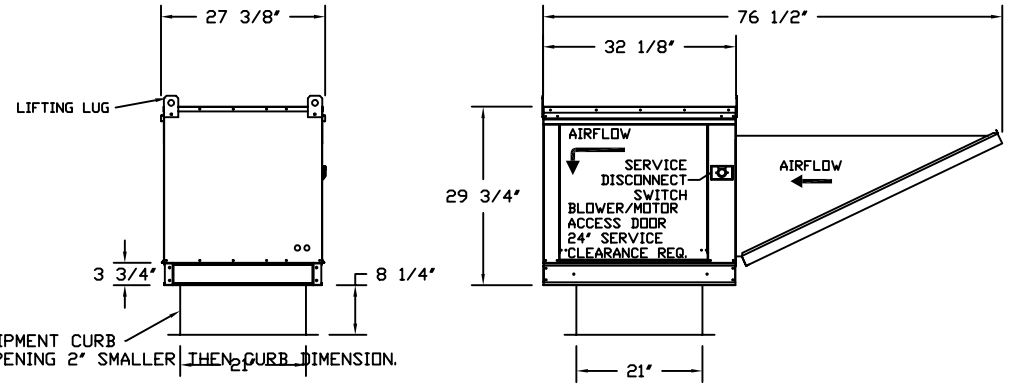
CAPTIVE-AIRE

JOB	
LOCATION MERIDIAN, MS	
DATE 12/21/2012	JOB # 1687156
DWG # 4	DRAWN BY ASE
REV.	SCALE 3/8" = 1'-0"

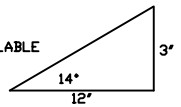
EXHIBIT E

FAN #2 A1-G10 - SUPPLY FAN
1. UNTEMPERED SUPPLY UNIT WITH 10" BLOWER IN SIZE #1 HOUSING
2. INTAKE HOOD WITH EZ FILTERS
3. DOWN DISCHARGE - AIR FLOW RIGHT -> LEFT





PITCHED CURBS ARE AVAILABLE FOR PITCHED ROOFS.



SPECIFY PITCH:
EXAMPLE: 7/12 PITCH = 30° SLOPE

CUSTOMER APPROVAL TO MANUFACTURE:

Approved as Noted ☐
Approved with NO Exception Taken ☐
Revise and Resubmit ☐
SIGNATURE _____
Your Title _____ Date _____

CAPTIVE-AIRE

JOB	
LOCATION MERIDIAN, MS	
DATE 12/21/2012	JOB # 1687156
DWG # 5	DRAWN BY ASE
REV.	SCALE 3/8" = 1'-0"

EXHIBIT E

ELECTRICAL PACKAGES – Job#1687156

NO.	TAG	PACKAGE #	LOCATION	SWITCHES		OPTION	FANS CONTROLLED				
				LOCATION	QUANTITY		TYPE	ø	H.P.	VOLT	FLA
1		EMS11102	Utility Cabinet Left	Utility Cabinet Left	1 Light	EMS 02: Exhaust in Fire, Lights out in Fire	Exhaust	3	0.500	208	1.8
				Hood # 1	1 Fan 1 Other						
							Supply	3	0.500	208	1.8

CUSTOMER APPROVAL TO MANUFACTURE:

Approved as Noted ☐

Approved with NO Exception Taken ☐

Revise and Resubmit ☐

SIGNATURE _____

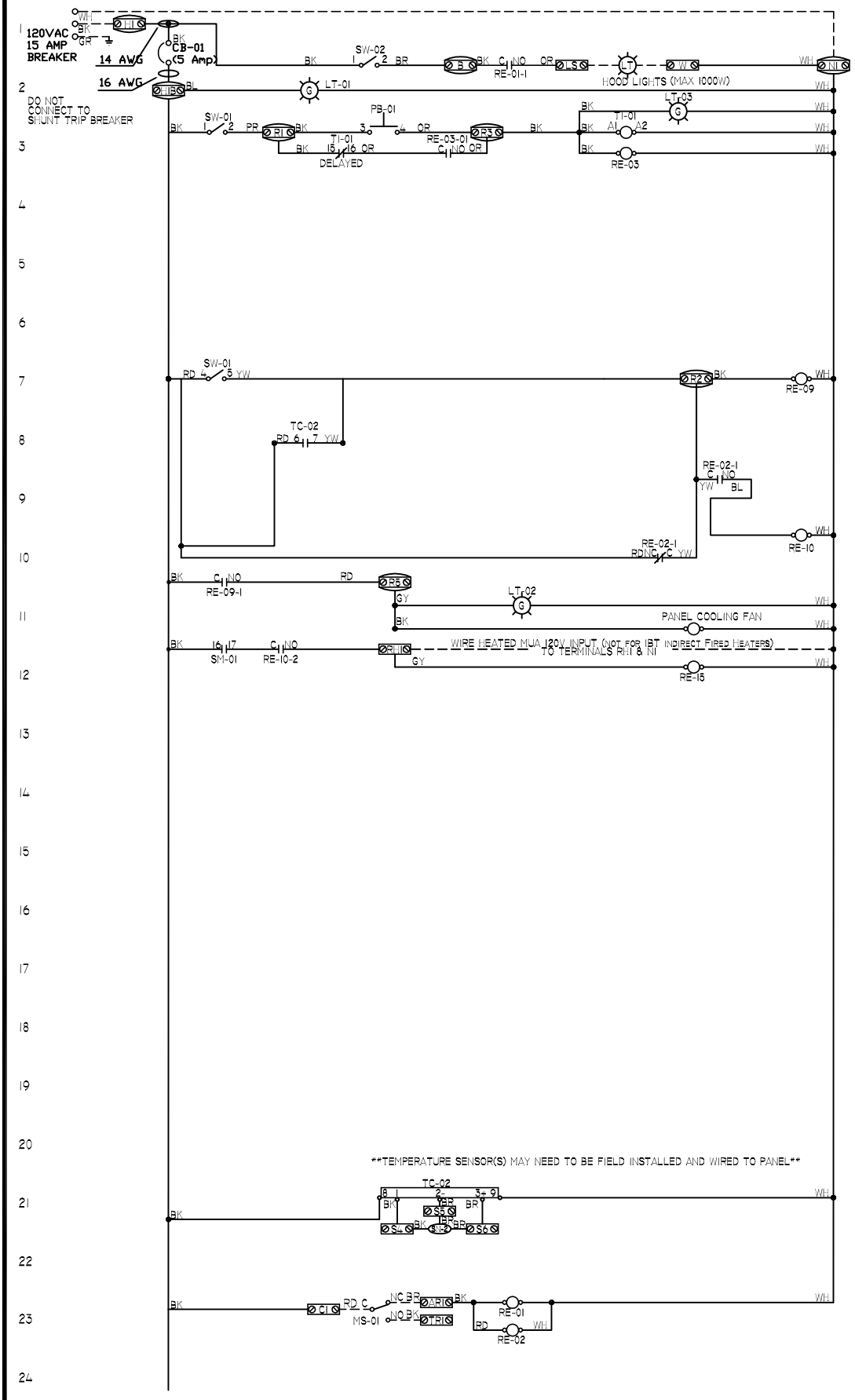
Your Title _____ Date _____

CAPTIVE-AIRE

JOB	
LOCATION MERIDIAN, MS	
DATE 12/21/2012	*JOB #* 1687156
DWG # 6	*DRAWN BY* ASE
REV.	*SCALE* 3/8" = 1'-0"

EXHIBIT E

ENERGY MANAGEMENT SYSTEM	JOB NAME *YWCA*	DATE *12/21/2012*
DRAWING NUMBER *EMS11102-1687156-#1-1*	JOB NUMBER *1687156*	MODEL **EMS11102**



PG. 1

20IN. X 18IN. X 8.6IN. BOX

INSTALLED OPTIONS

HOOD LIGHT SWITCH (MAX 1000 W)

EXHAUST ON IN FIRE

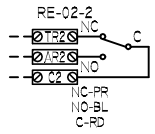
LIGHTS OUT IN FIRE

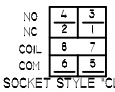
COMPONENT IDENTIFICATION

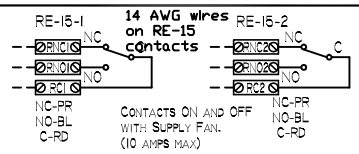
LABEL	DESCRIPTION	LOCATION
CB-01	CIRCUIT BREAKER UL489 (5 AMP)	[1]
LT-01	"POWER ON" LIGHT-PF50CG5-120VAC-W6	[2]
LT-02	"FANS ON" LIGHT-PF50CG5-120VAC-W6	[10]
LT-03	"100% OVERRIDE" LIGHT-PF50CG5-120VAC-W6	[2]
MS-XX	FIRE SYSTEM MICRO-SWITCH	[23]
PB-01	PUSH BUTTON OVERRIDE-D7-F2X11	[2]
RE-01	FIRE DPDT RELAY-34.110.0184.0	[26][27]
RE-02	FIRE DPDT RELAY-34.110.0184.0	[6][14]
RE-03	TIMER/PUSH BUTTON RELAY-34.110.0184.0	[2]
RE-09	FAN ON RELAY-34.110.0184.0	[5][28]
RE-10	SUPPLY FAN ON RELAY-34.110.0184.0	[5][28]
RE-15	RUN RELAY DPDT RELAY-34.110.0184.0	[9][18]
SM-01	SUP SPEED CONTROL-SMV SERIES	[27-31]
SM-02	EXH SPEED CONTROL-SMV SERIES	[32-35]
SN-XX	TEMPERATURE SENSOR - A/100-3W-P0-4"-EXPL	[21-22]
SW-01	FAN ON/AUTO SWITCH-RB24-2D1100	[2][29]
SW-02	HOOD LIGHT SWITCH-RB24-2D1100	[1]
TC-XX	TEMPERATURE CONTROLLER-PXR3 W/DIN RAIL MOUNT	[6-42]
TI-01	100% OVERRIDE TIMER (30 MINUTES)-RZ7-FSA4U023	[2][29]

SPARE RELAY CONTACTS

SPARE RELAY CONTACTS CAN BE USED TO CONTROL ITEMS REQUIRING SHUT DOWN WHEN THE FIRE SYSTEM DISCHARGES, SUCH AS SHUNT TRIPS, SIGNALS, ETC.







NOTES

- FIELD WIRING
- INTERNAL WIRING
- TERMINAL IN PANEL
- TERMINAL IN PANEL AND REMOTE

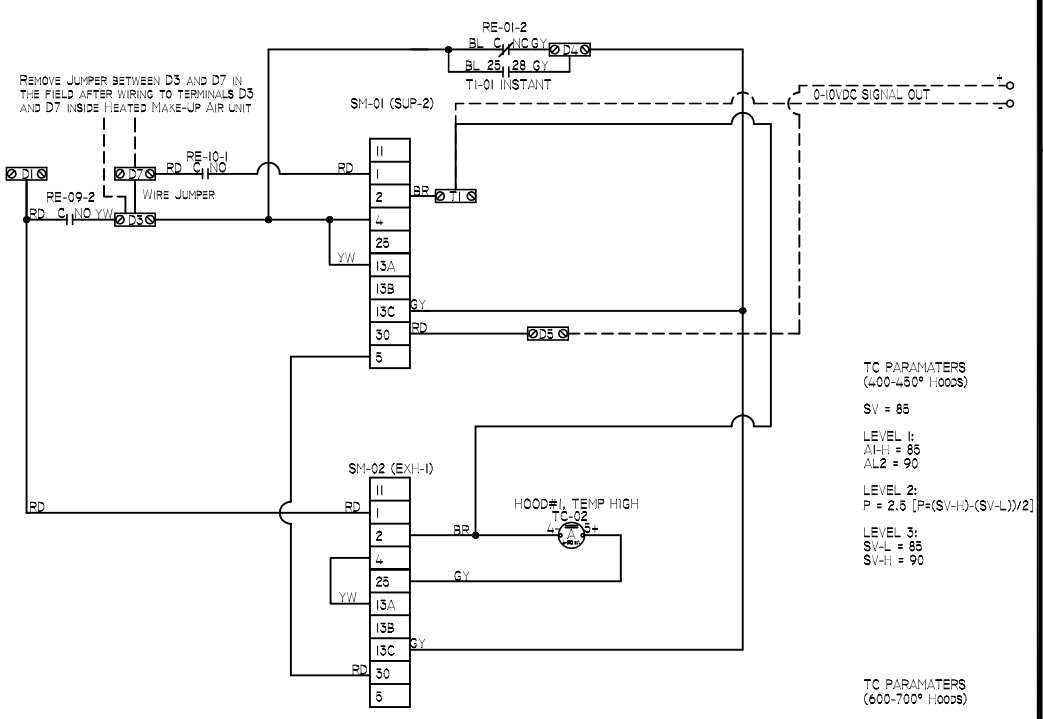
DRAWING SHOWN DE-ENERGIZED.

WIRE COLOR

BK - BLACK	YW - YELLOW
BL - BLUE	GR - GREEN
BR - BROWN	GY - GRAY
OR - ORANGE	OR/BL - ORANGE/BLUE (STRIPE)
RD - RED	BL/RD - BLUE/RED (STRIPE)
WH - WHITE	RD/GN - RED/GREEN (STRIPE)
PR - PURPLE	
PK - PINK	

EXHIBIT E

ENERGY MANAGEMENT SYSTEM	JOB NAME *YWCA*	DATE *12/21/2012*
DRAWING NUMBER *EMS11102-1687156-#1-2*	JOB NUMBER *1687156*	MODEL **EMS11102**



TC PARAMATERS
(400-450° Hoods)

SV = 85

LEVEL 1:
AI-H = 85
AL2 = 90

LEVEL 2:
P = 2.5 [P=(SV-H)-(SV-L))/2]

LEVEL 3:
SV-L = 85
SV-H = 90

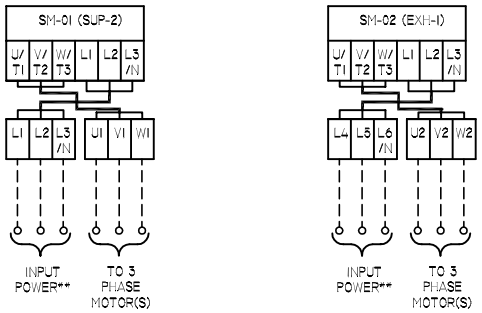
TC PARAMATERS
(600-700° Hoods)

SV = 85

LEVEL 1:
AI-H = 85
AL2 = 130

LEVEL 2:
P = 22.5 [P=(SV-H)-(SV-L))/2

LEVEL 3:
SV-L = 85
SV-H = 130



ALL EXTERNAL CONTROL WIRES TO MOTOR SPEED CONTROL SHOULD BE 16-20 AWG SHIELDED MULTICONDUCTOR CABLES AND MUST NOT BE RUN IN THE SAME CONDUIT OR RACEWAY WITH ANY HIGH POWER WIRING. GROUND SHIELDED CABLE AT THE DRIVE CHASIS ONLY.

PG. 14 OF THE AC TECH SMV DRIVE MANUAL DESCRIBES THE ELECTRICAL INSTALLATION.

PG. 23 OF THE AC TECH SMV DRIVE MANUAL DESCRIBES THE PARAMETER SETTINGS OF THE DRIVE.

**3 PHASE INPUT,
USE L1, L2, L3.
1 PHASE 240 VAC INPUT,
USE L1 & L2 ONLY.
1 PHASE 120 VAC INPUT,
USE L1 & N ONLY.

INSTALLED OPTIONS

HOOD LIGHT SWITCH (MAX 1000 W)
EXHAUST ON IN FIRE

LIGHTS OUT IN FIRE

COMPONENT IDENTIFICATION

LABEL	DESCRIPTION	LOCATION
RE-01	DPDT RELAY-34.110.0184.0	[23][29]
RE-09	FAN ON RELAY-34.110.0184.0	[5][28]
RE-10	SUPPLY FAN ON RELAY-34.110.0184.0	[5][28]
SM-01	SUP SPEED CONTROL-SMV SERIES	[27-31]
SM-02	EXH SPEED CONTROL-SMV SERIES	[32-35]
TC-XX	TEMPERATURE CONTROLLER-PXR3 W\DIN RAIL MOUNT	

GENERAL DRIVE PARAMETER SETTINGS (PW = 225)

SUPPLY FAN DRIVE
EPM PROGRAM #11

P100 - 01 (TERM STRIP)
P101 - 03 (PRESET #1)
P102 - 0 HZ (MIN FREQ)
P103 - 60 HZ (MAX FREQ)
P104 - 30 SEC. (ACCEL TIME)
P105 - 30 SEC. (DECEL TIME)
P110 - 03 (AUTO RESTART)
P121 - 01 (0 - 10 VDC)
P122 - 03 (PRESET SPEED #2)
P123 - 03 (PRESET SPEED #3)
P132 - 0 HZ (WASH CYCLE FREQ)
P133 - 60 HZ (MUST MATCH P103)
P136 - 60 HZ (MUST MATCH P103)
P140 - 03 (FAULT)
P142 - 10 (LOSS OF LOAD)
P144 - 00 (NO INVERSE P140)
P145 - 01% (ADJUST @ STARTUP)
P146 - 60 SEC (LOSS LOAD DELAY)
P150 - 01 (0-10 VDC OUTPUT)
P151 - 00 (NO OUTPUT ADDITION)
P152 - 60 HZ (FREQ SCALING)
P160 - 0 HZ (MIN SIGNAL SPEED)
P161 - 60 HZ (MAX SIGNAL SPEED)
(MUST MATCH P103)
P166 - 0 (CARRIER FREQ = 4 KHZ)
P171 - 150 (CURRENT LIMIT = 150 %)

EXHAUST FAN DRIVE(S)
EPM PROGRAM #04

P100 - 01 (TERM STRIP)
P101 - 03 (PRESET #1)
P102 - 0 HZ (MIN FREQ)
P103 - 60 HZ (MAX FREQ)
P104 - 30 SEC. (ACCEL TIME)
P105 - 30 SEC. (DECEL TIME)
P110 - 03 (AUTO RESTART)
P121 - 02 (4-20 MA)
P122 - 03 (PRESET SPEED #2)
P123 - 03 (PRESET SPEED #3)
P132 - 15 HZ (WASH CYCLE FREQ)
P133 - 60 HZ (MUST MATCH P103)
P136 - 60 HZ (MUST MATCH P103)
P140 - 01 (RUN)
P144 - 00 (NO INVERSE P140)

P150 - 01 (0-10 VDC OUTPUT)
P151 - 01 (ADD TB-5 TO TB-30)
P152 - 60 HZ (=P161*#EXH FANS)
P160 - 48 HZ (MIN SIGNAL SPEED)
P161 - 60 HZ (MAX SIGNAL SPEED)
(MUST MATCH P103)
P166 - 0 (CARRIER FREQ = 4 KHZ)
P171 - 150 (CURRENT LIMIT = 150 %)

ADJUST MANUALLY ON ALL DRIVES
P107 - 00 (IF 120 OR 208 VAC) OR 01 (IF 230, 480 OR 575 VAC)
P108 - MOTOR FLA X 100 / DRIVE OUTPUT RATING

SPEED #	TB-13A	TB-13B	TB-13C
2 (P132)	OPEN	CLOSED	OPEN
3 (P133)	OPEN	OPEN	CLOSED
6 (P136)	OPEN	CLOSED	CLOSED

MOTOR INFORMATION

MOTOR	TAG	PH	VOLT	HP	FLA	BRK
SUP-2		3	208	0.5	1.8	15A
EXH-1		3	208	0.5	1.8	15A

NOTES

FIELD WIRING
INTERNAL WIRING
TERMINAL IN PANEL
TERMINAL IN PANEL AND REMOTE
DRAWING SHOWN DE-ENERGIZED.

WIRE COLOR

BK - BLACK
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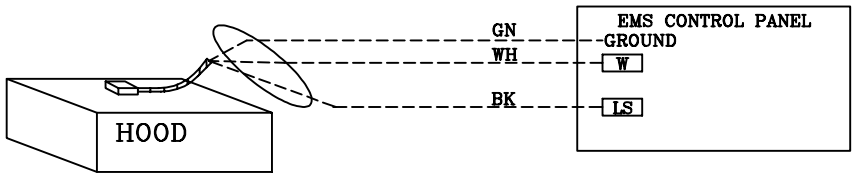
GY - GRAY
OR/BL - ORANGE/BLUE (STRIPE)
BL/RD - BLUE/RED (STRIPE)
RD/GN - RED/GREEN (STRIPE)

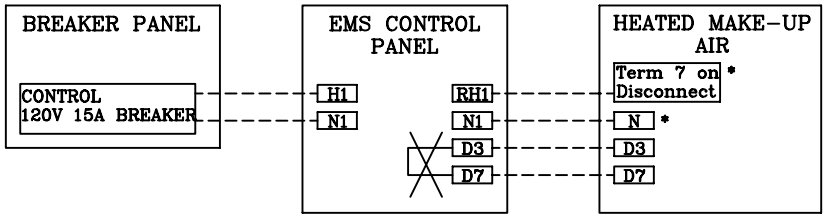
EXHIBIT E

MODULATING EMS INSTALLATION	JOB NAME *YWCA*	DATE *12/21/2012*
DRAWING NUMBER *EMS11102-1687156-#1-3*	JOB NUMBER *1687156*	MODEL **EMS11102**

HOOD LIGHTS TO CONTROL PANEL



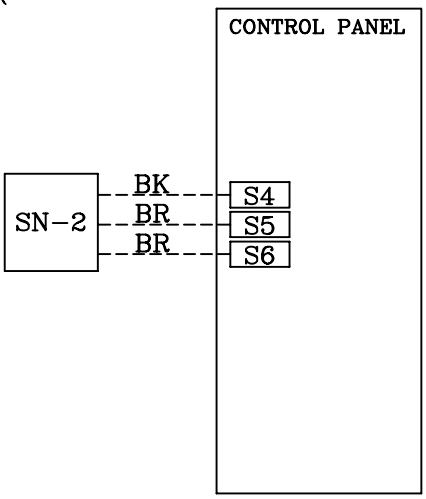
POWER FEED FOR CONTROLS AND LIGHTING



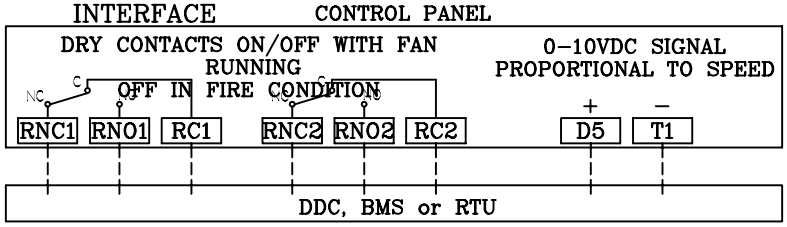
REMOVE JUMPER BETWEEN D3 AND D7 IN EMS IN THE FIELD AFTER WIRING TO TERMINALS D3 AND D7 INSIDE HEATED MAKE-UP AIR UNIT

* DO NOT WIRE WHEN IBT HEATER

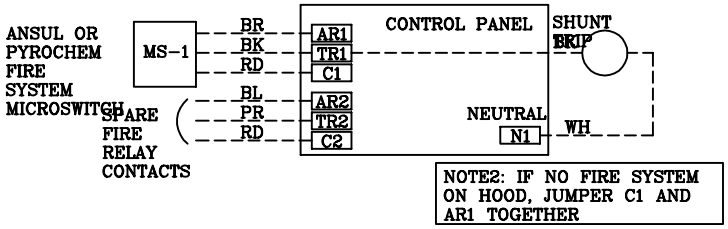
TEMPERATURE SENSOR WIRING (IF FIELD INSTALLED BY ELECTRICIAN)



DDC, BUILDING MANAGEMENT OR RTU INTERFACE



FIRE SYSTEM MICROSWITCH WIRING TO CONTROL PANEL

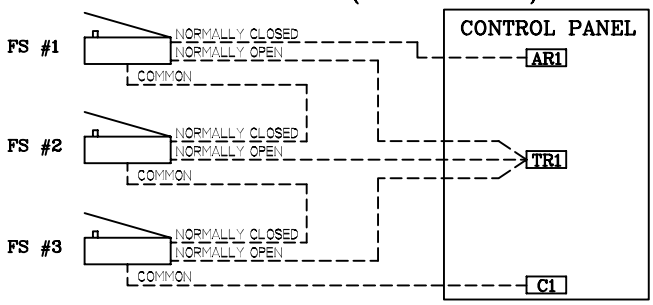


NOTE2: IF NO FIRE SYSTEM ON HOOD, JUMPER C1 AND AR1 TOGETHER

NOTE1: BUILDING FIRE ALARM IS TO BE WIRED TO THE "ALARM INITIATING SWITCH" INSIDE THE FIRE SYSTEM AUTOMAN

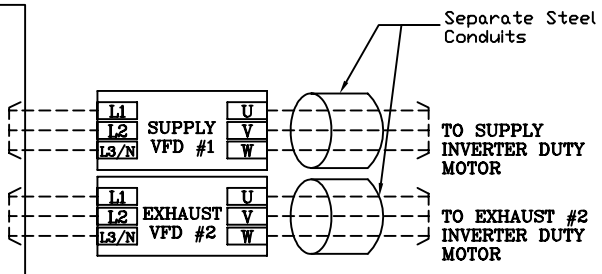
120VAC SHUNT TRIP BREAKER WIRING

MICRO-SWITCHES WIRING WHEN MULTIPLE FIRE SYSTEMS CONNECTED TO ONE EMS PANEL (3 SHOWN HERE)

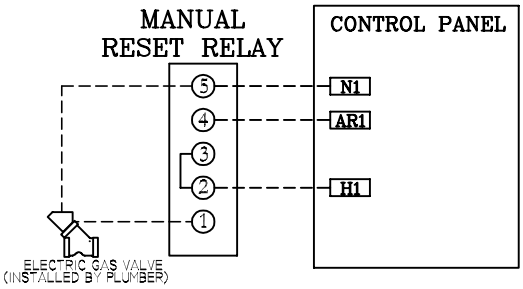


FAN WIRING TO CONTROL PANEL

FAN BREAKER PANEL, SEE DRAWING MOTOR TABLE FOR BREAKER SIZING



ELECTRIC GAS VALVE WITH RESET RELAY



NOTE:
3 PHASE INPUT, USE L1, L2, L3.
1 PHASE 240 VAC INPUT, USE L1 & L2 ONLY.
1 PHASE 120 VAC INPUT, USE L1 & N ONLY.

NOTES

----- DENOTES FIELD WIRING
——— DENOTES INTERNAL WIRING

WIRE COLOR

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OR - ORANGE	OR/BL - ORANGE/BLUE (STRIPE)
RD - RED	BL/RD - BLUE/RED (STRIPE)
WH - WHITE	RD/GN - RED/GREEN (STRIPE)
GN - GREEN	

YWCA
NEW ORLEANS
Celebrating 100 Years of Service

YWCA of New Orleans
New Daycare, Education and Counseling Building

601-605 Norman C. Francis Parkway (aka S. Jefferson Davis Parkway), New Orleans, Louisiana 70119

Project Manual
Specifications

Owner
YWCA of New Orleans

Architect
Trapolin-Peer Architects, A Professional Corporation
850 Tchoupitoulas Street
New Orleans, Louisiana 70130

ISSUE DATE: 7/12/2023
AS AMENDED 11/12/2024 & 06/18/2025

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DIVISION 32 – EXTERIOR IMPROVEMENTS
321244 POROUS UNIT PAVING

321313 CONCRETE PAVING
321373 PAVEMENT JOINT SEALANTS
321713 PARKING BUMPERS
321726 TACTILE WARNING SURFACING
321816 PLAYGROUND PROTECTIVE SURFACING
323115 WOOD FENCES AND GATES
323119 DECORATIVE METAL FENCES AND GATES
329200 TURFGRASSES
329300 PLANTING

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EXHIBIT B GEOTECHNICAL REPORT (EUSTIS ENGINEERING SERVICES, LLC)
EXHIBIT C EXISTING PRIVY AND CISTERN LOCATIONS (R.CHRISTOPHER GOODWIN & ASSOCIATES)
EXHIBIT D PILE LOAD TEST REPORT (STRATUM ENGINEERING, LLC)
EXHIBIT E HOOD DRAWINGS (CAPTIVE AIRE)

SECTION 00100

INVITATION TO BIDDERS

Landmark Consulting is seeking bids from qualified General Contractors for the following project:

YWCA of Greater New Orleans
New Daycare, Education and Counseling Building
601 S. Norman C. Francis Parkway (aka S. Jefferson Davis Parkway)
New Orleans, LA 70119
Project Number: CN09418

All bids are due on or before July 22, 2025 at 2:00pm CDT.

In accordance with LA RS 38: 2212.E(6), bids for this project must be submitted electronically via upload to CENTERLINE BidConnect (www.centerlinebidconnect.com). Each bid shall be accompanied by a bid security in the form of a bid bond equal to **5% of the amount of the bid** submitted as evidence of good faith of the Bidder. If a scanned copy of a Bid Bond is uploaded, the original notarized bid bond must be produced "on-demand" per the Owner's request.

Questions about this procedure should be directed to CENTERLINE (phone 504-291-5738, email: bidconnect@centerline.co).

Complete Bidding Documents for this project are being distributed in electronic form on behalf of the Owner by CENTERLINE BidConnect. They may be obtained without charge and without deposit from the Public Plan Room at www.centerlinebidconnect.com . Printed copies are not available from the Owner or Designer but arrangements can be made to obtain them through most reprographic firms. Plan holders are responsible for their own reproduction costs.

A NON MANDATORY PRE-BID MEETING WILL BE HELD
AT 2:00PM CDT ON JULY 01, 2025 VIA ZOOM WEB CONFERENCE

Join Zoom Meeting
https://us06web.zoom.us/j/82808550949?pwd=wXT3sW9zeUc3xLg8FSLnbbCP4o2tfg.1

Meeting ID: 828 0855 0949
Passcode: 815689

Bids shall be accepted from Contractors who are licensed under L.A. R.S. 37:2150-2163 for the classification of **BUILDING CONSTRUCTION.** Bidder is required to comply with provisions and requirements of LA R.S.38:2212 (A)(1)(c). No bid may be withdrawn for a period of ninety days (90) days after receipt of bids, except under the provisions of LA. R.S. 38:2214.

YWCA of Greater New Orleans reserves the right to reject any and all bids for just cause. In accordance with LA. R.S. 38:2212 (A)(1)(b), the provisions and requirements of this Section, those stated in the advertisement bids, and those required on the bid form shall not be considered as informalities and shall not be waived by any public entity.

Attention of Bidders is called particularly to the requirements for conditions of employment to be observed and minimum wages rates to be paid under the Contract (Davis-Bacon Act), Section 3

(Low Income Resident Participation) of the Housing and Urban Development Act of 1968, Section 109 (Non-Discrimination) of Housing and Community Development Act of 1974, Section 503 (Non-Discrimination Against Employees with Disabilities) and Section 504 (Non-Discrimination Against Individuals with Disabilities) of the Rehabilitation Act of 1973, Segregated Facilities, Executive Order 11246, and all applicable laws and regulations of the Federal government and State of Louisiana and bonding and insurance requirements.

Minority owned firms, small businesses, and/or Section 3 businesses are encouraged to participate.

YWCA Greater New Orleans is an equal opportunity employer.

Any person with disabilities required special accommodations must contact the YWCA Greater New Orleans no later than seven (7) days prior to bid opening.

Successful bidder must have an active Unique Entity ID (UEI), as verified on www.sam.gov, prior of award of contract.

SECTION 00200

INSTRUCTIONS TO BIDDERS

COMPLETION TIME:

The Bidder shall agree to substantially complete the contract within, three hundred sixty five (__365_____) consecutive calendar days, subject to such extensions as may be granted under Paragraph 8.3, in the General Conditions and the Supplementary Conditions, and acknowledges that this construction time will start on or before the date specified in the written "Notice to Proceed" from the Owner. Completion date will be enforced by a liquidated damages clause. Bidders are to allow for the average number of rain days in their bid. Weather delays above the average will be allowed.

LIQUIDATED DAMAGES:

The Bidder shall agree to pay as Liquidated Damages the amount of (One Thousand five hundred) Dollars ($ 1500.00) for each consecutive calendar day for which the work is not complete, beginning with the first day beyond the completion date stated on the "Notice to Proceed".

ARTICLE 1

DEFINITIONS

1.1 The Bidding Documents include the following:

Invitation to bidders
Instructions to Bidders
Bid Form
Bid Bond
Standard form of agreement between Owner and Contractor
Amendment A and Exhibit C, D & E
Exhibit B- CDBG Compliance Requirements
Exhibits C, D & E
General Conditions of the Contract for Construction, AIA Document A201, 2017 Edition
Supplementary Conditions
Performance and Payment Bond
Non-Collusion Affidavit
Attestation Affidavit
Notice of Construction Contract
Notice of Termination of Work
Contactor's conditional waiver of lien form
Contractor's unconditional waiver of lien form
Roofing guarantee r-1
Roofing guarantee r-2
Roofing guarantee r-3

Change order form
Davis bacon wage list for Orleans Parish
Payroll Reporting
Disadvantaged Business Enterprise (DBE)
Wage list for contactor
Substitution form (during bidding)
Submittal transmittal form
Subcontractors and material suppliers list
Substitution form (after bidding)
Request for interpretation form
Punch list form
Recommendation of Acceptance
Certificate of Compliance with ADA and ABAAG
Specifications & Drawings
Addenda issued during the bid period and
acknowledged in the Bid Form

1.2 All definitions set forth in the General Conditions of the Contract for Construction, AIA Document A201, or in other Contract Documents are applicable to the Bidding Documents.

1.3 Addenda are written and/or graphic instruments issued by the Architect prior to the opening of bids which modify or interpret the Bidding Documents by additions, deletions, clarifications, corrections and prior approvals.

1.4 A bid is a complete and properly signed proposal to do the work or designated portion thereof for the sums stipulated therein supported by data called for by the Bidding Documents.

1.5 Base bid is the sum stated in the bid for which the Bidder offers to perform the work described as the base, to which work may be added, or deleted for sums stated in alternate bids.

1.6 An alternate bid (or alternate) is an amount stated in the bid to be added to the amount of the base bid if the corresponding change in project scope or materials or methods of construction described in the Bidding Documents is accepted.

1.7 A Bidder is one who submits a bid for a prime Contract with the Owner for the work described in the proposed Contract Documents.

1.8 A Sub-bidder is one who submits a bid to a Bidder for materials and/or labor for a portion of the work.

1.9 Where the word "Architect" is used in any of the documents, it shall refer to the Prime Designer of the project, regardless of discipline

ARTICLE 2

PRE-BID CONFERENCE

2.1 A Pre-Bid Conference shall be held via web conference at least **10 days before the date** for receipt for bids. The Owner's Project Manager shall coordinate the setting of the date, time and place for the Pre-Bid Conference with the User Agency and shall invite in writing the Owner, User Agency, and all who have received sets of the Bidding Documents to attend.

2.1 A Pre-Bid Conference shall be held via Zoom at 2:00pm CDT on July 1, 2025.

To Join the Prebid Zoom Meeting:
https://us06web.zoom.us/j/82808550949?pwd=wXT3sW9zeUc3xLg8FSLnbbCP4o2tfg.1

Meeting ID: 828 0855 0949
Passcode: 815689

The purpose of the Pre-Bid Conference is to familiarize Bidders with the requirements of the Project and the intent of the Contract Documents, and to receive comments and information from interested Bidders. The Pre-Bid Conference is stated in the Advertisement for Bids to be a Non-Mandatory Pre-Bid Conference.

2.2 Any revision of the Bidding Documents made as a result of the Pre-Bid Conference shall not be valid unless included in an addendum.

ARTICLE 3

BIDDER'S REPRESENTATION

3.1 Each Bidder by making his bid represents that:

3.1.1 He has read and understands the Bidding Documents and his bid is made in accordance therewith.

3.1.2 He has visited the site and has familiarized himself with the local conditions under which the work is to be performed.

3.1.3 His bid is based solely upon the materials, systems and equipment described in the Bidding Documents as advertised and as modified by addenda.

3.1.4 His bid is not based on any verbal instructions contrary to the Contract Documents and addenda.

3.2 The Bidder must be fully qualified under any State or local licensing law for Contractors in effect at the time and at the location of the work before submitting his bid. In the State of Louisiana, Revised Statutes 37:2150, et seq. will be considered, if applicable.

The Contractor shall be responsible for determining that all of his Sub-bidders or prospective Subcontractors are duly licensed in accordance with law.

ARTICLE 4

BIDDING DOCUMENTS

4.1 Copies

4.1.1 Bidding Documents are being distributed in electronic form on behalf of the Owner by CENTERLINE BidConnect. They may be obtained without charge and without deposit from the Public Plan Room at www.centerlinebidconnect.com . Printed copies are not available from the Owner or Designer but arrangements can be made to obtain them through most reprographic firms. Plan holders are responsible for their own reproduction costs. Questions about this procedure shall be directed to: CENTERLINE. Phone: 504-291-5738, Email: bidconnect@centerline.co.

4.1.2 Complete sets of Bidding Documents shall be used in preparing bids; neither the Owner nor the Architect assume any responsibility for errors or misinterpretations resulting from the use of incomplete sets of Bidding Documents.

4.1.3 The Owner or Architect in making copies of the Bidding Documents available on the above terms, do so only for the purpose of obtaining bids on the work and do not confer a license or grant for any other use.

4.2 Interpretation or Correction of Bidding Documents

4.2.1 Bidders shall promptly notify the Architect of any ambiguity, inconsistency or error which they may discover upon examination of the Bidding Documents or of the site and local conditions.

4.2.2 Bidders requiring clarification or interpretation of the Bidding Documents shall make a formal request to the Architect, to reach him at least seven days prior to the date for receipt of bids.

4.2.3 Any interpretation, correction or change of the Bidding Documents will be made by addendum. Interpretations, corrections or changes of the Bidding Documents made in any other manner will not be binding, and Bidders shall not rely upon such interpretations, corrections and changes.

4.3 Substitutions

4.3.1 The materials, products and equipment described in the Bidding Documents establish a standard of required function, dimension, appearance and quality to be met by any proposed substitution. No substitution shall be allowed after building.

4.3.2 No substitution will be considered unless written request for approval has been submitted by the Proposer and has been received by the Architect at least seven (7) working days prior to the date for receipt of bids. (RS38:2295C) Each such request shall include the name of the material or equipment for which it is to be substituted and a complete description of the proposed substitute including model numbers, drawings, cuts, performance and test data and any other information necessary for an evaluation. A statement setting forth any changes in other materials, equipment of work that incorporation of the substitute would require shall be included. It shall be the responsibility of the proposer to include in his proposal all changes required of the Contract Documents if the proposed product is used. Prior approval is given contingent upon supplier being responsible for any costs which may be necessary to modify the space or facilities needed to accommodate the materials and equipment approved.

4.3.3 If the Architect approves any proposed substitution, such approval will be set forth in an addendum. Bidders shall not rely upon approvals made in any other manner.

4.4 Addenda

4.4.1 Addenda will be delivered via CENTERLINE BidConnect to all registered Plan Holders.

4.4.2 Copies of addenda will be made available for inspection wherever Bidding Documents are on file for that purpose.

4.4.3 Except as described herein, addenda shall not be issued within a period of seventy-two (72) hours prior to the advertised time for the opening of bids, excluding Saturdays, Sundays, and any other legal holidays. If the necessity arises of issuing an addendum modifying plans and specifications within the seventy-two (72) hour period prior to the advertised time for the opening of bids, then the opening of bids may be extended as determined by the Architect or Owner.

4.4.4 Each Bidder shall ascertain from the Architect prior to submitting his bid that he has received all addenda issued, and he shall acknowledge their receipt on the Bid Form.

4.4.5 The Owner shall have the right to extend the bid date by up to (30) thirty days. Any such extension shall be made by addendum issued by the Architect.

ARTICLE 5

BIDDING PROCEDURE

5.1 Form and Style of Bids

5.1.1 Bids shall be submitted on the forms provided by the Architect.

5.1.2 All blanks on the Bid Form shall be filled in by typewriter or manually in ink.

5.1.3 Bid sums shall be expressed in both words and figures, and in case of discrepancy between the two, the written words shall govern.

5.1.4 Any interlineation, alteration or erasure must be initialed by the signer of the bid or his authorized representative.

5.1.5 Bidders are cautioned to complete all alternates should such be required in the Bid Form.

5.1.6 Bidder shall make no additional stipulations on the Bid Form nor qualify his bid in any other manner.

5.1.7 The bid shall include the legal name of Bidder and shall be signed by the person or persons legally authorized to bind the Bidder to a Contract.
The authority of the signature of the person submitting the bid shall be deemed sufficient and acceptable under any of the following conditions:
(a) Signature on bid is that of any corporate officer or member of a partnership or partnership in commendam listed on most current annual report on file with Secretary of State.
(b) Signature on bid is that of authorized representative of corporation, partnership, or other legal entity and bid is accompanied by corporate resolution, certification as to the corporate principal, or other documents indicating authority.
(c) Corporation, partnership, or other legal entity has filed in the records of the Secretary of State, an affidavit, resolution or other acknowledged or authentic document indicating the names of all parties authorized to submit bids for public contracts. A bid submitted by an agency shall have a current Power of Attorney attached certifying agent's authority to bind Bidder. The name and license number on the envelope shall be the same as on the Bid Form.

5.1.8 On any bid in excess of fifty thousand dollars ($50,000.00), the Contractor shall certify that he is licensed under R.S. 37: 2150-2173 and show his license number on the bid above his signature or his duly authorized representative.

5.2 Bid Security

Bid Security: Attached is the bid security equal to 5% of the amount of the bid and must be in the form of a cashier’s check or certified check. The bid security is to become the property of the Owner in the event the Contract and Bond are not executed within the time set forth, as Liquidated Damages for the delay and additional work caused thereby. If the bid security attached to this proposal is a Bond, then such Bond shall be submitted on the Bid Bond Form in this addendum, and Surety shall meet the qualifications set forth therein.

If the bid security attached to this proposal is a Bond, then such Bond shall be submitted on the Bid Bond Form included in this addendum, and Surety shall meet the qualifications set forth therein.

5.3 Submission of Bids

5.3.1 In accordance with LA RS 38: 2212.E(6), bids for this project must be submitted electronically via upload to CENTERLINE BidConnect (www.centerlinebidconnect.com). CENTERLINE BidConnect provides a time-stamped receipt email to Bidders upon successful completion of the bid submission, along with a time-stamped, logged entry on the site displaying the bid submission.

5.3.2 Bids shall be uploaded to CENTERLINE BidConnect prior to the time on the date for receipt of bids indicated in the Advertisement for Bids, or any extension thereof made by addendum.

5.3.3 Bidder shall assume full responsibility for timely upload of all Bid Documents for receipt of bids.

5.3.4 Oral, telephonic or telegraphic bids are invalid and shall not receive consideration. Owner shall not consider notations written on outside of bid envelope which have the effect of amending the bid. Written modifications enclosed in the bid envelope, and signed or initialed by the Contractor or his representative, shall be accepted.

5.4 Modification or Withdrawal of Bid

5.4.1 A bid may not be modified, withdrawn or canceled by the Bidder during the time stipulated in the Advertisement for Bids, for the period following the time and bid date designated for the receipt of bids, and Bidder so agrees in submitting his bid, except in accordance with R.S. 38:2214 which states, in part, "Bids containing patently obvious mechanical, clerical or mathematical errors may be withdrawn by the Contractor if clear and convincing sworn, written evidence of such errors is furnished to the owner within forty-eight hours of the Bid Opening excluding Saturdays, Sundays and legal holidays".

5.4.2 Prior to the time and date designated for receipt of bids, bids submitted early may be modified or withdrawn only by notice to the party receiving bids at the place and prior to the time designated for receipt of bids.

5.4.3 Withdrawn bids may be resubmitted up to the time designated for the receipt of bids provided that they are then fully in conformance with these Instructions to Bidders.

5.4.4 Bid Security shall be in an amount sufficient for the bid as modified or resubmitted.

ARTICLE 6

CONSIDERATION OF BIDS

6.2 Rejection of Bids

6.2.1 Owner will select proposal most advantageous to them from the standpoints of time and money. He reserves the right to reject all bids and waive all formalities if such is in his interest, including selecting a bid not necessarily the lowest. The Owner shall have the right to reject any or all bids and in particular to reject a bid not accompanied by a required bid security or data required by the Bidding Documents or a bid in any way incomplete or irregular.

6.3 Acceptance of Bid

6.3.2 It is the intent of the Owner, if he accepts any alternates, to accept them in the order in which they are listed in the Bid Form. Determination of the Low Bidder shall be on the basis of the sum of the base bid and the alternates accepted. However, the Owner shall reserve the right to accept alternates in any order which does not affect determination of the Low Bidder.

ARTICLE 7

POST-BID INFORMATION

7.1 Submissions
7.1.1 At the Pre-Construction Conference, the Contractor shall submit the following information to the Architect.

7.1.1.1 A designation of the work to be performed by the Contractor with his own forces.

7.1.1.2 An acceptable breakdown of the Contract cost attributable to each item listed in the Schedule of Values Form (attached). No payments will be made to the Contractor until this is received.

7.1.1.3 The proprietary names and the suppliers of principal items or systems of material and equipment proposed for the work.

7.1.1.4 A list of names and business domiciles of all Subcontractors, or other persons or organizations for the principal portions of the work. It is the preference of the Owner that, to the greatest extent possible or practical, the Contractor utilize Louisiana Subcontractors and labor.

7.1.2 The Contractor will be required to establish to the satisfaction of the Architect the reliability and responsibility of the proposed Subcontractors to furnish and perform the work described in the sections of the Specifications pertaining to such proposed Subcontractor's respective trades. The General Contractor shall be responsible for actions or inactions of Subcontractors and/or material suppliers.

The General Contractor is totally responsible for any lost time or extra expense incurred due to a Subcontractor's failure to perform. Failure to perform includes, but is not limited to, a Subcontractor's financial failure, abandonment of the project, failure to make prompt delivery, or

failure to do work up to standard. Under no circumstances shall the Owner mitigate the General Contractor's losses or reimburse the General Contractor for losses caused by these events.

7.1.3 Subcontractors and other persons and organizations selected by the Bidder must be used on the work for which they were proposed and shall not be changed except with the written approval of the Owner and the Architect.

7.1.4 The lowest responsive and responsible bidder shall submit to the Owner's Project Manager and the Owner within ten days after the bid opening a letter/letters from the manufacturer stating that the manufacturer will issue the roof system guarantee complying with the requirements of the Young Women's Christian Association (YWCA) Greater New Orleans based on the specified roof system and include the name of the applicator acceptable to the manufacturer at the highest level of certification for installing the specified roof system. This manufacturer shall be one that has received prior approval or is named in the specifications.

In accordance with La. R.S. 38:2227, La. R.S. 38:2212.10 and La. R.S. 23:1726(B) each bidder on this project must submit the completed Attestations Affidavit (Past Criminal Convictions of Bidders, Verification of Employees and Certification Regarding Unpaid Workers Compensation Insurance) form found within this bid package. The Attestations Affidavit form shall be submitted to Landmark Consulting, 525 St. Charles Avenue, Suite 330, New Orleans, LA 70130, within 10 days after the opening of bids.

ARTICLE 8

PERFORMANCE AND PAYMENT BOND

8.1 Bond Required

8.1.1 The Contractor shall furnish and pay for a Performance and Payment Bond written by a company licensed to do business in Louisiana, which shall be signed by the surety's agent or attorney-in-fact, in an amount equal to 100% of the Contract amount. Surety must be listed currently on the U. S. Department of Treasury Financial Management Service List (Treasury List) as approved for an amount equal to or greater than the contract amount. The Bond shall be signed by the surety's agent or attorney-in-fact. The Bond shall be in favor of YWCA Greater New Orleans.

8.2 Time of Delivery and Form of Bond

8.2.1 The Bidder shall deliver the required bond to the Owner simultaneous with the execution of the Contract.

8.2.2 Bond shall be in the form furnished by YWCA Greater New Orleans, entitled CONTRACT BETWEEN OWNER AND CONTRACTOR AND PERFORMANCE AND PAYMENT BOND, a copy of which is included in the Contract Documents.

8.2.3 The Bidder shall require the Attorney-in-Fact who executes the required bond on behalf of the surety to affix thereto a certified and current copy of his power of Attorney.

ARTICLE 9

FORM OF AGREEMENT BETWEEN OWNER AND CONTRACTOR

9.1 Form to be Used

9.1.1 Form of the Contract to be used shall be the AIA Document A101 - 2017, Standard Form of Agreement Between Owner and Contractor where the Basis of Payment is a STIPULATED SUM, a copy of which is included in the Bidding Documents.

9.2 Award

9.2.1 Before award of the Contract, the successful Bidder shall furnish to the Owner a copy of a Disclosure of Ownership Affidavit stamped by the Secretary of State, a certified copy of the minutes of the corporation or partnership meeting which authorized the party executing the bid to sign on behalf of the Contractor.

9.2.2 In accordance with Louisiana Law, when the Contract is awarded, the successful Bidder shall, at the time of the signing of the Contract, execute the Non-Collusion Affidavit included in the Contract Documents

9.2.3 Contract to be recorded with City of New Orleans

LOUISIANA UNIFORM PUBLIC WORK BID FORM

TO: Landmark Consulting, LLC
525 St. Charles Ave, Suite 330
New Orleans, LA 70130
C/O Keely Thibodeaux

YWCA Greater New Orleans
601-605 Norman C Francis Parkway
(Aka 601-605 South Jefferson Davis)
New Orleans, LA 70119
Project Number CN09418

BID FOR: YWCA Daycare, Education and Counseling Building

The undersigned bidder hereby declares and represents that she/he: a) has carefully examined and understands the Bidding Documents, b) has not received, relied on, or based his bid on any verbal instructions contrary to the Bidding Documents or any addenda, c) has personally inspected and is familiar with the project site, and hereby proposes to provide all labor, materials, tools, appliances and facilities as required to perform, in a workmanlike manner, all work and services for the construction and completion of the referenced project, all in strict accordance with the Bidding Documents prepared by: **Trapolin-Peer Architects** and dated: 7/12/2023 (as amended 11/12/2024 & 06/18/2025)_____
(Owner to provide name of entity preparing bidding documents.)

Bidders must acknowledge all addenda. The Bidder acknowledges receipt of the following **ADDENDA:** (Enter the number the Designer has assigned to each of the addenda that the Bidder is acknowledging) _____ .

TOTAL BASE BID: Price includes the cost for materials and labor for ***Daycare, Education and Counseling Building and Playground Storage Building*** (including any and all unit prices designated "Base Bid" * but not alternates) the sum of:

_____ Dollars ($ _____)

ALTERNATES: For any and all work required by the Bidding Documents for Alternates including any and all unit prices designated as alternates in the unit price description.

Alternate No. 1 *price includes the cost for materials and labor for* ***Storm Water Management*** *as indicated in the Drawings* for the *additive* lump sum of:

_____ Dollars ($ _____)

Alternate No. 2 *price includes the cost for materials and labor for* ***the Parking Lot, Playground & Trellises, Landscaping, Site Elements, Folding Partition, Flooring Upgrades, Classroom/Lounge Sinks and Food Equipment*** *as indicated in the Drawings* for the *additive* lump sum of:

_____ Dollars ($ _____)

Alternate No. 3 *price includes the cost for materials and labor for* ***Drop off site work and Canopy*** *as indicated in the Drawings* for The *additive* lump sum of:

_____ Dollars ($_____)

NAME OF BIDDER: _____

ADDRESS OF BIDDER: _____

_____

LOUISIANA CONTRACTOR'S LICENSE NUMBER: _____

NAME OF AUTHORIZED SIGNATORY OF BIDDER: _____

TITLE OF AUTHORIZED SIGNATORY OF BIDDER: _____

SIGNATURE OF AUTHORIZED SIGNATORY OF BIDDER **: _____

DATE: _____

THE FOLLOWING ITEMS ARE TO BE INCLUDED WITH THE SUBMISSION OF THIS LOUISIANA UNIFORM PUBLIC WORK BID FORM:

* The Unit Price Form shall be used if the contract includes unit prices. Otherwise it is not required and need not be included with the form. The number of unit prices that may be included is not limited and additional sheets may be included if needed.

**** A CORPORATE RESOLUTION OR WRITTEN EVIDENCE** of the authority of the person signing the bid for the public work as prescribed by LA R.S. 38:2212(B)(5).

BID SECURITY in the form of a bid bond, certified check or cashier's check as prescribed by LA R.S. 38:2218(A) attached to and made a part of this bid.

BID BOND
FOR
YWCA Greater New Orleans

Date:_____

KNOW ALL MEN BY THESE PRESENTS:

That _____of
, as Principal, and_____, as Surety, are held and firmly bound unto YWCA Greater New Orleans (Obligee), in the full and just sum of five (5%) percent of the total amount of this proposal, including all alternates, lawful money of the United States, for payment of which sum, well and truly be made, we bind ourselves, our heirs, executors, administrators, successors and assigns, jointly and severally firmly by these presents.

Surety represents that it is listed on the current U.S. Department of the Treasury Financial Management Service list of approved bonding companies as approved for an amount equal to or greater that the amount for which it obligates itself in this instrument or that it is a Louisiana domiciled insurance company with at least an A-rating in the latest printing of the A.M. Best's Key Rating Guide. If surety qualifies by virtue of its Best's listing, the Bond amount may not exceed ten percent of policyholders' surplus as shown in the latest A.M. Best's Key Rating Guide.

Surety further represents that it is licensed to do business in the State of Louisiana and that this Bond is signed by surety's agent or attorney-in-fact. This Bid Bond is accompanied by appropriate power of attorney.

THE CONDITION OF THIS OBLIGATION IS SUCH that, whereas said Principal shall, within such time as may be specified, enter into the Contract in writing and give a good and sufficient bond to secure the performance of the terms and conditions of the Contract with surety acceptable to the Obligee, then this obligation shall be void; otherwise this obligation shall become due and payable.

_____

PRINCIPAL (BIDDER) SURETY

BY:_____ BY:_____
AUTHORIZED OFFICER-OWNER-PARTNER AGENT OR
ATTORNEY-IN-FACT(SEAL)

DRAFT

AIA® Document A101® – 2017

Standard Form of Agreement Between Owner and Contractor

where the basis of payment is a Stipulated Sum

AGREEMENT made as of the « » day of «» in the year Two Thousand Twenty-three»
(In words, indicate day, month and year.)

BETWEEN the Owner:
(Name, legal status, address and other information)

YWCA Greater New Orleans
601- 605 South Norman C. Francis Parkway
New Orleans, LA 70119
« »
« »

and the Contractor:
(Name, legal status, address and other information)

« »
« »
« »

for the following Project:
(Name, location and detailed description)

«YWCA Greater New Orleans»
«New Orleans, LA»
601-605 South Norman C. Francis Parkway
New Orleans, LA 70119
»

The Architect:
(Name, legal status, address and other information)

«Trapolin-Peer Architects»«, Professional Corporation»
«850 Tchoupitoulas Street
New Orleans, LA 70130»
«Telephone Number: 504-523-2772»
«Fax Number: 504-523-3081»

The Owner and Contractor agree as follows.

ADDITIONS AND DELETIONS: The author of this document has added information needed for its completion. The author may also have revised the text of the original AIA standard form. An *Additions and Deletions Report* that notes added information as well as revisions to the standard form text is available from the author and should be reviewed.

This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

The parties should complete A101®–2017, Exhibit A, Insurance and Bonds, contemporaneously with this Agreement. AIA Document A201®–2017, General Conditions of the Contract for Construction, is adopted in this document by reference. Do not use with other general conditions unless this document is modified.

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EXHIBIT A INSURANCE AND BONDS

ARTICLE 1 THE CONTRACT DOCUMENTS

The Contract Documents consist of this Agreement, Conditions of the Contract (General, Supplementary, and other Conditions), Drawings, Specifications, Addenda issued prior to execution of this Agreement, other documents listed in this Agreement, and Modifications issued after execution of this Agreement, all of which form the Contract, and are as fully a part of the Contract as if attached to this Agreement or repeated herein. The Contract represents the entire and integrated agreement between the parties hereto and supersedes prior negotiations, representations, or agreements, either written or oral. An enumeration of the Contract Documents, other than a Modification, appears in Article 9.

ARTICLE 2 THE WORK OF THIS CONTRACT

The Contractor shall fully execute the Work described in the Contract Documents, except as specifically indicated in the Contract Documents to be the responsibility of others.

ARTICLE 3 DATE OF COMMENCEMENT AND SUBSTANTIAL COMPLETION

§ 3.1 The date of commencement of the Work shall be:
(Check one of the following boxes.)

[« »] The date of this Agreement.

[« »] A date set forth in a notice to proceed issued by the Owner.

[« X »] Established as follows:
(Insert a date or a means to determine the date of commencement of the Work.)

Notwithstanding any other provisions in any of the Contract Documents, the date of commencement of the Work shall be the date set forth in a written notice to proceed issued by Owner to Contractor on or before TBD. If no notice to proceed is issued by Owner to Contractor on or before TBD, then the Contract shall automatically terminate, and neither Owner nor Contractor shall have any obligation to the other under the Contract. Contractor acknowledges and agrees that Owner may decline to issue a notice to proceed for any reason or no reason in its sole discretion. In light of the foregoing, Contractor shall not enter into any subcontracts or purchase orders or otherwise incur any costs related to the Work or the Project unless and until Owner issues a written notice to proceed to Contractor. Contractor further acknowledges and agrees that Owner may decide, for any reason or no reason, to terminate the Contract for convenience without cause as set forth in Article 14.4 of the General Conditions of the Contract for Construction (AIA Document A201-2017), as amended by the

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Supplementary Conditions Document 00 73 00, prior to issuing a notice to proceed, and in that case, Owner shall not owe Contractor any payment or termination fee as no Work will be executed prior to issuance of a notice to proceed.

If a date of commencement of the Work is not selected, then the date of commencement shall be the date of this Agreement.

§ 3.2 The Contract Time shall be measured from the date of commencement of the Work.

§ 3.3 Substantial Completion

§ 3.3.1 Subject to adjustments of the Contract Time as provided in the Contract Documents, the Contractor shall achieve Substantial Completion of the entire Work:
(Check one of the following boxes and complete the necessary information.)

[« »] Not later than « » (« ») calendar days from the date of commencement of the Work.

[« »] By the following date: TBD

§ 3.3.2 Subject to adjustments of the Contract Time as provided in the Contract Documents, if portions of the Work are to be completed prior to Substantial Completion of the entire Work, the Contractor shall achieve Substantial Completion of such portions by the following dates:

Portion of Work	Substantial Completion Date

§ 3.3.3 If the Contractor fails to achieve Substantial Completion as provided in this Section 3.3, liquidated damages, if any, shall be assessed as set forth in Section 4.5.

ARTICLE 4 CONTRACT SUM

§ 4.1 The Owner shall pay the Contractor the Contract Sum in current funds for the Contractor's performance of the Contract. The Contract Sum shall be « » ($ «»), subject to additions and deductions as provided in the Contract Documents.

§ 4.2 Alternates

§ 4.2.1 Alternates, if any, included in the Contract Sum:

Item	Price
Alternate #1, #2. #3	

§ 4.2.2 Subject to the conditions noted below, the following alternates may be accepted by the Owner following execution of this Agreement. Upon acceptance, the Owner shall issue a Modification to this Agreement.
(Insert below each alternate and the conditions that must be met for the Owner to accept the alternate.)

Item	Price	Conditions for Acceptance

§ 4.3 Allowances, if any, included in the Contract Sum:
(Identify each allowance.)

Item	Price

§ 4.4 Unit prices, if any:
(Identify the item and state the unit price and quantity limitations, if any, to which the unit price will be applicable.)

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Item	Units and Limitations	Price per Unit ($0.00)

§ 4.5 Liquidated damages, if any:
(Insert terms and conditions for liquidated damages, if any.)

Contractor shall pay as stipulated damages the amount of $1,500.00 (one thousand five hundred dollars) for each consecutive calendar day, including Saturdays, Sundays and holidays, for which the Work is not Substantially Complete after TBD.

§ 4.6 Other:
(Insert provisions for bonus or other incentives, if any, that might result in a change to the Contract Sum.)

« »

ARTICLE 5 PAYMENTS

§ 5.1 Progress Payments

§ 5.1.1 Based upon Applications for Payment submitted to the Architect by the Contractor and Certificates for Payment issued by the Architect, the Owner shall make progress payments on account of the Contract Sum to the Contractor as provided below and elsewhere in the Contract Documents.

§ 5.1.2 The period covered by each Application for Payment shall be one calendar month ending on the last day of the month, or as follows:

« »

§ 5.1.3 Provided that an Application for Payment is received by the Architect not later than the « 15th » day of a month, the Owner shall make payment of the amount certified to the Contractor not later than the « 30th » day of the « the following » month. If an Application for Payment is received by the Architect after the application date fixed above, payment of the amount certified shall be made by the Owner not later than «Sixty » («60 ») days after the Architect receives the Application for Payment.
(Federal, state or local laws may require payment within a certain period of time.)

§ 5.1.4 Each Application for Payment shall be based on the most recent schedule of values submitted by the Contractor in accordance with the Contract Documents. The schedule of values shall allocate the entire Contract Sum among the various portions of the Work. The schedule of values shall be prepared in such form, and supported by such data to substantiate its accuracy, as the Architect may require. This schedule of values shall be used as a basis for reviewing the Contractor's Applications for Payment.

§ 5.1.5 Applications for Payment shall show the percentage of completion of each portion of the Work as of the end of the period covered by the Application for Payment.

§ 5.1.6 In accordance with AIA Document A201™–2017, General Conditions of the Contract for Construction, and subject to other provisions of the Contract Documents, the amount of each progress payment shall be computed as follows:

§ 5.1.6.1 The amount of each progress payment shall first include:

.1 That portion of the Contract Sum properly allocable to completed Work;

.2 That portion of the Contract Sum properly allocable to materials and equipment delivered and suitably stored at the site for subsequent incorporation in the completed construction, or, if approved in advance by the Owner, suitably stored off the site at a location agreed upon in writing; and

.3 That portion of Construction Change Directives that the Architect determines, in the Architect's professional judgment, to be reasonably justified.

§ 5.1.6.2 The amount of each progress payment shall then be reduced by:

.1 The aggregate of any amounts previously paid by the Owner;

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.2 The amount, if any, for Work that remains uncorrected and for which the Architect has previously withheld a Certificate for Payment as provided in Article 9 of AIA Document A201–2017;

.3 Any amount for which the Contractor does not intend to pay a Subcontractor or material supplier, unless the Work has been performed by others the Contractor intends to pay;

.4 For Work performed or defects discovered since the last payment application, any amount for which the Architect may withhold payment, or nullify a Certificate of Payment in whole or in part, as provided in Article 9 of AIA Document A201–2017; and

.5 Retainage withheld pursuant to Section 5.1.7.

§ 5.1.7 Retainage

§ 5.1.7.1 For each progress payment made prior to Substantial Completion of the Work, the Owner may withhold the following amount, as retainage, from the payment otherwise due:
(Insert a percentage or amount to be withheld as retainage from each Application for Payment. The amount of retainage may be limited by governing law.)

« » 10%

§ 5.1.7.1.1 The following items are not subject to retainage:
(Insert any items not subject to the withholding of retainage, such as general conditions, insurance, etc.)

« »

§ 5.1.7.2 Reduction or limitation of retainage, if any, shall be as follows:
(If the retainage established in Section 5.1.7.1 is to be modified prior to Substantial Completion of the entire Work, including modifications for Substantial Completion of portions of the Work as provided in Section 3.3.2, insert provisions for such modifications.)

« »

§ 5.1.7.3 Except as set forth in this Section 5.1.7.3, upon Substantial Completion of the Work, the Contractor may submit an Application for Payment that includes the retainage withheld from prior Applications for Payment pursuant to this Section 5.1.7. The Application for Payment submitted at Substantial Completion shall not include retainage as follows:
(Insert any other conditions for release of retainage upon Substantial Completion.)

« »

§ 5.1.8 If final completion of the Work is materially delayed through no fault of the Contractor, the Owner shall pay the Contractor any additional amounts in accordance with Article 9 of AIA Document A201–2017.

§ 5.1.9 Except with the Owner's prior approval, the Contractor shall not make advance payments to suppliers for materials or equipment which have not been delivered and stored at the site.

§ 5.2 Final Payment

§ 5.2.1 Final payment, constituting the entire unpaid balance of the Contract Sum, shall be made by the Owner to the Contractor when

.1 the Contractor has fully performed the Contract except for the Contractor's responsibility to correct Work as provided in Article 12 of AIA Document A201–2017, and to satisfy other requirements, if any, which extend beyond final payment; and

.2 a final Certificate for Payment has been issued by the Architect.

§ 5.2.2 The Owner's final payment to the Contractor shall be made no later than 30 days after the issuance of the Architect's final Certificate for Payment, or as follows:

60 days after (1) issuance of Architect's final Certificate for Payment, (2) Contractor has provided a certificate demonstrating that no liens have been filed, (3) Contractor and any subcontractors have provided all lien waivers requested by Owner, (4) the period for filing of construction liens has expired, if permitted by law, (5) a Certificate

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of Occupancy has been obtained from the City of New Orleans, and (6) Owner's lender has inspected the Work and found it was completed in a good and workmanlike manner.

§ 5.3 Interest

Payments due and unpaid under the Contract shall bear interest from the date payment is due at the rate stated below, or in the absence thereof, at the legal rate prevailing from time to time at the place where the Project is located.

(Insert rate of interest agreed upon, if any.)

« 0 » % « zero »

ARTICLE 6 DISPUTE RESOLUTION

§ 6.1 Initial Decision Maker

The Architect will serve as the Initial Decision Maker pursuant to Article 15 of AIA Document A201–2017, unless the parties appoint below another individual, not a party to this Agreement, to serve as the Initial Decision Maker.

(If the parties mutually agree, insert the name, address and other contact information of the Initial Decision Maker, if other than the Architect.)

« »
« »
« »
« »

§ 6.2 Binding Dispute Resolution

For any Claim subject to, but not resolved by, mediation pursuant to Article 15 of AIA Document A201–2017, the method of binding dispute resolution shall be as follows:

(Check the appropriate box.)

[« X »] Arbitration pursuant to Section 15.4 of AIA Document A201–2017

[« »] Litigation in a court of competent jurisdiction

[« »] Other *(Specify)*

« »

If the Owner and Contractor do not select a method of binding dispute resolution, or do not subsequently agree in writing to a binding dispute resolution method other than litigation, Claims will be resolved by litigation in a court of competent jurisdiction.

ARTICLE 7 TERMINATION OR SUSPENSION

§ 7.1 The Contract may be terminated by the Owner or the Contractor as provided in Article 14 of AIA Document A201–2017.

§ 7.1.1 If the Contract is terminated for the Owner's convenience in accordance with Article 14 of AIA Document A201–2017, then the Owner shall pay the Contractor a termination fee as follows:

(Insert the amount of, or method for determining, the fee, if any, payable to the Contractor following a termination for the Owner's convenience.)

$0.00 (no termination fee shall be due if the Contract is terminated for the Owner's convenience in accordance with Article 14 of AIA Document A201–2017)

§ 7.2 The Work may be suspended by the Owner as provided in Article 14 of AIA Document A201–2017.

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ARTICLE 8 MISCELLANEOUS PROVISIONS

§ 8.1 Where reference is made in this Agreement to a provision of AIA Document A201–2017 or another Contract Document, the reference refers to that provision as amended or supplemented by other provisions of the Contract Documents.

§ 8.2 The Owner's representative:
(Name, address, email address, and other information)

« »Keely Thibodeaux
Landmark Consulting LLC
525 St. Charles Avenue, Suite 330
New Orleans, LA 70130
« »
« »
« »
« »

§ 8.3 The Contractor's representative:
(Name, address, email address, and other information)

« »

« »
« »
« »
« »
« »

§ 8.4 Neither the Owner's nor the Contractor's representative shall be changed without ten days' prior notice to the other party.

§ 8.5 Insurance and Bonds

§ 8.5.1 The Owner and the Contractor shall purchase and maintain insurance as set forth in AIA Document A101™–2017, Standard Form of Agreement Between Owner and Contractor where the basis of payment is a Stipulated Sum, Exhibit A, Insurance and Bonds, and elsewhere in the Contract Documents.

§ 8.5.2 The Contractor shall provide bonds as set forth in AIA Document A101™–2017 Exhibit A, and elsewhere in the Contract Documents.

§ 8.6 Notice in electronic format, pursuant to Article 1 of AIA Document A201–2017, may be given in accordance with AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, if completed, or as otherwise set forth below:
(If other than in accordance with AIA Document E203–2013, insert requirements for delivering notice in electronic format such as name, title, and email address of the recipient and whether and how the system will be required to generate a read receipt for the transmission.)

« »

§ 8.7 Other provisions:

« »

ARTICLE 9 ENUMERATION OF CONTRACT DOCUMENTS

§ 9.1 This Agreement is comprised of the following documents:

.1 AIA Document A101™–2017, Standard Form of Agreement Between Owner and Contractor
.2 AIA Document A101™–2017, Exhibit A, Insurance and Bonds
.3 AIA Document A201™–2017, General Conditions of the Contract for Construction

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.4

« »

.5 Drawings

Number	Title	Date
See Exhibit "F"		

.6 Specifications

Section	Title	Date	Pages
See Exhibit "F"			

.7 Addenda, if any:

Number	Date	Pages
See Exhibit "F"		

Portions of Addenda relating to bidding or proposal requirements are not part of the Contract Documents unless the bidding or proposal requirements are also enumerated in this Article 9.

.8 Other Exhibits:
(Check all boxes that apply and include appropriate information identifying the exhibit where required.)

[« »] AIA Document E204™–2017, Sustainable Projects Exhibit, dated as indicated below:
(Insert the date of the E204-2017 incorporated into this Agreement.)

« »

[« »] The Sustainability Plan:

Title	Date	Pages

[« X »] Supplementary and other Conditions of the Contract:

Document	Title	Date	Pages
007300	Supplemental Conditions	7/12/2023	13

.9 Other documents, if any, listed below:
(List here any additional documents that are intended to form part of the Contract Documents. AIA Document A201™–2017 provides that the advertisement or invitation to bid, Instructions to Bidders, sample forms, the Contractor's bid or proposal, portions of Addenda relating to bidding or proposal requirements, and other information furnished by the Owner in anticipation of receiving bids or proposals, are not part of the Contract Documents unless enumerated in this Agreement. Any such documents should be listed here only if intended to be part of the Contract Documents.)

«Amendment "A" Standard Form of Agreement between Owner and Contractor AIA document A101-2017

Exhibit "A" Insurance and Bonds

Exhibit "B" CDBG Compliance provisions for Construction Contracts

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Exhibit “C” FEMA Addendum

Exhibit “D” Contractor Limited Statement of Assurances

Exhibit “E” Appendix A, C.F.R. Part 18- Certification regarding Lobbying »

Exhibit “F” Drawings and Specifications by Trapolin-Peer Architects for Project No. CN09418, dated July 12, 2023, including Architectural Drawings A-0.00-A-6.51, Landscape Drawings L1.00-L3.04, Civil Drawings C-0.0-C-8.1, Structural Drawings S1.0A-S3.0, Kitchen Drawing FS-1, Mechanical Drawing M001-M301, Plumbing Drawings P001-P203, Electrical Drawings E001-E501, and Project Specifications including Bidding Requirements and Contract Forms, Division 1-General Requirements, Division 2-Site Construction, Division 3-Concrete, Division 4-Masonry, Division 5-Metals, Division 6- Woods and Plastics, Division 7-Thermal and Moisture Protection, Division 8-Doors and Windows, Division 9-Finishes, Division 10-Specialties, Division 11- Equipment, Division 12- Furnishings, Division 13- Special Construction, Division 14-Conveying Systems, Division 15-Mechanical, Division 16-Electrical, Division 22-Plumbing, Division 31-Earthwork, Division 32-Exterior Improvements, and Addendums XX.

This Agreement entered into as of the day and year first written above.

OWNER *(Signature)*	**CONTRACTOR** *(Signature)*
« »« »	« »« »
(Printed name and title)	*(Printed name and title)*

DRAFT

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AMENDMENT A

AMENDMENT "A"
TBD

STANDARD FORM OF AGREEMENT
BETWEEN OWNER AND CONTRACTOR
AIA DOCUMENT A101 -2017 (TBD)

Owner: YWCA Greater New Orleans
Contractor: TBD

ARTICLE 3

DATE OF COMMENCEMENT AND SUBSTANTIAL COMPLETION

3.1 **Delete the following sentence at end of section:**

If a date of commencement of the Work is not selected, then the date of commencement shall be the date of this Agreement.

ARTICLE 9

ENUMERATION OF CONTRACT DOCUMENTS

9.9.1 Add the following paragraph:

Equal Employment Opportunity

During the performance of this contract and to the extent applicable, Contractor agrees as follows:

9.9.1(1) Contractor will not discriminate against any employee or applicant for employment because of race, color, religion, sex, sexual orientation, gender identity, or national origin. Contractor will take affirmative action to ensure that applicants are employed, and that employees are treated during employment without regard to their race, color, religion, sex, sexual orientation, gender identity, or national origin. Such action shall include, but not be limited to the following:

> Employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. Contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided setting forth the provisions of this nondiscrimination clause.

9.9.1(2) To the extent applicable, Contractor will, in all solicitations or advertisements for

Contractor _____Owner _____

employees placed by or on behalf of the Contractor, state that all qualified applicants will receive consideration for employment without regard to race, color, religion, sex, sexual orientation, gender identity, or national origin.

9.9.1(3) Contractor will not discharge or in any other manner discriminate against any employee or applicant for employment because such employee or applicant has inquired about, discussed, or disclosed the compensation of the employee or applicant or another employee or applicant. This provision shall not apply to instances in which an employee who has access to the compensation information of other employees or applicants as a part of such employee's essential job functions discloses the compensation of such other employees or applicants to individuals who do not otherwise have access to such information, unless such disclosure is in response to a formal complaint or charge, in furtherance of an investigation, proceeding, hearing, or action, including an investigation conducted by the employer, or is consistent with Contractor's legal duty to furnish information.

9.9.1(4) To the extent applicable, Contractor will send to each labor union or representative of workers with which he has a collective bargaining agreement or other contract or understanding, a notice to be provided advising the said labor union or workers' representatives of Contractor's commitments under this section, and shall post copies of the notice in conspicuous places available to employees and applicants for employment.

9.9.1(5) Contractor will comply with all provisions of Executive Order 11246 of September 24, 1965, and of the rules, regulations, and relevant orders of the Secretary of Labor.

9.9.1(6) To the extent applicable, Contractor will furnish all information and reports required by Executive Order 11246 of September 24, 1965, and by rules, regulations, and orders of the Secretary of Labor, or pursuant thereto, and will permit access to his books, records, and accounts by the administering agency and the Secretary of Labor for purposes of investigation to ascertain compliance with such rules, regulations, and orders.

9.9.1(7) In the event of the Contractor's noncompliance with the nondiscrimination clauses of this contract or with any of the said rules, regulations, or orders, this contract may be canceled, terminated, or suspended in whole or in part and Contractor may be declared ineligible for further Government contracts or federally assisted construction contracts in accordance with procedures authorized in Executive Order 11246 of September 24, 1965, and such other sanctions may be imposed and remedies invoked as provided in Executive Order 11246 of September 24, 1965, or by rule, regulation, or order of the Secretary of Labor, or as otherwise provided by law.

9.9.1(8) To the extent applicable, Contractor will include the portion of the sentence immediately preceding paragraph (1) and the provisions of paragraphs (1) through (8) in every subcontract or purchase order unless exempted by rules, regulations, or orders of the Secretary of Labor issued pursuant to section 204 of Executive Order 11246 of September 24, 1965, so that such provisions will be binding upon each subcontractor or vendor. To the extent applicable, Contractor will take such action with respect to any subcontract or purchase order as the administering agency may direct as a means of enforcing such provisions, including sanctions for noncompliance:

Contractor _____Owner _____

Provided, however, that in the event Contractor becomes involved in, or is threatened with, litigation with a subcontractor or vendor as a result of such direction by the administering agency, Contractor may request the United States to enter into such litigation to protect the interests of the United States.

The applicant further agrees that it will be bound by the above equal opportunity clause with respect to its own employment practices when it participates in federally assisted construction work: *Provided,* that if the applicant so participating is a State or local government, the above equal opportunity clause is not applicable to any agency, instrumentality or subdivision of such government which does not participate in work on or under the contract.

The applicant agrees that it will assist and cooperate actively with the administering agency and the Secretary of Labor in obtaining the compliance of contractors and subcontractors with the equal opportunity clause and the rules, regulations, and relevant orders of the Secretary of Labor, that it will furnish the administering agency and the Secretary of Labor such information as they may require for the supervision of such compliance, and that it will otherwise assist the administering agency in the discharge of the agency's primary responsibility for securing compliance.

The applicant further agrees that it will refrain from entering into any contract or contract modification subject to Executive Order 11246 of September 24, 1965, with a contractor debarred from, or who has not demonstrated eligibility for, Government contracts and federally assisted construction contracts pursuant to the Executive Order and will carry out such sanctions and penalties for violation of the equal opportunity clause as may be imposed upon contractors and subcontractors by the administering agency or the Secretary of Labor pursuant to Part II, Subpart D of the Executive Order. In addition, the applicant agrees that if it fails or refuses to comply with these undertakings, the administering agency may take any or all of the following actions: Cancel, terminate, or suspend in whole or in part this grant (contract, loan, insurance, guarantee); refrain from extending any further assistance to the applicant under the program with respect to which the failure or refund occurred until satisfactory assurance of future compliance has been received from such applicant; and refer the case to the Department of Justice for appropriate legal proceedings.

9.9.2 Add the following paragraph:

Byrd Anti-Lobbying Amendment, 31 U.S.C. §1352 (as amended).

During the performance of this contract and to the extent applicable, Contractor agrees as follows:

9.9.2(1) Contractor, and any who apply or bid for this Project for an award of $100,000 or more, shall sign and submit the required certification - APPENDIX A, 44 C.F.R. PART 18 – CERTIFICATION REGARDING LOBBYING – attached and incorporated herein as

Exhibit "E". Further, each tier certifies to the tier above that it will not and has not used Federal appropriated funds to pay any person or organization for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, officer or employee of Congress, or an employee of a Member of Congress in connection with obtaining any Federal contract, grant, or any other award covered by 31 U.S.C. § 1352. Each tier shall also disclose any lobbying with non-Federal funds that takes place in connection with obtaining any Federal award. Such disclosures are forwarded from tier to tier up to the recipient who in turn will forward the certification(s) to the awarding agency.

9.9.3 Add the following paragraph:

Disbarment and Suspension

9.9.3(1) This contract is a covered transaction for purposes of 2 C.F.R. pt. 180 and 2 C.F.R. pt. 3000. As such, Contractor is required to verify that none of Contractor's principals (defined at 2 C.F.R. § 180.995) or its affiliates (defined at 2 C.F.R. § 180.905) are excluded (defined at 2 C.F.R. § 180.940) or disqualified (defined at 2 C.F.R. § 180.935).

9.9.3(2) Contractor must comply with 2 C.F.R. pt. 180, subpart C and 2 C.F.R. pt. 3000, subpart C, and must include a requirement to comply with these regulations in any lower tier covered transaction it enters into.

9.9.3(3) This certification is a material representation of fact relied upon by Owner. If it is later determined that Contractor did not comply with 2 C.F.R. pt. 180, subpart C and 2 C.F.R. pt. 3000, subpart C, in addition to remedies available to Owner, the Federal Government may pursue available remedies, including but not limited to suspension and/or debarment.

9.9.3(4) The bidder or proposer agrees to comply with the requirements of 2 C.F.R. pt. 180, subpart C and 2 C.F.R. pt. 3000, subpart C while this offer is valid and throughout the period of any contract that may arise from this offer. The bidder or proposer further agrees to include a provision requiring such compliance in its lower tier covered transactions.

EXHIBIT B

CDBG COMPLIANCE PROVISIONS

EXHIBIT B

COMMUNITY DEVELOPMENT BLOCK GRANT PROGRAM
DISASTER RECOVERY RIDER
&
CDBG COMPLIANCE PROVISIONS FOR CONSTRUCTION CONTRACTS
&
DAVIS-BACON DOCUMENTS
&
CDBG SECTION 3 REQUIREMENTS

Section 01000 – Community Development Block Grant Program Disaster Recovery Rider and CDBG Compliance Provisions for Construction Contracts

Section 01010 – Federal Wage Decision

Section 01011 – Davis-Bacon and Labor Standards Contractor Guide Addendum

Section 01020 – Section 3 General Information

Section 01021 – Section 3 Frequently Asked Questions

Section 01022 – Certification of **Prime Contractor** Regarding Section 3 and Segregated Facilities

Section 01023 – Certification of **Subcontractor** Regarding Section 3 and Segregated Facilities

Section 01024 – Contractor Section 3 Plan

Section 01025 – Section 3 Worker Self Certification

Section 01026 – Section 3 Worker Employer Certification Form

Section 01027 – Section 3 Business Concern Contractor/Subcontractor Certification

Section 01028 – Section 3 Activity and Good Faith Efforts Quarterly Report

Section 01029 - Section 3 Utilization Final Report

SECTION 01000

COMMUNITY DEVELOPMENT BLOCK GRANT PROGRAM DISASTER RECOVERY RIDER

YWCA Greater New Orleans
New Daycare, Education & Counseling Building

Community Development Block Grant Program Disaster Recovery Rider
&
CDBG Compliance Provisions For Construction Contracts

This Community Development Block Grant Program Rider contains supplementary general conditions for use with procurement contracts and subrecipient agreements that are funded in whole or in part by the U.S. Department of Housing and Urban Development ("HUD") under Title I of the Housing and Community Development Act of 1974 (Pub. L. 93-383) as amended.

For all procurement contracts and subrecipient agreements funded fully or in part by the Community Development Block Grant Disaster Recovery ("CDBG-DR") Program by and between the *YWCA Greater New Orleans*, State of Louisiana, acting herein by Loyce Pierce Wright, President of the Board of Directors, YWCA Greater New Orleans hereunto duly authorized, and [*contractor*], a [*type of business (partnership, corporation)*] organized under the laws of the State of Louisiana, acting herein by [*name*], [Chief Executive Officer or appointed representative], hereunto duly authorized; this CDBG Rider will serve as a universal addendum to each of those contracts and/or agreements.

This Rider must be signed separately as a stand-alone document, and the terms and provisions outlined herein will be applicable to all contracts and agreements between *YWCA Greater New Orleans*, and [*Contractor*] in which CDBG-DR grant funds are a funding source.

FEDERAL REGISTER NOTICES

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT

Federal Register Notices applicable to the use of CDBG-DR Funds for all associated grants are available on the HUD Web site at:
https://www.hudexchange.info/programs/cdbg-dr/cdbg-dr-laws-regulations-and-federal-register-notices/

CDBG COMPLIANCE PROVISIONS

for

CONSTRUCTION CONTRACTS

(These provisions must be included in all construction contracts)

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1. EQUAL EMPLOYMENT OPPORTUNITY (Equal Opportunity Clause)
(Applicable to contracts and subcontracts above $10,000)

During the performance of this contract, the Contractor agrees as follows:

A. The Contractor will not discriminate against any employee or applicant for employment because of race, color, religion, sex, or national origin. The Contractor will take affirmative action to ensure that applicants are employed, and that employees are treated during employment, without regard to their race, color, religion, sex, sexual orientation, gender identity or national origin. Such action shall include, but not be limited to, the following:

Employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. The Contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided setting forth the provisions of this nondiscrimination clause.

B. The Contractor will, in all solicitations or advertisements for employees placed by or on behalf of the Contractor, state that all qualified applicants will receive consideration for employment without regard to race, color, religion, sex, sexual orientation, gender identity, or national origin.

C. The contractor will not discharge or in any other manner discriminate against any employee or applicant for employment because such employee or applicant has inquired about, discussed, or disclosed the compensation of the employee or applicant or another employee or applicant. This provision shall not apply to instances in which an employee who has access to the compensation information of other employees or applicants as a part of such employee's essential job functions discloses the compensation of such other employees or applicants to individuals who do not otherwise have access to such information, unless such disclosure is in response to a formal complaint or charge, in furtherance of an investigation, proceeding, hearing, or action, including an investigation conducted by the employer, or is consistent with the contractor's legal duty to furnish information.

D. The Contractor will send to each labor union or representative of workers with which he has a collective bargaining agreement or other contract or understanding, a notice to be provided advising the said labor union or workers' representatives of the Contractor's commitment under this section, and shall post copies of the notice in conspicuous places available to employees and applicants for employment.

E. The Contractor will comply with all provisions of Executive Order 11246 of September 24, 1965, as amended, and the rules, regulations, and relevant orders of the Secretary of Labor.

F. The Contractor will furnish all information and reports required by Executive Order 11246 of September 24, 1965, as amended, and by rules, regulations, and orders of the Secretary of Labor, or pursuant thereto, and will permit access to his books, records, and accounts by the administering agency and the Secretary of Labor for purposes of investigation to ascertain compliance with such rules, regulations, and others.

G. In the event of the Contractor's noncompliance with the non-discrimination clauses of this contract or with any of the said rules, regulations, or orders, this contract may be cancelled, terminated, or suspended in whole or in part and the Contractor may be declared ineligible for

further Government contracts or federally assisted construction contracts in accordance with procedures authorized in Executive Order 11246 of September 24, 1965, and such other sanctions may be imposed and remedies invoked as provided in Executive Order 11246 of September 24, 1965, or by rule, regulation, or by rule, regulation, or order of the Secretary of Labor, or as otherwise provided by law.

H. The Contractor will include the provisions of the sentence immediately preceding paragraph A and the provisions of paragraphs A through H in every subcontract or purchase order unless exempted by rules, regulations, or orders of the Secretary of Labor issued pursuant to Section 204 of Executive Order 11246 of September 24, 1965, so that such provisions will be binding upon each subcontractor or vendor. The Contractor will take such action with respect to any subcontract or purchase order as administering agency may be direct as a means of enforcing such provisions, including sanctions for noncompliance:

Provided, however, that in the event a contractor becomes involved in, or is threatened with, litigation with a subcontractor or vendor as a result of such direction by the administering agency, the Contractor may request the United States to enter into such litigation to protect the interest of the United States.

2. <u>STANDARD FEDERAL EQUAL EMPLOYMENT OPPORTUNITY CONSTRUCTION CONTRACT SPECIFICATIONS</u>

(Applicable to contracts and subcontracts above $10,000)

A. As used in these specifications:

(1) "Covered area" means the geographical area described in the solicitation from which this contract resulted;

(2) "Director" means Director, Office of Federal Contract Compliance Programs, United States Department of Labor, or any person to whom the Director delegates authority;

(3) "Employer identification number" means the Federal Social Security number used on the Employer's Quarterly Federal Tax Return, U.S. Treasury Department Form 941.

(4) "Minority" includes:

(a) Black (all persons having origins in any of the Black African racial groups not of Hispanic origin);

(b) Hispanic (all persons of Mexican, Puerto Rican, Cuban, Central or South America or other Spanish Culture or origin, regardless of race);

(c) Asian and Pacific Islander (all persons having origins in any of the original people of the Far East, Southeast Asia, the Indian Subcontinent, or the Pacific Islands); and

(d) American Indian or Alaskan Native (all persons having origins in any of the original peoples of North America and maintaining identifiable tribal affiliations through membership and participation or community identification).

B. When the Contractor, or any subcontractor, at any tier, subcontracts a portion of the work involving any construction trade, it shall physically include in each subcontract, in excess of $10,000, the provisions of these specifications and the Notice which contains the applicable goals for minority and female participation and which is set forth in the solicitations from which this contract resulted.

C. If the Contractor is participating (pursuant to 41 CFR 60-4.5) in a Hometown Plan approved by the U.S. Department of Labor in the covered area either individually or through an association, its affirmative action obligations on all work in the Plan area (including goals and timetables) shall be in accordance with that Plan for those trades which have unions participating in the Plan. Contractors must be able to demonstrate their participation in compliance with the provisions of any such Hometown Plan. Each Contractor or subcontractor participating in an approved Plan is individually required to comply with its obligations under the EEO clause, and to make a good faith effort to achieve each goal under the Plan in each trade in which it has employees. The overall good faith performance by other Contractors or subcontractors toward a goal in an approved Plan does not excuse any covered Contractor's or subcontractor's failure to take good faith efforts to achieve the Plan goals and timetables.

D. The Contractor shall implement the specific affirmative action standards provided in paragraphs G(1) through G(16) of these specifications. The goals set forth in the solicitation from which this contract resulted are expressed as percentages of the total hours of employment and training of minority and female utilization the Contractor should reasonably be able to achieve in each construction trade in which it has employees in the covered area. Covered construction contractors performing contracts in geographical areas where they do not have a federal or federally-assisted construction contract shall apply the minority and female goals established for the geographic area where the contract is being performed. Goals are published periodically in the Federal Register in notice form and such notices may be obtained from any Office of Federal Contract Compliance Programs office or from Federal procurement contracting officers. The Contractor is expected to make substantially uniform progress in meeting its goals in each craft during the period specified.

E. Neither the provisions of any collective bargaining agreement, nor the failure by a union with whom the Contractor has a collective bargaining agreement, to refer either minorities or women shall excuse the Contractor's obligations under these specifications, Executive Order 11246, or the regulations promulgated pursuant thereto.

F. In order for the non-working training hours of apprentices and trainees to be counted in meeting the goals, such apprentices and trainees must be employed by the Contractor during the training period, and the Contractor must have made a commitment to employ the apprentices and trainees at the completion of their training, subject to the availability of employment opportunities. Trainees must be trained pursuant to training programs approved by the U.S. Department of Labor.

G. The Contractor shall take specific affirmative action to ensure equal employment opportunity. The evaluation of the Contractor's compliance with these specifications shall be based upon its effort to achieve maximum results from its actions. The Contractor shall document these efforts fully, and shall implement affirmative action steps at least as extensive as the following:

(1) Ensure and maintain a working environment free of harassment, intimidation, and coercion at all sites, and in all facilities at which the Contractor's employees are assigned to

work. The Contractor, where possible, will assign two or more women to each construction project. The Contractor shall specifically ensure that all foremen, superintendents and other on-site supervisory personnel are aware of and carry out the Contractor's obligation to maintain such a working environment, with specific attention to minority or female individuals working at such sites or in such facilities.

(2) Establish and maintain a current list of minority and female recruitment sources, provide written notification to minority and female recruitment sources and to community organizations when the Contractor or its unions have employment opportunities available, and maintain a record of the organization's responses.

(3) Maintain a current file of the names, addresses, and telephone numbers of each minority and female off-the-street applicant and minority or female referral from a union, a recruitment source, or community organization and of what action was taken with respect to each such individual. If such individual was sent to the union hiring hall for referral and was not referred back to the Contractor by the union or, if referred, not employed by the Contractor, this shall be documented in the file with the reason therefore, along with whatever additional actions the Contractor may have taken.

(4) Provide immediate written notification to the Director when the union or unions with which the Contractor has a collective bargaining agreement have not referred to the Contractor a minority person or woman sent by the Contractor, or when the Contractor has other information that the union referral process has impeded the Contractor's efforts to meet its obligations.

(5) Develop on-the-job training opportunities and/or participate in training programs for the area which expressly includes minorities and women, including upgrading programs and apprenticeship and trainee programs relevant to the Contractor's employment needs, especially those programs funded or approved by the Department of Labor. The Contractor shall provide notice of these programs to the sources compiled under G(2) above.

(6) Disseminate the Contractor's EEO policy by providing notice of the policy to unions and training programs and requesting their cooperation in assisting the Contractor in meeting its EEO obligations; by including it in any policy manual and collective bargaining agreement; by publicizing it in the company newspaper, annual report, etc.; by specific review of the policy with all management personnel and with all minority and female employees at least once a year; and by posting the company EEO policy on a bulletin board accessible to all employees at each location where construction work is performed.

(7) Review, at least annually, the company's EEO policy and affirmative action obligations under these specifications with all employees having any responsibility for hiring, assignment, layoff, termination, or other employment decisions including specific review of these items with on-site supervisory personnel such as Superintendents, General Foreman, etc., prior to the initiation of construction work at any job site. A written record shall be made and maintained identifying the time and place of these meetings, persons attending, subject matter discussed, and disposition of the subject matter.

(8) Disseminate the Contractor's EEO policy externally by including it in any advertising in the news media, specifically including minority and female news media, and providing written

notification to and discussing the Contractor's EEO policy with other Contractors and Subcontractors with whom the Contractor does or anticipates doing business.

(9) Direct its recruitment efforts, both oral and written, to minority, female and community organizations, to schools with minority and female students and to minority and female recruitment and training organizations serving the Contractor's recruitment area and employment needs. Not later than one month prior to the date for acceptance of applications for apprenticeship or other training by any recruitment source, the Contractor shall send written notification to organizations such as the above, describing the openings, screening procedures, and tests to be used in the selection process.

(10) Encourage present minority and female employees to recruit other minority persons and women and, where reasonable, provide after school, summer, and vacation employment to minority and female youth both on the site and in other areas of a Contractor's work force.

(11) Validate all tests and other selection requirements where there is an obligation to do so under 41 CFR Part 60-3.

(12) Conduct, at least annually, an inventory and evaluation of all minority and female personnel for promotional opportunities and encourage these employees to seek or to prepare for, through appropriate training, etc., such opportunities.

(13) Ensure that seniority practices, job classifications, work assignments and other personnel practices, do not have a discriminatory effect by continually monitoring all personnel and employment related activities to ensure that the EEO policy and the Contractor's obligations under these specifications are being carried out.

(14) Ensure that all facilities and company activities are nonsegregated except that separate or single-user toilet and necessary changing facilities shall be provided to assure privacy between the sexes.

(15) Document and maintain a record of all solicitations of offers for subcontracts from minority and female construction contractors and suppliers, including circulation of solicitation to minority and female contractor associations and other business associations.

(16) Conduct a review, at least annually, of all supervisors' adherence to and performance under the Contractor's EEO policies and affirmative action obligations.

H. Contractors are encouraged to participate in voluntary associations which assist in fulfilling one or more of their affirmative action obligations (G(1) through G(16)). The efforts of a contractor association, joint contractor-union, contractor-community, or other similar group of which the Contractor is a member and participant, may be asserted as fulfilling any one or more of its obligations under G(1) through G(16) of these specifications provided that the Contractor actively participates in the group, makes every effort to assure that the group has a positive impact on the employment of minorities and women in the industry, ensures that the concrete benefits of the program are reflected in the Contractor's minority and female workforce participation, makes a good faith effort to meet its individual goals and timetables, and can provide access to documentation which demonstrates the effectiveness of actions taken on behalf of the Contractor. The obligation shall not be a defense for the Contractor's non-compliance.

I. A single goal for minorities and a separate single goal for women has been established. The Contractor, however, is required to provide equal employment opportunity and to take affirmative action for all minority groups, both male and female, and all women, both minority and non-minority. Consequently, the Contractor may be in violation of the Executive Order if a particular group is employed in a substantially disparate manner (for example, even though the Contractor has achieved its goals for women generally, the Contractor may be in violation of the Executive Order if a specific minority group of women is underutilized).

J. The Contractor shall not use the goals and timetables or affirmative action standards to discriminate against any persons because of race, color, religion, sex, or national origin.

K. The Contractor shall not enter into any subcontract with any person or firm debarred from government contracts pursuant to E.O. 11246.

L. The Contractor shall carry out such sanctions and penalties for violation of these specifications and of the Equal Opportunity Clause including suspension, termination, and cancellation of existing subcontracts as may be imposed or ordered pursuant to E.O. 11246, as amended.

M. The Contractor, in fulfilling its obligations under these specifications, shall implement specific affirmative action steps, at least as extensive as those standards prescribed in paragraph G of these specifications, so as to achieve maximum results from its efforts to ensure equal employment opportunity. If the Contractor fails to comply with the requirements of the Executive Order, the implementing regulations, or these specifications, the Director shall proceed in accordance with 41 CFR 60-4.8.

N. The Contractor shall designate a responsible official to monitor all employment related activity to ensure that the company EEO policy is being carried out, to submit reports relating to the provisions hereof as may be required by the government and to keep records. Records shall at least include for each employee, the name, address, telephone numbers, construction trade, union affiliation if any, employee identification number where assigned, social security number, race, sex, status (e.g., mechanic, apprenticeship trainee, helper, or laborer), dates of changes in status, hours worked per week in the indicated trade, rate of pay, and location at which the work was performed. Records shall be maintained in an easily understandable and retrievable form; however, to the degree that existing records satisfy this requirement, Contractors shall not be required to maintain separate records.

O. Nothing herein provided shall be construed as a limitation upon the application of other laws which establish different standards of compliance or upon the application or requirements for the hiring of local or other area residents (e.g., those under the Public Works Employment Act of 1977 and the Community Development Block Grant Program).

3. <u>NOTICE OF REQUIREMENT FOR AFFIRMATIVE ACTION</u>
(Applicable to contracts and subcontract over $10,000)

A. The Offeror’s or Bidder's attention is called to the "Equal Opportunity Clause" and the "Standard Federal Equal Employment Opportunity Construction Contract Specifications" set forth herein.

B. The goals and timetables for minority and female participation, expressed in percentage terms for the Contractor's aggregate workforce in each trade on all construction work in the covered area, are as follows:

Goals for minority participation: *(see table below)*

Goals for female participation: 6.9%

These goals are applicable to all the Contractor's construction work (whether or not it is federal or federally assisted) performed in the covered area. If the contractor performs construction work in a geographic area located outside of the covered area, it shall apply the goals established for such geographic area where the work is actually performed. With regard to this second area, the Contractor also is subject to the goals for both its federally involved and non-federally involved construction.

The Contractor's compliance with the Executive Order and the regulations in 41 CFR Part 60-4 shall be based on its implementation of the Equal Opportunity Clause, specific affirmative action obligations required by the specifications set forth in 41 CFR 60-4.3 (a) and its efforts to meet the goals established for the geographical area where the contract resulting from this solicitation is to be performed. The hours of minority and female employment and training must be substantially uniform throughout the length of the contract, and in each trade, and the Contractor shall make a good faith effort to employ minorities and women evenly on each of its projects. The transfer of minority or female employees or trainees from Contractor to Contractor or from project to project for the sole purpose of meeting the Contractor's goals shall be a violation of the contract, the Executive Order, and the regulations in 41 CFR Part 60-4. Compliance with the goals will be measured against the total work hours performed.

MINORITY PARTICIPATION GOALS

PARISH	MIN. GOAL (%)	PARISH	MIN. GOAL (%)	PARISH	MIN. GOAL (%)	PARISH	MIN. GOAL (%)
Acadia	24.1	E. Baton Rouge	26.1	Madison	27.9	St. Landry	24.1
Allen	17.8	East Carroll	27.9	Morehouse	27.9	St. Martin	24.1
Ascension	26.1	East Feliciana	30.4	Natchitoches	29.3	St. Mary	24.1
Assumption	27.7	Evangeline	24.1	Orleans	31.0	St. Tammany	31.0
Avoyelles	29.3	Franklin	27.9	Ouachita	22.8	Tangipahoa	27.7
Beauregard	17.8	Grant	25.7	Plaquemines	27.7	Tensas	27.9
Bienville	29.3	Iberia	24.1	Pointe Coupee	30.4	Terrebonne	27.7
Bossier	29.3	Iberville	30.4	Rapides	25.7	Union	27.9
Caddo	29.3	Jackson	27.9	Red River	29.3	Vermilion	24.1
Calcasieu	19.3	Jefferson	31.0	Richland	27.9	Vernon	17.8
Caldwell	27.9	Jefferson Davis	17.8	Sabine	29.3	Washington	27.7
Cameron	17.8	Lafayette	20.6	St. Bernard	31.0	Webster	29.3
Catahoula	27.9	Lafourche	27.7	St. Charles	27.7	W. Baton Rouge	26.1
Claiborne	29.3	LaSalle	27.9	St. Helena	30.4	West Carroll	27.9
Concordia	30.4	Lincoln	27.9	St. James	27.7	West Feliciana	30.4
De Soto	29.3	Livingston	26.1	St. John the Baptist	27.7	Winn	29.3

C. The Contractor shall provide written notification to the Director of the Office of Federal Contract Compliance Programs within 10 working days of award of any construction subcontract in

excess of $10,000 at any tier for construction work under the contract resulting from this solicitation. The notification shall list the name, address, and telephone number of the subcontractor; employer identification number; estimated dollar amount of the subcontract; estimated starting and completion dates of the sub-contract; and the geographical area in which the contract is to be performed.

D. As used in this Notice, and in the contract resulting from this solicitation, the "covered area" is *(insert description of the geographical areas where the contract is to be performed, giving the State, parish, and city, if any)*:

4. CERTIFICATION OF NONSEGREGATED FACILITIES

(Applicable to contracts and subcontracts over $10,000)

By the submission of this bid, the bidder, offeror, applicant or subcontractor certifies that he/she does not maintain or provide for his/her establishments, and that he/she does not permit employees to perform their services at any location, under his/her control, where segregated facilities are maintained. He/she certifies further that he/she will not maintain or provide for employees any segregated facilities at any of his/her establishments, and he/she will not permit employees to perform their services at any location under his/her control where segregated facilities are maintained. The bidder, offeror, applicant or subcontractor agrees that a breach of this certification is a violation of the equal opportunity clause of this contract.

As used in this certification, the term "segregated facilities" means any waiting rooms, work areas, rest rooms and wash rooms, restaurants and other eating areas, time clocks, locker rooms, and other storage or dressing areas, parking lots, drinking fountains, recreation or entertainment areas, transportation and housing facilities provided for employees which are segregated by explicit directive or are, in fact, segregated on the basis of race, color, religion, or national origin because of habit, local custom, or any other reason.

He/she further agrees that (except where he/she has obtained for specific time periods) he/she will obtain identical certification from proposed subcontractors prior to the award of subcontracts exceeding $10,000 which are not exempt from the provisions of the equal opportunity clause; that he/she will retain such certifications in his/her files; and that he/she will forward the following notice to such proposed subcontractors (except where proposed subcontractors have submitted identical certifications for specific time periods).

5. CIVIL RIGHTS

The Contractor shall comply with the provisions of Title VI of the Civil Rights Act of 1964. No person shall, on the grounds of race, color, or national origin, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving federal financial assistance.

6. SECTION 109 OF THE HOUSING AND COMMUNITY DEVELOPMENT ACT OF 1974

The Contractor shall comply with the provisions of Section 109 of the Housing and Community Development Act of 1974. No person in the United States shall on the grounds of race, color, national origin, or sex be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity funded in whole or in part with funds made available under this title. Section 109 further provides that discrimination on the basis of age under the Age

Discrimination Act of 1975 or with respect to an otherwise qualified handicapped individual as provided in Section 504 of the Rehabilitation Act of 1973, as amended, is prohibited.

7. SECTION 3 OF THE HOUSING AND URBAN DEVELOPMENT ACT OF 1968 - COMPLIANCE IN EMPLOYMENT AND TRAINING

The work to be performed under this Contract, including services performed under any related subcontract or subrecipient agreement, is subject to the requirements of Section 3 of the Housing and Urban Development Act of 1968, as amended, 12 U.S.C. 1701u (Section 3), 24 CFR §75, and 85 FR 61562, and any directives, benchmarks and programmatic requirements hereafter issued by HUD or OCD in the implementation of Section 3 requirements.

A. Section 3 requires that to the greatest extent feasible, and consistent with existing Federal, state, and local laws and regulations, recipients of CDBG assistance shall ensure that employment and training opportunities arising in connection with Section 3 projects are provided to Section 3 workers within the metropolitan area (or nonmetropolitan county) in which the project is located.

B. Section 3 also requires that to the greatest extent feasible, and consistent with existing Federal, state, and local laws and regulations, recipients covered by this subpart shall ensure contracts for work awarded in connection with Section 3 projects are provided to business concerns that provide economic opportunities to Section 3 workers residing within the metropolitan area (or nonmetropolitan county) in which the project is located.

C. The parties to this contract agree to comply with HUD's regulations in 24 CFR part 75, which implement Section 3. As evidenced by their execution of this contract, the parties to this contract certify that they are under no contractual or other impediment that would prevent them from complying with the part 75 regulations.

D. The contractor agrees, to the greatest extent feasible, take steps to achieve the Section 3 benchmarks established by HUD for Section 3 workers and Targeted Section 3 workers. Section 3 benchmarks will consist of the following two ratios: (i) The number of labor hours worked by Section 3 workers divided by the total number of labor hours worked by all workers on a Section 3 project. (ii) The number of labor hours worked by Targeted Section 3 workers as defined in § 75.21(a), divided by the total number of labor hours worked by all workers on a Section 3 project.

E. The contractor agrees to report in a manner prescribed by the Owner, (i) The total number of labor hours worked; (ii) The total number of labor hours worked by Section 3 workers; and (iii) The total number of labor hours worked by Targeted Section 3 workers.

F. If the contractor fails to achieve the HUD Section 3 benchmarks, the contractor must report in a form prescribed by the Owner on the qualitative nature of its activities and those of its subcontractors. Such qualitative efforts may, for example, include but are not limited to the following:

(1) Outreach efforts to generate job applicants who are Targeted Section 3 workers.

(2) Provided training or apprenticeship opportunities.

(3) Provided technical assistance to help Section 3 workers compete for jobs (*e.g.,* resume assistance, coaching).

(4) Provided or connected Section 3 workers with assistance in seeking employment including: drafting resumes, preparing for interviews, and finding job opportunities connecting residents to job placement services.

(5) Held one or more job fairs.

(6) Provided or referred Section 3 workers to services supporting work readiness and retention (*e.g.,* work readiness activities, interview clothing, test fees, transportation, child care).

(7) Provided assistance to apply for/or attend community college, a four-year educational institution, or vocational/technical training.

(8) Assisted Section 3 workers to obtain financial literacy training and/or coaching.

(9) Engaged in outreach efforts to identify and secure bids from Section 3 business concerns.

(10) Provided technical assistance to help Section 3 business concerns understand and bid on contracts.

(11) Divided contracts into smaller jobs to facilitate participation by Section 3 business concerns.

(12) Provided bonding assistance, guaranties, or other efforts to support viable bids from Section 3 business concerns.

(13) Promoted use of business registries designed to create opportunities for disadvantaged and small businesses.

(14) Outreach, engagement, or referrals with the state one-stop system as defined in Section 121(e)(2) of the Workforce Innovation and Opportunity Act.

G. The contractor agrees to include these Section 3 contract provisions in every subcontract subject to compliance with regulations in 24 CFR part 75 and agrees to take appropriate action, as provided in an applicable provision of the subcontract upon a finding that the subcontractor is in violation of the regulations in 24 CFR part 75. The contractor will not subcontract with any subcontractor where the contractor has notice or knowledge that the subcontractor has been found in violation of the regulations in 24 CFR part 75.

H. Noncompliance with HUD's regulations in 24 CFR part 75 may result in sanctions, termination of this contract for default, and debarment or suspension from future HUD assisted contracts.

8. <u>SECTION 503 OF THE REHABILITATION ACT OF 1973 (29 USC 793)</u>
(Applicable to contracts and subcontracts over $10,000)

A. The contractor will not discriminate against any employee or applicant for employment because of physical or mental disability in regard to any position for which the employee or applicant for employment is qualified. The contractor agrees to take affirmative action to employ and advance in employment individuals with disabilities, and to treat qualified individuals without discrimination on the basis of their physical or mental disability in all employment practices, including the following:

(1) Recruitment, advertising, and job application procedures;

(2) Hiring, upgrading, promotion, award of tenure, demotion, transfer, layoff, termination, right of return from layoff and rehiring;

(3) Rates of pay or any other form of compensation and changes in compensation;

(4) Job assignments, job classifications, organizational structures, position descriptions, lines of progression, and seniority lists;

(5) Leaves of absence, sick leave, or any other leave;

(6) Fringe benefits available by virtue of employment, whether or not administered by the contractor;

(7) Selection and financial support for training, including apprenticeship, professional meetings, conferences, and other related activities, and selection for leaves of absence to pursue training;

(8) Activities sponsored by the Contractor including social or recreational programs;

(9) Any other term, condition, or privilege of employment.

B. The Contractor agrees to comply with the rules, regulations, and relevant orders of the Secretary of Labor issued pursuant to the Act.

C. In the event of the Contractor's noncompliance with the requirements of this clause, actions for noncompliance may be taken in accordance with the rules, regulations, and relevant orders of the Secretary of Labor issued pursuant to the Act.

D. The Contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices in a form to be prescribed by the Director, Office of Federal Contract Compliance Programs, provided by or through the contracting officer. Such notices shall state the rights of applicants and employees as well as the Contractor's obligation under the law to take affirmative action to employ and advance in employment qualified employees and applicants with disabilities. The contractor must ensure that applicants or employees with disabilities are provided the notice in a form that is accessible and understandable to the individual applicant or employee (e.g., providing Braille or large print versions of the notice, or posting a copy of the notice at a lower height for easy viewing by a person using a wheelchair). With respect to employees who do not work at a physical location of the contractor, a contractor will satisfy its posting obligations by posting such notices in an electronic format, provided that the contractor provides computers, or access to computers, that can access the electronic posting to such employees, or the contractor has actual knowledge that such employees otherwise are able to access the electronically posted notices. Electronic notices for employees must be posted in a conspicuous location and format on the company's intranet or sent by electronic mail to employees. An electronic posting must be used by the contractor to notify job applicants of their rights if the contractor utilizes an electronic application process. Such electronic applicant notice must be conspicuously stored with, or as part of, the electronic application.

E. The Contractor will notify each labor organization or representative of workers with which it has a collective bargaining agreement or other contract understanding, that the Contractor is bound by the terms of Section 503 of the Rehabilitation Act of 1973, and is committed to take affirmative action to employ and advance in employment, and shall not discriminate against, individuals with physical or mental disabilities.

F. The Contractor will include the provisions of this clause in every subcontract or purchase order of $10,000 or more unless exempted by rules, regulations, or orders of the Secretary issued pursuant to Section 503 of the Act, so that such provisions will be binding upon each subcontractor or vendor. The Contractor will take such action with respect to any subcontract or purchase order as the Director of the Office of Federal Contract Compliance Programs may direct to enforce such provisions, including action for noncompliance.

G. The contractor must, in all solicitations or advertisements for employees placed by or on behalf of the contractor, state that all qualified applicants will receive consideration for employment and will not be discriminated against on the basis of disability.

9. SECTION 504 OF THE REHABILITATION ACT OF 1973, AS AMENDED

The Contractor agrees that no otherwise qualified individual with disabilities shall, solely by reason of his disability, be denied the benefits, or be subjected to discrimination including discrimination in employment, any program or activity that receives the benefits from the federal financial assistance.

10. AGE DISCRIMINATION ACT OF 1975

The Contractor shall comply with the provisions of the Age Discrimination Act of 1975. No person in the United States shall, on the basis of age, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under, any program or activity receiving federal financial assistance.

11. CERTIFICATION OF COMPLIANCE WITH AIR AND WATER ACTS
(Applicable to contracts and subcontracts exceeding $150,000)

The Contractor and all subcontractors shall comply with the requirements of the Clean Air Act, as amended, 42 USC 7401 et seq., the Federal Water Pollution Control Act, as amended, 33 USC 1251 et seq. Violations must be reported to the Federal awarding agency and the Regional Office of the Environmental Protection Agency (EPA)

In addition to the foregoing requirements, all nonexempt contractors and subcontractors shall furnish to the owner, the following:

A. A stipulation by the Contractor or subcontractors, that any facility to be utilized in the performance of any nonexempt contract or subcontract, is not listed on the List of Violating Facilities issued by the Environmental Protection Agency (EPA) pursuant to 40 CFR Part 15, as amended.

B. Agreement by the Contractor to comply with all the requirements of Section 114 of the Clean Air Act, as amended, (42 USC 1857 c-8) and Section 308 of the Federal Water Pollution Control Act, as amended, (33 USC 1318) relating to inspection, monitoring, entry, reports and information, as well as all other requirements specified in said Section 114 and Section 308, and all regulations and guidelines issued thereunder

C. A stipulation that as a condition for the award of the contract, prompt notice will be given of any notification received from the Director, Office of Federal Activities, EPA, indicating that a facility

utilized, or to be utilized for the contract, is under consideration to be listed on the EPA List of Violating Facilities.

D. Agreement by the Contractor that he will include, or cause to be included, the criteria and requirements in paragraph (1) through (4) of this section in every nonexempt subcontract and requiring that the Contractor will take such action as the government may direct as a means of enforcing such provisions.

12. SPECIAL CONDITIONS PERTAINING TO HAZARDS, SAFETY STANDARDS AND ACCIDENT PREVENTION

A. Lead-Based Paint Hazards
(Include in contracts for construction or rehabilitation of residential structures)

The construction or rehabilitation of residential structures is subject to the HUD Lead-Based Paint regulations, 24 CFR Part 35. The Contractor and subcontractors shall comply with the provisions for the elimination of lead-based paint hazards under Subpart B of said regulations. The Owner will be responsible for the inspections and certifications required under Section 35.14 (f) thereof.

B. Use of Explosives (Modify as Required)

When the use of explosives is necessary for the prosecution of the work, the Contractor shall observe all local, state and federal laws in purchasing and handling explosives. The Contractor shall take all necessary precaution to protect completed work, neighboring property, water lines, or other underground structures. Where there is danger to structures or property from blasting, the charges shall be reduced and the material shall be covered with suitable timber, steel or rope mats.

The Contractor shall notify all owners of public utility property of intention to use explosives at least 8 hours before blasting is done close to such property. Any supervision or direction of use of explosives by the engineer does not in any way reduce the responsibility of the Contractor or his Surety for damages that may be caused by such use.

C. Danger Signals and Safety Devices (Modify as Required)

The Contractor shall make all necessary precautions to guard against damages to property and injury to persons. He shall put up and maintain in good condition, sufficient red or warning lights at night, suitable barricades and other devices necessary to protect the public. In case the Contractor fails or neglects to take such precautions, the Owner may have such lights and barricades installed and charge the cost of this work to the Contractor. Such action by the Owner does not relieve the Contractor of any liability incurred under these specifications or contract.

13. FLOOD DISASTER PROTECTION

This contract is subject to the requirements of the Flood Disaster Protection Act of 1973 (P.L. 93-234). Nothing included as a part of this contract is approved for acquisition or construction purposes as defined under Section 3(a) of said

Act, for use in an area identified by the Secretary of HUD as having special flood hazards which is located in a community not then in compliance with the requirements for participation in the National Flood Insurance Program pursuant to Section 201(d) of said Act; and the use of any assistance provided under this contract for such acquisition for construction in such identified areas in communities then participating in the National Flood Insurance Program shall be subject to the mandatory purchase of flood insurance requirements or Section 102(a) of said Act.

Any contract or agreement for the sale, lease, or other transfer of land acquired, cleared or improved with assistance provided under this Contract shall contain, if such land is located in an area identified by the Secretary as having special flood hazards and in which the sale of flood insurance has been made available under the National Flood Insurance Act of 1968, as amended, 42 U.S.C. 4001 et seq., provisions obligating the transferee and its successors or assigns to obtain and maintain, during the ownership of such land, such flood insurance as required with respect to financial assistance for acquisition or construction purposes under Section 102(a) of Flood Disaster Protection Act of 1973.

14. ACCESS TO RECORDS - MAINTENANCE OF RECORDS

The State of Louisiana, the Department of Housing and Urban Development, the Comptroller General of the United States, or any of their duly authorized representatives, shall have access to any books, documents, papers and records of the Contractor which are directly pertinent to this specific contract, for the purpose of audits, examinations, and making excerpts and transcriptions. All records connected with this contract will be maintained in a central location by the unit of local government and will be maintained for a period of five (5) years after the official date of the State's final closeout of its grant with HUD.

15. INSPECTION

The authorized representative and agents of the State of Louisiana and the Department of Housing and Urban Development shall be permitted to inspect all work, materials, payrolls, records of personnel, invoices of materials, and other relevant data and records.

16. REPORTING REQUIREMENTS

The Contractor shall complete and submit all reports, in such form and according to such schedule, as may be required by the Owner.

17. CONFLICT OF INTEREST

A. No officer or employee of the local jurisdiction or its designees or agents, no member of the governing body, and no other public official of the locality who his/her tenure or for one year thereafter, shall have any interest, direct or indirect, in any contract or subcontract, or the proceeds thereof, for work to be performed. Further, the Contractor shall cause to be incorporated in all subcontracts the language set forth in this paragraph prohibiting conflict of interest.

B. No member of or delegate to Congress, or Resident Commissioner, shall be admitted to any share or part of this contract or to any benefit that may arise therefrom, but this provision shall not be construed to extend to this contract if made with a corporation for its general benefit.

18. ACTIVITIES AND CONTRACTS NOT SUBJECT TO EXECUTIVE ORDER 11246, AS AMENDED
(Applicable to contracts and subcontracts of $10,000 and under)

During the performance of this contract, the Contractor agrees as follows:

A. The Contractor shall not discriminate against any employee or applicant for employment because of race, color, religion, sex, or national origin. The Contractor shall take affirmative action to ensure that applicants for employment are employed, and that employees are treated during employment, without regard to their race, color, religion, sex, or national origin. Such action shall include, but not be limited to, the following: employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship.

B. The Contractor shall post in conspicuous places, available to employees and applicants for employment, notices to be provided by Contracting Officer setting forth the provisions of this non-discrimination clause. The Contractor shall state that all qualified applicants will receive consideration for employment without regard to race, color, religion, sex, or national origin.

C. Contractors shall incorporate foregoing requirements in all subcontracts.

19. PATENTS

A. The Contractor shall hold and save the Owner and its officers, agents, servants, and employees harmless from liability of any nature or kind, including cost and expenses for, or on account of any patented or unpatented invention, process, article, or appliance manufactured or used in the performance of the contract including its use by the Owner, unless otherwise specifically stipulated in the Contract Document.

B. License or Royalty Fees: License and/or Royalty Fees for the use of a process which is authorized by the Owner of the project must be reasonable, and paid to the holder of the patent, or his authorized license, direct by the Owner and not by or through the Contractor.

C. If the Contractor uses any design device or materials covered by letters, patent or copyright, he shall provide for such use by suitable agreement with the owner of such patented or copy-righted design device or material. It is mutually agreed and understood, that without exception the contract prices shall include all royalties or costs arising from the use of such design, device or materials, in any way involved in the work. The Contractor and/or his Sureties shall indemnify and save harmless the Owner of the project from any and all claims for infringement by reason of the use of such patented or copy-righted design, device or materials or any trademark or copy-right in connection with work agreed to be performed under this contract, and shall indemnify the Owner for any cost, expense, or damage which it may be obliged to pay by reason of such infringement at any time during the prosecution of the work or after completion of the work.

20. COPYRIGHT

No materials, to include but not limited to reports, maps, or documents produced as a result of this contract, in whole or in part, shall be available to the Contractor for copyright purposes. Any such materials produced as a result of this contract that might be subject to copyright shall be the property of the Owner and all such rights shall belong to the Owner.

21. TERMINATION FOR CAUSE

If, through any cause, the Contractor shall fail to fulfill in a timely and proper manner his obligations under this contract, or if the Contractor shall violate any of the covenants, agreements, or stipulations of this contract, the Owner shall thereupon have the right to terminate this contract by giving written notice to the Contractor of such termination and specifying the effective date thereof, at least five (5) days before the effective date of such termination. In such event, all finished or unfinished documents, data, studies, surveys, drawings, maps, models, photographs, and reports prepared by the Contractor under this contract shall, at the option of the Owner, become the Owner's property and the Contractor shall be entitled to receive just and equitable compensation for any work satisfactorily completed hereunder. Notwithstanding the above, the Contractor shall not be relieved of liability to the Owner for damages sustained by the Owner by virtue of any breach of the contract by the Contractor, and the Owner may withhold any payments to the Contractor for the purpose of set-off until such time as the exact amount of damages due the Owner from the Contractor is determined.

22. TERMINATION FOR CONVENIENCE

The Owner may terminate this contract at any time by giving at least ten (10) days notice in writing to the Contractor. If the contract is terminated by the Owner as provided herein, the Contractor will be paid for the time provided and expenses incurred up to the termination date.

23. ENERGY EFFICIENCY

The Contractor shall comply with mandatory standards and policies relating to energy efficiency which are contained in the state energy conservation plan issued in compliance with the Energy Policy and Conservation Act (Public Law 94-163).

24. SUBCONTRACTS

A. The Contractor shall not enter into any subcontract with any subcontractor who has been debarred, suspended, declared ineligible, or voluntarily excluded from participating in contacting programs by any agency of the United States Government or the State of Louisiana.

B. The Contractor shall be as fully responsible to the Owner for the acts and omissions of the Contractor's subcontractors, and of persons either directly or indirectly employed by them, as he is for the acts and omissions of persons directly employed by the Contractor.

C. The Contractor shall cause appropriate provisions to be inserted in all subcontracts relative to the work to bind subcontractor to the Contractor by the terms of the contract documents insofar as applicable to the work of subcontractors and to give the Contractor the same power as regards terminating any subcontract that the Owner may exercise over the Contractor under any provision of the contract documents.

D. Nothing contained in this contract shall create any contractual relation between any subcontractor and the Owner.

25. DEBARMENT, SUSPENSION, AND INELIGIBILITY

The Contractor represents and warrants that it and its subcontractors are not debarred, suspended, or placed in ineligibility status under the provisions of 2 CFR 180 that implement Executive Order 12549, *Debarment and Suspension* (3 CFR Part 1986 Comp., p. 189) and Executive Order 12689, *Debarment and Suspension* (3 CFR Part 1989 Comp., p. 235).

26. PROTECTION OF LIVES AND HEALTH

The Contractor shall exercise proper precaution at all times for the protection of persons and property and shall be responsible for all damages to persons or property, either on or off the worksite, which occur as a result of his prosecution of the work. The safety provisions of applicable laws and building and construction codes, in addition to specific safety and health regulations described by Chapter XIII, Bureau of Labor Standards, Department of Labor, Part 1518, Safety and Health Regulations for Construction, as outlined in the Federal Register, Volume 36, No. 75, Saturday, April 17, 1971, Title 29 - LABOR, shall be observed and the Contractor shall take or cause to be taken, such additional safety and health measures as the Owner may determine to be reasonably necessary.

27. BREACH OF CONTRACT TERMS

Any violation or breach of terms of this contract on the part of the Contractor or the Contractor's subcontractors may result in the suspension or termination of this contract or such other action that may be necessary to enforce the rights of the parties of this contract. The duties and obligations imposed by the contract documents and the rights and remedies available thereunder shall be in addition to and not a limitation of any duties, obligations, rights and remedies otherwise imposed or available by law.

28. PROVISIONS REQUIRED BY LAW DEEMED INSERTED

Each and every provision of law and clause required by law to be inserted in this contract shall be deemed to be inserted herein and the contract shall be read and enforced as though it were included herein, and if through mistake or otherwise any such provision is not inserted, or is not correctly inserted, then upon the application of either party the contract shall forthwith be physically amended to make such insertion or correction.

29. CHANGES

The Owner may, from time to time, request changes in the scope of the services of the Contractor to be performed hereunder. Such changes, including any increase or decrease in the amount of the Contractor's compensation which are mutually agreed upon by and between the Owner and the Contractor, shall be incorporated in written and executed amendments to this Contract.

30. PERSONNEL

The Contractor represents that it has, or will secure at its own expense, all personnel required in performing the services under this Contract. Such personnel shall not be employees of or have any contractual relationship with the Owner.

All the services required hereunder will be performed by the Contractor or under its supervision, and all personnel engaged in the work shall be fully qualified and shall be authorized or permitted under State and local law to perform such services.

No person who is serving sentence in a penal or correctional institution shall be employed on work under this Contract.

31. ANTI-KICKBACK RULES

Salaries of personnel performing work under this Contract shall be paid unconditionally and not less often than once a month without payroll deduction or rebate on any account except only such payroll deductions as are mandatory by law or permitted by the applicable regulations issued by the Secretary of Labor pursuant to the "Anti-Kickback Act" of June 13, 1934 (48 Stat. 948; 62 Stat. 740; 63 Stat. 108; Title 18 U.S.C. 874; and Title 40 U.S.C. 276c). The Contractor shall comply with all applicable "Anti-Kickback" regulations and shall insert appropriate provisions in all subcontracts covering work under this contract to insure compliance by the subcontractors with such regulations, and shall be responsible for the submission of affidavits required of subcontractors thereunder except as the Secretary of Labor may specifically provide for variations of or exemptions from the requirements thereof.

32. ASSIGNABILITY

The Contractor shall not assign any interest in this Contract, and shall not transfer any interest in the same (whether by assignment or novation) without prior written approval of the Owner provided that claims for money due or to become due the Contractor from the Owner under this Contract may be assigned to a bank, trust company, or other financial institution, or to a Trustee in Bankruptcy, without such approval. Notice of any such assignment or transfer shall be furnished promptly to the Owner.

33. INTEREST OF CONTRACTOR

The Contractor covenants that he presently has no interest and shall not acquire any interest direct or indirect in the above described project or any parcels therein or any other interest which would conflict in any manner or degree with the performance of his services hereunder. The Contractor further covenants that in the performance of this Contract no person having any such interest shall be employed.

34. POLITICAL ACTIVITY

The Contractor will comply with the provisions of the Hatch Act (5 U.S.C. 1501 et seq.), which limits the political activity of employees.

35. COMPLIANCE WITH THE OFFICE OF MANAGEMENT AND BUDGET

The parties agree to comply with the regulations, policies, guidelines, and requirements of the Office of Management and Budget, *"Uniform Administrative Requirements, Cost Principles, and Audit Requirements for Federal Awards"*, 2 CFR Part 200, as they relate to the use of Federal funds under this contract.

36. DISCRIMINATION DUE TO BELIEFS

No person with responsibilities in operation of the project to which this grant relates will discriminate with respect to any program participant or any applicant for participation in such program because of political affiliation or beliefs.

37. CONFIDENTIAL FINDINGS

All of the reports, information, data, etc., prepared or assembled by the Contractor under this Contract are confidential, and the Contractor agrees that they shall not be made available to any individual or organization without prior written approval of the Owner.

38. LOBBYING

The Contractor certifies, to the best of his or her knowledge and belief that:

A. No federally appropriated funds have been paid or will be paid, by or on behalf of the contractor, to any person for influencing or attempting to influence an officer or employee of any agency, a member of Congress, an officer or employee of Congress, or an employee of a member of Congress in connection with the awarding of any federal contract, the making of any federal grant, the making of any federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any federal contract, grant, loan, or cooperative agreement.

B. If any funds other than federally appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a member of Congress, an officer or employee of Congress, or an employee of a member of Congress in connection with this federal contract, grant, loan, or cooperative agreement, the contractor shall complete and submit Standard Form-LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions.

39. CONTRACTING WITH SMALL AND MINORITY FIRMS, WOMEN'S BUSINESS ENTERPRISES, AND LABOR SURPLUS AREA FIRMS

The Contractor will take necessary affirmative steps to assure that minority firms, women's business enterprises, and labor surplus area firms are used in subcontracting when possible. Steps include:

A. Placing qualified small and minority businesses and women's business enterprises on solicitation lists;

B. Assuring that small and minority businesses, and women's business enterprises are solicited whenever they are potential sources;

C. Dividing total requirements, when economically feasible, into smaller tasks or quantities to permit maximum participation by small and minority business, and women's business enterprises;

D. Establishing delivery schedules, where the requirement permits, which encourage participation by small and minority business, and women's business enterprises; and

E. Using the services and assistance of the Small Business Administration, and the Minority Business Development Agency of the Department of Commerce.

40. PROCUREMENT OF RECOVERED MATERIALS

A. In accordance with Section 6002 of the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act, the Contractor shall procure items designated in guidelines of the Environmental Protection Agency (EPA) at 40 CFR Part 247 that contain the highest percentage of recovered materials practicable, consistent with maintaining a satisfactory level of competition. The Contractor shall procure items designated in the EPA guidelines that contain the highest percentage of recovered materials practicable unless the Contractor determines that such items: (1) are not reasonably available in a reasonable period of time; (2) fail to meet reasonable performance standards, which shall be determined on the basis of the guidelines of the National Institute of Standards and Technology, if applicable to the item; or (3) are only available at an unreasonable price.

B. Paragraph A of this clause shall apply to items purchased under this contract where: (1) the Contractor purchases in excess of $10,000 of the item under this contract; or (2) during the preceding Federal fiscal year, the Contractor: (i) purchased any amount of the items for use under a contract that was funded with Federal appropriations and was with a Federal agency or a State agency or agency of a political subdivision of a State; and (ii) purchased a total of in excess of $10,000 of the item both under and outside that contract.

41. PROHIBITION ON CONTRACTING FOR COVERED TELECOMMUNICATIONS EQUIPMENT OR SERVICES

A. Definitions. As used in this clause, the terms backhaul; covered foreign country; covered telecommunications equipment or services; interconnection arrangements; roaming; substantial or essential component; and telecommunications equipment or services have the meaning as defined in FEMA Policy 405-143-1, Prohibitions on Expending FEMA Award Funds for Covered Telecommunications Equipment or Services (Interim), as used in this clause—

B. Prohibitions.

i) Section 889(b) of the John S. McCain National Defense Authorization Act for Fiscal Year 2019, Pub. L. No. 115-232, and 2 C.F.R. § 200.216 prohibit the head of an executive agency on or after Aug.13, 2020, from obligating or expending grant, cooperative agreement, loan, or loan guarantee funds on certain telecommunications products or from certain entities for national security reasons.

ii) Unless an exception in paragraph (c) of this clause applies, the contractor and its subcontractors may not use grant, cooperative agreement, loan, or loan guarantee funds from the Federal Emergency Management Agency to:

(1) Procure or obtain any equipment, system, or service that uses covered telecommunications equipment or services as a substantial or essential component of any system, or as critical technology of any system;

(2) Enter into, extend, or renew a contract to procure or obtain any equipment, system, or service that uses covered telecommunications equipment or services as a substantial or essential component of any system, or as critical technology of any system;

(3) Enter into, extend, or renew contracts with entities that use covered telecommunications equipment or services as a substantial or essential component of any system, or as critical technology as part of any system; or

(4) Provide, as part of its performance of this contract, subcontract, or other contractual instrument, any equipment, system, or service that uses covered telecommunications equipment or services as a substantial or essential component of any system, or as critical technology as part of any system.

C. Exceptions.

i) This clause does not prohibit contractors from providing—

(1) A service that connects to the facilities of a third-party, such as backhaul, roaming, or interconnection arrangements; or

(2) Telecommunications equipment that cannot route or redirect user data traffic or permit visibility into any user data or packets that such equipment transmits or otherwise handles.

ii) By necessary implication and regulation, the prohibitions also do not apply to:

(1) Covered telecommunications equipment or services that:

i. Are not used as a substantial or essential component of any system; and
ii. Are not used as critical technology of any system.

(2) Other telecommunications equipment or services that are not considered covered telecommunications equipment or services.

D. Reporting requirement.

i) In the event the contractor identifies covered telecommunications equipment or services used as a substantial or essential component of any system, or as critical technology as part of any system, during contract performance, or the contractor is notified of such by a subcontractor at any tier or by any other source, the contractor shall report the information in paragraph (d)(2) of this clause to the recipient or subrecipient, unless elsewhere in this contract are established procedures for reporting the information.

ii) The Contractor shall report the following information pursuant to paragraph (d)(1) of this clause:

(1) Within one business day from the date of such identification or notification: The contract number; the order number(s), if applicable; supplier name; supplier unique entity identifier (if known); supplier Commercial and Government Entity (CAGE) code (if known); brand; model number (original equipment manufacturer number, manufacturer part number, or wholesaler number); item description; and any readily available information about mitigation actions undertaken or recommended.

(2) Within 10 business days of submitting the information in paragraph (d)(2)(i) of this clause: Any further available information about mitigation actions undertaken or recommended. In addition, the contractor shall describe the efforts it undertook to prevent use or submission of covered telecommunications equipment or services, and any additional efforts that will be incorporated to prevent future use or submission of covered telecommunications equipment or services.

iii) Subcontracts. The Contractor shall insert the substance of this clause, including this paragraph, in all subcontracts and other contractual instruments."

42. DOMESTIC PREFERENCES FOR PROCUREMENTS

As appropriate, and to the extent consistent with law, the contractor should, to the greatest extent practicable, provide a preference for the purchase, acquisition, or use of goods, products, or materials produced in the United States. This includes, but is not limited to iron, aluminum, steel, cement, and other manufactured products.

For purposes of this clause:

Produced in the United States means, for iron and steel products, that all manufacturing processes, from the initial melting stage through the application of coatings, occurred in the United States.

Manufactured products mean items and construction materials composed in whole or in part of non-ferrous metals such as aluminum; plastics and polymer-based products such as polyvinyl chloride pipe; aggregates such as concrete; glass, including optical fiber; and lumber

43. FEDERAL LABOR STANDARDS PROVISIONS

The Contractor shall abide by the requirements of the Federal Labor Standards Provisions (form HUD-4010) as follows.

44. AUTHORIZATION

ATTEST:

YWCA Greater New Orleans

_____

By: Loyce Pierce Wright
President of the Board of Directors

_____ Date: _____

[name of CONTRACTOR]

_____ By: _____
[*name & title of CONTRACTOR Representative*]

_____ Date: _____

HUD-4010
Federal Labor Standards Provisions

U.S. Department of Housing and Urban Development
Office of Davis-Bacon and Labor Standards

A. APPLICABILITY

The Project or Program to which the construction work covered by this Contract pertains is being assisted by the United States of America, and the following Federal Labor Standards Provisions are included in this Contract pursuant to the provisions applicable to such Federal assistance.

(1) MINIMUM WAGES

(i) All laborers and mechanics employed or working upon the site of the work will be paid unconditionally and not less often than once a week, and without subsequent deduction or rebate on any account (except such payroll deductions as are permitted by regulations issued by the Secretary of Labor under the Copeland Act (29 CFR Part 3)), the full amount of wages and bona fide fringe benefits (or cash equivalents thereof) due at time of payment, computed at rates not less than those contained in the wage determination of the Secretary of Labor (which is attached hereto and made a part hereof), regardless of any contractual relationship which may be alleged to exist between the contractor and such laborers and mechanics. Contributions made or costs reasonably anticipated for bona fide fringe benefits under Section 1(b)(2) of the Davis-Bacon Act on behalf of laborers or mechanics are considered wages paid to such laborers or mechanics, subject to the provisions of 29 CFR 5.5(a)(1)(iv); also, regular contributions made or costs incurred for more than a weekly period (but not less often than quarterly) under plans, funds, or programs, which cover the particular weekly period, are deemed to be constructively made or incurred during such weekly period.

Such laborers and mechanics shall be paid the appropriate wage rate and fringe benefits on the wage determination for the classification of work actually performed, without regard to skill, except as provided in 29 CFR 5.5(a)(4). Laborers or mechanics performing work in more than one classification may be compensated at the rate specified for each classification for the time actually worked therein: Provided, that the employer's payroll records accurately set forth the time spent in each classification in which work is performed. The wage determination (including any additional classification and wage rates conformed under 29 CFR 5.5(a)(1)(ii) and the Davis-Bacon poster (WH1321)) shall be posted at all times by the contractor and its subcontractors at the site of the work in a prominent and accessible place, where it can be easily seen by the workers.

(ii) Additional Classifications.

(A) Any class of laborers or mechanics which is not listed in the wage determination and which is to be employed under the contract shall be classified in conformance with the wage determination. HUD shall approve an additional classification and wage rate and fringe benefits therefor only when the following criteria have been met:

(1) The work to be performed by the classification requested is not performed by a classification in the wage determination;
(2) The classification is utilized in the area by the construction industry; and
(3) The proposed wage rate, including any bona fide fringe benefits, bears a reasonable relationship to the wage rates contained in the wage determination.

(B) If the contractor, the laborers and mechanics to be employed in the classification (if known), or their representatives, and HUD or its designee agree on the proposed classification and wage rate (including the amount designated for fringe benefits, where appropriate), a report of the action taken shall be sent by HUD or its designee to the Administrator of the Wage and Hour Division ("Administrator"), Employment Standards Administration, U.S. Department of Labor, Washington, D.C. 20210. The Administrator, or an authorized representative, will approve, modify, or disapprove every additional classification action within 30 days of receipt and so advise HUD or its designee or will notify HUD or its designee within the 30-day period that additional time is necessary. (Approved by the Office of Management and Budget ("OMB") under OMB control number 1235-0023.)

(C) In the event the contractor, the laborers or mechanics to be employed in the classification or their representatives, or HUD or its designee do not agree on the proposed classification and wage rate (including the amount designated for fringe benefits, where appropriate), HUD or its designee shall refer the questions, including the views of all interested parties and the recommendation of HUD or its designee, to the Administrator for determination. The Administrator, or an authorized representative, will issue a determination within 30 days of receipt and so advise HUD or its designee or will notify HUD or its designee within the 30-day period that additional time is necessary. (Approved by the Office of Management and Budget under OMB Control Number 1235-0023.)

(D) The wage rate (including fringe benefits, where appropriate) determined pursuant to subparagraphs (1)(ii)(B) or (C) of this paragraph, shall be paid to all workers performing work in the classification under this Contract from the first day on which work is performed in the classification.

(iii) Whenever the minimum wage rate prescribed in the contract for a class of laborers or mechanics includes a fringe benefit which is not expressed as an hourly rate, the contractor shall either pay the benefit as stated in the wage determination or shall pay another bona fide fringe benefit or an hourly cash equivalent thereof.

(iv) If the contractor does not make payments to a trustee or other third person, the contractor may consider as part of the wages of any laborer or mechanic the amount of any costs reasonably anticipated in providing bona fide fringe benefits under a plan or program, Provided, that the Secretary of Labor has found, upon the written request of the contractor, that the applicable standards of the Davis-Bacon Act have been met. The Secretary of Labor may require the contractor to set aside in a separate account assets for the meeting of obligations under the plan or program. (Approved by the Office of Management and Budget under OMB Control Number 1235-0023.)

(2) Withholding. HUD or its designee shall, upon its own action or upon written request of an authorized representative of the U.S. Department of Labor, withhold or cause to be withheld from the contractor under this contract or any other Federal contract with the same prime contractor, or any other Federally-assisted contract subject to Davis-Bacon prevailing wage requirements which is held by the same prime contractor, so much of the accrued payments or advances as may be considered necessary to pay laborers and mechanics, including apprentices, trainees and helpers, employed by the contractor or any subcontractor the full amount of wages required by the contract. In the event of failure to pay any laborer or mechanic, including any apprentice, trainee or helper, employed or working on the site of the work, all or part of the wages required by the contract, HUD or its designee may, after written notice to the contractor, sponsor, applicant, or owner, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds until such violations have ceased. HUD or its designee may, after written notice to the contractor, disburse such amounts withheld for and on account of the contractor or subcontractor to the respective employees to whom they are due. The U.S. Department of Labor shall make such disbursements in the case of direct Davis-Bacon Act contracts.

(3) Payrolls and basic records.

(i) Maintaining Payroll Records. Payrolls and basic records relating thereto shall be maintained by the contractor during the course of the work and preserved for a period of three years thereafter for all laborers and mechanics working at the site of the work. Such records shall contain the name, address, and social security number of each such worker, his or her correct classification(s), hourly rates of wages paid (including rates of contributions or costs anticipated for bona fide fringe benefits or cash equivalents thereof of the types described in Section 1(b)(2)(B) of the Davis-Bacon Act), daily and weekly number of hours worked, deductions made, and actual wages paid.

Whenever the Secretary of Labor has found, under 29 CFR 5.5(a)(1)(iv), that the wages of any laborer or mechanic include the amount of any costs reasonably anticipated in providing benefits under a plan or program described in Section 1(b)(2)(B) of the Davis-Bacon Act, the contractor shall maintain records which show that the commitment to provide such benefits is enforceable, that the plan or program is financially responsible, and that the plan or program has been communicated in writing to the laborers or mechanics affected, and records which show the costs anticipated or the actual cost incurred in providing such benefits.

Contractors employing apprentices or trainees under approved programs shall maintain written evidence of the registration of apprenticeship programs and certification of trainee programs, the registration of the apprentices and trainees, and the ratios and wage rates prescribed in the applicable programs. (Approved by the Office of Management and Budget under OMB Control Numbers 1235-0023 and 1215-0018)

(ii) Certified Payroll Reports.

(A) The contractor shall submit weekly, for each week in which any contract work is performed, a copy of all payrolls to HUD or its designee if the agency is a party to the contract, but if the agency is not such a party, the contractor will submit the payrolls to the applicant sponsor, or owner, as the case may be, for transmission to HUD or its designee. The payrolls submitted shall set out accurately and completely all of the information required to be maintained under 29 CFR 5.5(a)(3)(i), except that full social security numbers and home addresses shall not be included on weekly transmittals. Instead, the payrolls only need to include an individually identifying number for each employee (e.g., the last four digits of the employee's social security number). The required weekly payroll information may be submitted in any form desired. Optional Form WH-347 is available for this purpose from the Wage and Hour Division Web site at **https://www.dol.gov/agencies/whd/forms** or its successor site. The prime contractor is responsible for the submission of copies of payrolls by all subcontractors.

Contractors and subcontractors shall maintain the full social security number and current address of each covered worker, and shall provide them upon request to HUD or its designee if the agency is a party to the contract, but if the agency is not such a party, the contractor will submit the payrolls to the applicant sponsor, or owner, as the case may be, for transmission to HUD or its designee, the contractor, or the Wage and Hour Division of the U.S. Department of Labor for purposes of an investigation or audit of compliance with prevailing wage requirements. It is not a violation of this subparagraph for a prime contractor to require a subcontractor to provide addresses and social security numbers to the prime contractor for its own records, without weekly submission to HUD or its designee. (Approved by the Office of Management and Budget under OMB Control Number 1235-0008.)

(B) Each payroll submitted shall be accompanied by a "Statement of Compliance," signed by the contractor or subcontractor or his or her agent who pays or supervises the payment of the persons employed under the contract and shall certify the following:

(1) That the payroll for the payroll period contains the information required to be provided under 29 CFR 5.5(a)(3)(ii), the appropriate information is being maintained under 29 CFR 5.5(a)(3)(i), and that such information is correct and complete;

(2) That each laborer or mechanic (including each helper, apprentice, and trainee) employed on the contract during the payroll period has been paid the full weekly wages earned, without rebate, either directly or indirectly, and that no deductions have been made either directly or indirectly from the full wages earned, other than permissible deductions as set forth in 29 CFR Part 3;

(3) That each laborer or mechanic has been paid not less than the applicable wage rates and fringe benefits or cash equivalents for the classification of work performed, as specified in the applicable wage determination incorporated into the contract; and

(C) The weekly submission of a properly executed certification set forth on the reverse side of Optional Form WH-347 shall satisfy the requirement for submission of the "Statement of Compliance" required by subparagraph (a)(3)(ii)(b).

(D) The falsification of any of the above certifications may subject the contractor or subcontractor to civil or criminal prosecution under Section 1001 of Title 18 and Section 3729 of Title 31 of the United States Code.

(iii) The contractor or subcontractor shall make the records required under subparagraph (a)(3)(i) available for inspection, copying, or transcription by authorized representatives of HUD or its designee or the U.S. Department of Labor, and shall permit such representatives to interview employees during working hours on the job. If the contractor or subcontractor fails to submit the required records or to make them available, HUD or its designee may, after written notice to the contractor, sponsor, applicant, or owner, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds. Furthermore, failure to submit the required records upon request or to make such records available may be grounds for debarment action pursuant to 29 CFR 5.12.

(4) Apprentices and Trainees.

(i) Apprentices. Apprentices will be permitted to work at less than the predetermined rate for the work they performed when they are employed pursuant to and individually registered in a bona fide apprenticeship program registered with the U.S. Department of Labor, Employment and Training Administration, Office of Apprenticeship Training, Employer and Labor Services, or with a State Apprenticeship Agency recognized by the Office, or if a person is employed in his or her first 90 days of probationary employment as an apprentice in such an apprenticeship program, who is not individually registered in the program, but who has been certified by the Office of Apprenticeship Training, Employer and Labor Services, or a State Apprenticeship Agency (where appropriate), to be eligible for probationary employment as an apprentice.

The allowable ratio of apprentices to journeymen on the job site in any craft classification shall not be greater than the ratio permitted to the contractor as to the entire work force under the registered program. Any worker listed on a payroll at an apprentice wage rate, who is not registered or otherwise employed as stated above, shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any apprentice performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. Where a contractor is performing construction on a project in a locality other than that in which its program is registered, the ratios and wage rates (expressed in percentages of the journeyman's hourly rate) specified in the contractor's or subcontractor's registered program shall be observed.

Every apprentice must be paid at not less than the rate specified in the registered program for the apprentice's level of progress, expressed as a percentage of the journeymen hourly rate specified in the applicable wage determination. Apprentices shall be paid fringe benefits in accordance with the provisions of the apprenticeship program.

If the apprenticeship program does not specify fringe benefits, apprentices must be paid the full amount of fringe benefits listed on the wage determination for the applicable classification. If the Administrator determines that a different practice prevails for the applicable apprentice classification, fringe benefits shall be paid in accordance with that determination. In the event the Office of Apprenticeship Training, Employer and Labor Services, or a State Apprenticeship Agency recognized by the Office, withdraws approval of an apprenticeship program, the contractor will no longer be permitted to utilize apprentices at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

(ii) **Trainees.** Except as provided in 29 CFR 5.16, trainees will not be permitted to work at less than the predetermined rate for the work performed, unless they are employed pursuant to and individually registered in a program which has received prior approval, evidenced by formal certification by the U.S. Department of Labor, Employment and Training Administration. The ratio of trainees to journeymen on the job site shall not be greater than permitted under the plan approved by the Employment and Training Administration. Every trainee must be paid at not less than the rate specified in the approved program for the trainee's level of progress, expressed as a percentage of the journeyman hourly rate specified in the applicable wage determination. Trainees shall be paid fringe benefits in accordance with the provisions of the trainee program. If the trainee program does not mention fringe benefits, trainees shall be paid the full amount of fringe benefits listed on the wage determination unless the Administrator of the Wage and Hour Division determines that there is an apprenticeship program associated with the corresponding journeyman wage rate on the wage determination which provides for less than full fringe benefits for apprentices. Any employee listed on the payroll at a trainee rate who is not registered and participating in a training plan approved by the Employment and Training Administration shall be paid not less than the applicable wage rate on the wage determination for the work actually performed.

In addition, any trainee performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. In the event the Employment and Training Administration withdraws approval of a training program, the contractor will no longer be permitted to utilize trainees at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

(iii) **Equal employment opportunity.** The utilization of apprentices, trainees, and journeymen under 29 CFR Part 5 shall be in conformity with the equal employment opportunity requirements of Executive Order 11246, as amended, and 29 CFR Part 30.

(5) **Compliance with Copeland Act requirements.** The contractor shall comply with the requirements of 29 CFR Part 3, which are incorporated by reference in this Contract.

(6) **Subcontracts.** The contractor or subcontractor will insert in any subcontracts the clauses contained in subparagraphs (1) through (11) in this paragraph (a) and such other clauses as HUD or its designee may, by appropriate instructions, require, and a copy of the applicable prevailing wage decision, and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for the compliance by any subcontractor or lower tier subcontractor with all the contract clauses in this paragraph.

(7) **Contract termination; debarment.** A breach of the contract clauses in 29 CFR 5.5 may be grounds for termination of the contract and for debarment as a contractor and a subcontractor as provided in 29 CFR 5.12.

(8) **Compliance with Davis-Bacon and Related Act Requirements.** All rulings and interpretations of the Davis-Bacon and Related Acts contained in 29 CFR Parts 1, 3, and 5 are herein incorporated by reference in this Contract.

(9) **Disputes concerning labor standards.** Disputes arising out of the labor standards provisions of this Contract shall not be subject to the general disputes clause of this Contract. Such disputes shall be resolved in accordance with the procedures of the U.S. Department of Labor set forth in 29 CFR Parts 5, 6, and 7. Disputes within the meaning of this clause include disputes between the contractor (or any of its subcontractors) and HUD or its designee, the U.S. Department of Labor, or the employees or their representatives.

(10) **Certification of Eligibility.**

(i) By entering into this Contract, the contractor certifies that neither it (nor he or she) nor any person or firm who has an interest in the contractor's firm is a person or firm ineligible to be awarded Government contracts by virtue of Section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1) or to be awarded HUD contracts or participate in HUD programs pursuant to 24 CFR Part 24.

(ii) No part of this Contract shall be subcontracted to any person or firm ineligible for award of a Government contract by virtue of Section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1) or to be awarded HUD contracts or participate in HUD programs pursuant to 24 CFR Part 24.

(iii) Anyone who knowingly makes, presents, or submits a false, fictitious, or fraudulent statement, representation or certification is subject to criminal, civil and/or administrative sanctions, including fines, penalties, and imprisonment (e.g., 18 U.S.C. §§ 287, 1001, 1010, 1012; 31 U.S.C. §§ 3729, 3802.

(11) Complaints, Proceedings, or Testimony by Employees. No laborer or mechanic, to whom the wage, salary, or other labor standards provisions of this Contract are applicable, shall be discharged or in any other manner discriminated against by the contractor or any subcontractor because such employee has filed any complaint or instituted or caused to be instituted any proceeding or has testified or is about to testify in any proceeding under or relating to the labor standards applicable under this Contract to his employer.

B. CONTRACT WORK HOURS AND SAFETY STANDARDS ACT

The provisions of this paragraph (b) are applicable where the amount of the prime contract exceeds **$100,000**. As used in this paragraph, the terms "laborers" and "mechanics" include watchmen and guards.

(1) Overtime requirements. No contractor or subcontractor contracting for any part of the contract work, which may require or involve the employment of laborers or mechanics, shall require or permit any such laborer or mechanic in any workweek in which the individual is employed on such work to work in excess of 40 hours in such workweek, unless such laborer or mechanic receives compensation at a rate not less than one and one-half times the basic rate of pay for all hours worked in excess of 40 hours in such workweek.

(2) Violation; liability for unpaid wages; liquidated damages. In the event of any violation of the clause set forth in subparagraph B(1) of this paragraph, the contractor, and any subcontractor responsible therefor, shall be liable for the unpaid wages. In addition, such contractor and subcontractor shall be liable to the United States (in the case of work done under contract for the District of Columbia or a territory, to such District or to such territory) for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer or mechanic, including watchmen and guards, employed in violation of the clause set forth in subparagraph B(1) of this paragraph, **in the sum set by the U.S. Department of Labor at 29 CFR 5.5(b)(2)** for each calendar day on which such individual was required or permitted to work in excess of the standard workweek of 40 hours without payment of the overtime wages required by the clause set forth in subparagraph B(1) of this paragraph. In accordance with the Federal Civil Penalties Inflation Adjustment Act of 1990 (28 U.S.C. § 2461 Note), the DOL adjusts this civil monetary penalty for inflation no later than January 15 each year.

(3) Withholding for unpaid wages and liquidated damages. HUD or its designee shall, upon its own action or upon written request of an authorized representative of the U.S. Department of Labor, withhold or cause to be withheld from any moneys payable on account of work performed by the contractor or subcontractor under any such contract, or any other Federal contract with the same prime contract, or any other Federally-assisted contract subject to the Contract Work Hours and Safety Standards Act which is held by the same prime contractor, such sums as may be determined to be necessary to satisfy any liabilities of such contractor or subcontractor for unpaid wages and liquidated damages, as provided in the clause set forth in subparagraph B(2) of this paragraph.

(4) Subcontracts. The contractor or subcontractor shall insert in any subcontracts the clauses set forth in subparagraph B(1) through (4) of this paragraph and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for compliance by any subcontractor or lower tier subcontractor with the clauses set forth in subparagraphs B(1) through (4) of this paragraph.

C. HEALTH AND SAFETY

The provisions of this paragraph (c) are applicable where the amount of the prime contract exceeds **$100,000**.

(1) No laborer or mechanic shall be required to work in surroundings or under working conditions which are unsanitary, hazardous, or dangerous to his or her health and safety, as determined under construction safety and health standards promulgated by the Secretary of Labor by regulation.

(2) The contractor shall comply with all regulations issued by the Secretary of Labor pursuant to 29 CFR Part 1926 and failure to comply may result in imposition of sanctions pursuant to the Contract Work Hours and Safety Standards Act, (Public Law 91-54, 83 Stat 96), 40 U.S.C. § 3701 et seq.

(3) The contractor shall include the provisions of this paragraph in every subcontract, so that such provisions will be binding on each subcontractor. The contractor shall take such action with respect to any subcontractor as the Secretary of Housing and Urban Development or the Secretary of Labor shall direct as a means of enforcing such provisions.

SECTION 01010

FEDERAL WAGE DECISION

YWCA GREATER NEW ORLEANS
NEW DAYCARE, EDUCATION & COUNSELING BUILDING

DAVIS BACON WAGE LIST FOR ORLEANS PARISH

"General Decision Number: LA20250041 04/04/2025

Superseded General Decision Number: LA20240041

State: Louisiana

Construction Type: Building

County: Orleans County in Louisiana.

BUILDING CONSTRUCTION PROJECTS (does not include single family
homes or apartments up to and including 4 stories).

Note: Contracts subject to the Davis-Bacon Act are generally
required to pay at least the applicable minimum wage rate
required under Executive Order 14026 or Executive Order 13658.
Please note that these Executive Orders apply to covered
contracts entered into by the federal government that are
subject to the Davis-Bacon Act itself, but do not apply to
contracts subject only to the Davis-Bacon Related Acts,
including those set forth at 29 CFR 5.1(a)(1).

If the contract is entered into on or after January 30, 2022, or the contract is	. Executive Order 14026 generally applies to the contract.

renewed or extended (e.g., an option is exercised) on or after January 30, 2022:	. The contractor must pay all covered workers at least $17.75 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on the contract in 2025.	
If the contract was awarded on or between January 1, 2015 and January 29, 2022, and the contract is not renewed or extended on or after January 30, 2022:	. Executive Order 13658 generally applies to the contract. . The contractor must pay all covered workers at least $13.30 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on that contract in 2025.	

|_____|_____|

The applicable Executive Order minimum wage rate will be adjusted annually. If this contract is covered by one of the Executive Orders and a classification considered necessary for performance of work on the contract does not appear on this wage determination, the contractor must still submit a conformance request.

Additional information on contractor requirements and worker protections under the Executive Orders is available at http://www.dol.gov/whd/govcontracts.

Modification Number	Publication Date
0	01/03/2025
1	02/28/2025
2	03/14/2025
3	04/04/2025

ASBE0053-001 09/02/2024

	Rates	Fringes
ASBESTOS WORKER/HEAT & FROST INSULATOR	$ 32.66	9.86

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* ELEC0130-010 12/02/2024

	Rates	Fringes

ELECTRICIAN (Including
Communication Technician and
Low Voltage Wiring).....$ 35.00
16.03

ELEV0016-001 01/01/2025

	Rates	Fringes
ELEVATOR MECHANIC	$ 51.11	38.435+a+b

a. PAID HOLIDAYS: New Year's Day, Memorial Day, Independence Day, Labor Day, Veterans' Day, Thanksgiving Day, the Friday after Thanksgiving Day and Christmas Day.

b. VACATION: Employer contributes 8% of basic hourly rate for 5 years or more of service; 6% of basic hourly rate for under 5 years of service as vacation pay credit.

ENGI0406-002 07/01/2014

	Rates	Fringes
POWER EQUIPMENT OPERATOR (Crane)	$ 23.46	8.35

CRANE PREMIUMS:

50-150 Tons	$1.75
Over 150 Tons	$2.25

IRON0623-021 07/01/2024

	Rates	Fringes
IRONWORKER (REINFORCING AND STRUCTURAL)	$ 34.75	13.86

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* PAIN1244-006 09/01/2024

	Rates	Fringes
GLAZIER	$ 25.44	12.20

PAIN1244-013 12/01/2021

	Rates	Fringes
PAINTER: Spray Only (Excludes Drywall Finishing/Taping)	$ 18.83	9.48

PLAS0567-001 08/01/2022

	Rates	Fringes
CEMENT MASON/CONCRETE FINISHER	$ 30.47	7.97

PLUM0060-009 06/03/2024

	Rates	Fringes
PIPEFITTER (Including HVAC Pipe and Unit Installation; Excluding Installation of HVAC Temperature Controls)	$ 33.30	14.98
PLUMBER (Installation of HVAC Temperature Controls; Excluding HVAC Pipe and Unit Installation)	$ 33.30	14.98

SHEE0214-010 09/01/2013

	Rates	Fringes
SHEET METAL WORKER (Including HVAC Duct Installation)	$ 26.71	11.93

* SULA2012-026 09/22/2014

	Rates	Fringes
BRICKLAYER	$ 18.66	0.00
CARPENTER (Form Work Only)	$ 15.00 **	0.00
CARPENTER, Excludes Drywall Hanging and Metal Stud Installation, and Form Work	$ 19.37	2.46
DRYWALL FINISHER/TAPER	$ 16.55 **	0.00

DRYWALL HANGER AND METAL STUD
INSTALLER.....$ 18.21
4.90

LABORER: Common or General.....$ 13.09 **
0.00

LABORER: Mason Tender - Brick...$ 12.38 **
0.00

OPERATOR:
Backhoe/Excavator/Trackhoe.....$ 22.92
0.00

PAINTER (BRUSH AND ROLLER),
Excludes Drywall
Finishing/Taping.....$ 17.25 **
0.00

ROOFER.....$ 16.77 **
5.66

SPRINKLER FITTER (Fire
Sprinklers).....$ 21.08
5.79

TILE SETTER.....$ 20.00
0.00

TRUCK DRIVER: Dump Truck.....$ 15.00 **
0.00

WELDERS - Receive rate prescribed for craft performing
operation to which welding is incidental.

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** Workers in this classification may be entitled to a higher minimum wage under Executive Order 14026 ($17.75) or 13658 ($13.30). Please see the Note at the top of the wage determination for more information. Please also note that the minimum wage requirements of Executive Order 14026 are not currently being enforced as to any contract or subcontract to which the states of Texas, Louisiana, or Mississippi, including their agencies, are a party.

Note: Executive Order (EO) 13706, Establishing Paid Sick Leave for Federal Contractors applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2017. If this contract is covered by the EO, the contractor must provide employees with 1 hour of paid sick leave for every 30 hours they work, up to 56 hours of paid sick leave each year. Employees must be permitted to use paid sick leave for their own illness, injury or other health-related needs, including preventive care; to assist a family member (or person who is like family to the employee) who is ill, injured, or has other health-related needs, including preventive care; or for reasons resulting from, or to assist a family member (or person who is

like family to the employee) who is a victim of, domestic violence, sexual assault, or stalking. Additional information on contractor requirements and worker protections under the EO is available at https://www.dol.gov/agencies/whd/government-contracts.

Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses (29CFR 5.5 (a) (1) (iii)).

The body of each wage determination lists the classifications and wage rates that have been found to be prevailing for the type(s) of construction and geographic area covered by the wage determination. The classifications are listed in alphabetical order under rate identifiers indicating whether the particular rate is a union rate (current union negotiated rate), a survey rate, a weighted union average rate, a state adopted rate, or a supplemental classification rate.

Union Rate Identifiers

A four-letter identifier beginning with characters other than

""SU"", ""UAVG"", ?SA?, or ?SC? denotes that a union rate was prevailing for that classification in the survey. Example: PLUM0198-005 07/01/2024. PLUM is an identifier of the union whose collectively bargained rate prevailed in the survey for this classification, which in this example would be Plumbers. 0198 indicates the local union number or district council number where applicable, i.e., Plumbers Local 0198. The next number, 005 in the example, is an internal number used in processing the wage determination. The date, 07/01/2024 in the example, is the effective date of the most current negotiated rate.

Union prevailing wage rates are updated to reflect all changes over time that are reported to WHD in the rates in the collective bargaining agreement (CBA) governing the classification.

Union Average Rate Identifiers

The UAVG identifier indicates that no single rate prevailed for those classifications, but that 100% of the data reported for the classifications reflected union rates. EXAMPLE: UAVG-OH-0010 01/01/2024. UAVG indicates that the rate is a weighted union average rate. OH indicates the State of Ohio. The next number, 0010 in the example, is an internal number

used in producing the wage determination. The date, 01/01/2024
in the example, indicates the date the wage determination was
updated to reflect the most current union average rate.

A UAVG rate will be updated once a year, usually in January, to
reflect a weighted average of the current rates in the
collective bargaining agreements on which the rate is based.

Survey Rate Identifiers

The ""SU"" identifier indicates that either a single non-union
rate prevailed (as defined in 29 CFR 1.2) for this
classification in the survey or that the rate was derived by
computing a weighted average rate based on all the rates
reported in the survey for that classification. As a weighted
average rate includes all rates reported in the survey, it may
include both union and non-union rates. Example: SUFL2022-007
6/27/2024. SU indicates the rate is a single non-union
prevailing rate or a weighted average of survey data for that
classification. FL indicates the State of Florida. 2022 is the
year of the survey on which these classifications and rates are
based. The next number, 007 in the example, is an internal
number used in producing the wage determination. The date,

6/27/2024 in the example, indicates the survey completion date
for the classifications and rates under that identifier.

?SU? wage rates typically remain in effect until a new survey
is conducted. However, the Wage and Hour Division (WHD) has the
discretion to update such rates under 29 CFR 1.6(c)(1).

State Adopted Rate Identifiers

The ""SA"" identifier indicates that the classifications and
prevailing wage rates set by a state (or local) government were
adopted under 29 C.F.R 1.3(g)-(h). Example: SAME2023-007
01/03/2024. SA reflects that the rates are state adopted. ME
refers to the State of Maine. 2023 is the year during which the
state completed the survey on which the listed classifications
and rates are based. The next number, 007 in the example, is an
internal number used in producing the wage determination.
The date, 01/03/2024 in the example, reflects the date on which
the classifications and rates under the ?SA? identifier took
effect under state law in the state from which the rates were
adopted.

WAGE DETERMINATION APPEALS PROCESS

1) Has there been an initial decision in the matter? This can
be:

a) a survey underlying a wage determination
b) an existing published wage determination
c) an initial WHD letter setting forth a position on
a wage determination matter
d) an initial conformance (additional classification
and rate) determination

On survey related matters, initial contact, including requests
for summaries of surveys, should be directed to the WHD Branch
of Wage Surveys. Requests can be submitted via email to
davisbaconinfo@dol.gov or by mail to:

Branch of Wage Surveys
Wage and Hour Division
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

Regarding any other wage determination matter such as
conformance decisions, requests for initial decisions should be
directed to the WHD Branch of Construction Wage Determinations.
Requests can be submitted via email to BCWD-Office@dol.gov or
by mail to:

Branch of Construction Wage Determinations
Wage and Hour Division
U.S. Department of Labor

200 Constitution Avenue, N.W.
Washington, DC 20210

2) If an initial decision has been issued, then any interested party (those affected by the action) that disagrees with the decision can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Requests for review and reconsideration can be submitted via email to dba.reconsideration@dol.gov or by mail to:

Wage and Hour Administrator
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

The request should be accompanied by a full statement of the interested party's position and any information (wage payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

3) If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board). Write to:

Administrative Review Board
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210.

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END OF GENERAL DECISION"

SECTION 01011

DAVIS-BACON AND LABOR STANDARDS CONTRACTOR GUIDE ADDENDUM

YWCA GREATER NEW ORLEANS
NEW DAYCARE, EDUCATION & COUNSELING BUILDING

DAVIS-BACON AND LABOR STANDARDS
CONTRACTOR GUIDE ADDENDUM

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INTRODUCTION

This Guide has been prepared for you as a contractor performing work on construction projects that are assisted by the Department of Housing and Urban Development and subject to Davis-Bacon prevailing wage requirements. This Guide does not address contractor requirements involved in direct Federal contracting where HUD or another Federal agency enters into a procurement contract. In this latter case, the Federal Acquisition Regulations (FAR) are applicable. While the guidance contained in this Guide is generally applicable to any Davis-Bacon covered project, specific questions pertaining to direct Federal contracts should be addressed to the Contracting Officer who signed the contract for the Federal agency.

Our objective here is to provide you with a guide that is simple and non-bureaucratic yet comprehensive, and will help you better understand and comply with Davis-Bacon labor standards. HUD's Office of Davis Bacon and Labor Standards worked closely with the Department of Labor's Wage and Hour Division to make sure that the labor standards provisions in your contract and the specifics of complying with them represent the latest information. It is the Department of Labor that has general administrative oversight of all Federal contracting agencies, such as HUD, which administer the day-to-day responsibilities of enforcing Davis-Bacon provisions in construction contracts that they either fund or assist in funding.

This Guide contains six main chapters. The first chapter includes the laws and regulations associated with Federal labor standards administration and enforcement. The second chapter lists the responsibilities of contractors and of state, tribal, and local contracting agencies that administer HUD programs. The third chapter lists wage basics, including wage decisions, wage classifications, and wage rates, to provide background for the rest of the Guide. The fourth chapter discusses reviewing and reporting payrolls. The fifth chapter delves into additional work classifications and wage rates. The sixth and final chapter discusses sanctions and restitution. For further background, the DBLS Agency Guide may be used as a reference.

Finally, not all HUD construction projects are covered by Davis-Bacon wage rates. For the purpose of this Guide, we are assuming that a determination has already been made that Davis-Bacon wage rates are applicable. Should you wish assistance in determining whether Davis-Bacon wage rates apply to a particular project or if you need other related technical assistance, please consult with the HUD Labor Standards Field staff for your area.

RESOURCE

Visit the Office of Davis Bacon and Labor Standards online: www.hud.gov/program_offices/davis_bacon_and_labor_standards

BASIC DBA DEFINITIONS

See Section 3 in the Agency Guide.

LAWS AND REGULATIONS

The Davis-Bacon Act (DBA)

The Davis-Bacon Act (DBA) requires the payment of prevailing wage rates (determined by the U.S. Department of Labor) to all laborers and mechanics on Federal government and District of Columbia construction projects in excess of $2,000. Construction includes alteration and/or repair, including painting and decorating, of public buildings or public works. Most HUD construction work is not covered by the DBA itself since HUD seldom contracts directly for construction services. Most often, if DB applies to a HUD project is it because of a labor provision contained in one of HUD's "Related Acts" (see 5.9 in the Agency Guide). The Related Acts are often referred to as the Davis-Bacon and Related Acts or DBRA.

The Contract Work Hours and Safety Standards Act (CWHSSA)

CWHSSA requires time and one-half pay for overtime (OT) hours (over 40 in any workweek) worked on a covered project. The CWHSSA applies to both direct federal contracts and to federally-assisted contracts where those contracts require or involve the employment of laborers and mechanics and where federal wage standards (e.g., Davis-Bacon or HUD-determined prevailing wage rates) are applicable. CWHSSA provisions apply to all laborers and mechanics, including watchmen and guards, employed by any contractor or subcontractor. CWHSSA also applies to maintenance laborers and mechanics employed by contractors or subcontractors engaged in the operation of Public Housing Agencies (PHA), Tribally Designated Housing Entities (TDHE), and Indian Housing Agencies (IHA) developments.

Exemptions:

CWHSSA O/T provisions do not apply where the federal assistance is only in the nature of a loan guarantee or insurance.

CWHSSA O/T provisions do not apply to prime contracts of $100,000 or less.

The Copeland Act (Anti-Kickback Act)

The Copeland Act makes it a Federal crime for anyone to require any laborer or mechanic (employed on a Federal or Federally-assisted project) to kickback, (i.e., give up or pay back) any part of their wages. The Copeland Act requires every employer to submit weekly certified payroll reports, and regulates permissible payroll deductions.

The Fair Labor Standards Act (FLSA)

The FLSA governs matters such as federal minimum wage rates and O/T. These standards are generally applicable to any labor performed and may be pre-empted by other (often more stringent) federal standards such as the DBRA prevailing wage requirements and CWHSSA O/T provisions. The authority to administer and enforce FLSA provisions resides solely with DOL.

Davis-Bacon Regulations

DOL has published rules and instructions concerning Davis-Bacon and other labor laws in the Code of Federal Regulations (CFR). These regulations can be found in Title 29 CFR Parts 1, 3, 5, 6, and 7. Part 1 explains how DOL establishes and publishes DBA wage determinations (also referred to as wage decisions) and provides instructions on how to use the determinations. Part 3 describes Copeland Act requirements for payroll deductions and the submission of weekly CPRs. Part 5 covers the labor standards provisions that are in contracts relating to Davis-Bacon Act wage rates and the responsibilities of contractors and contracting agencies to administer and enforce the provisions. Part 6 provides for administrative proceedings enforcing Federal labor standards on construction and service contracts. Finally, Part 7 sets parameters for practice before the Administrative Review Board. These regulations are used as the basis for administering and enforcing the laws.

DOL Regulations are available online: www.ecfr.gov/current/title-29

Construction Contract Provisions and Labor Standards Administration

Labor standards administration involves the activities that take place primarily before construction begins. Administration sets the stage for the compliance activities that occur during the construction phase. The first and sometimes most difficult step is determining whether and to what extent Davis-Bacon wage standards apply to a particular contract or project. The Factors of Labor Standards Applicability (see Appendix II-6) should be helpful. Most HUD-assisted construction work is covered by Davis-Bacon, but there are some exceptions. The best and safest approach is to first assume that Davis-Bacon requirements will be applicable whenever the contract/project involves construction work valued in excess of $2,000, then look more closely to see if there is any reason for non-coverage. Each contract subject to Davis-Bacon labor standards requirements must contain labor standards clauses and a Davis-Bacon wage decision. These documents are normally wound into the contract specifications.

The labor standards clauses

The contract for construction is the vehicle to ensure contractor compliance and Davis-Bacon wage enforcement. Therefore, the bid specifications and/or the contract for each project subject to Davis-Bacon wage rates must contain both a Davis-Bacon wage decision and labor standards clauses. The labor standards clauses describe the responsibilities of the contractor concerning Davis-Bacon wages and obligate the contractor to comply with the Davis-Bacon wage and reporting requirements and with the O/T provisions of the CWHSSA (applicable only when the prime contract is valued at over $100,000). The labor standards clauses also provide for remedies in the event of violations, including the withholding of payments due to the contractor to ensure the payment of wages or liquidated damages that may be found due, and sanctions should violations occur. These contract clauses enable the contract administrator to enforce the Federal labor standards applicable to the project. HUD has standard forms that contain contract clauses. For example, the HUD-92554M, Supplementary Conditions Of The Contract for Construction, which is issued primarily for FHA (Federal Housing Administration) multifamily housing and other construction projects administered by HUD; the HUD-4010, Federal Labor Standards Provisions, which is used for CDBG (Community Development and Block Grant) and HOME (HOME Investment Partnerships Program) projects; and the HUD-5370, General Conditions for Construction Contracts (construction contracts >$150,000) or the HUD-5370-EZ, General Contract Conditions for Small Construction/Development Contracts (construction contracts >$2,000 but ≤$150,000) which are used for Public and Indian Housing projects. These should be wound into the contract specifications or incorporated by specific reference in the bid/contract documents (see Labor Relations Letter 96-03).

Davis-Bacon Wage Decisions

The term "wage decision" includes the original decision and any subsequent decisions that modify, supersede, correct, or otherwise change the provisions of the original decision. The term "wage decision" is used within this Guide to mean the Davis-Bacon wage decision. The terms "wage decision" and "wage determination" are used interchangeably. A wage decision is a schedule of construction work classifications, wage rates, and fringe benefits that represent the minimum rates that must be paid to workers employed in those classifications. Wage decisions are established for defined geographic areas, usually by county or group of counties, and four general characters of construction work.

RESOURCE

The Department of Housing and Urban Development (HUD) one stop forms resource page.
www.hud.gov/program_offices/administration/hudclips/forms

RESOURCE

All current Davis Bacon wage decisions can be accessed online at no cost at www.sam.gov

CONTRACTOR RESPONSIBILITIES

The principal contractor is responsible for the full compliance of all employers (the contractor, subcontractors, and any lower-tier subcontractors) with the labor standards provisions applicable to the project. Because of the contractual relationship between a prime contractor and their subcontractors, subcontractors generally should communicate with the contract administrator only through the prime contractor. (See Contract Administrator Responsibilities, below.)

CONTRACT ADMINISTRATOR RESPONSIBILITIES

The contract administrator is responsible for the proper administration and enforcement of the Federal labor standards provisions on contracts covered by Davis-Bacon requirements. This term is used to represent the person (or persons) who will provide labor standards advice and support to contractors and other project principals (e.g., owner, sponsor, architect), including providing the proper Davis-Bacon wage decision (see 6.1, The Wage Decision) and ensuring that the wage decision and contract clauses are incorporated into the contract for construction. The contract administrator also monitors labor standards compliance (see Section 12, Payroll Compliance Reviews and Corrections, in the Agency Guide) by conducting interviews with construction workers at the job site and reviewing payroll reports, and oversees any enforcement actions that may be required.

The contract administrator could be an employee or agent of HUD, or of a city or county or public housing agency. For HUD projects administered directly by HUD staff, usually FHA-insured multifamily projects, the contract administrator will be the HUD Labor Standards field staff. But many HUD-assisted projects are administered by local contracting agencies such as PHAs, TDHEs, and States, cities and counties under HUD's CDBG and HOME programs.

In these cases, the contract administrator will likely be local agency staff. In either case, the guidance for contractors remains essentially the same.

DOL also has a role in monitoring Davis-Bacon administration and enforcement. In addition, DOL has independent authority to conduct investigations. A DOL investigator or other DOL representative may visit Davis-Bacon construction sites to interview construction workers or review payroll information.

RESOURCE

Program technical guidance

For interpretations of program requirements or handbooks and instructions on the use of forms:

Housing Programs - See our Contact List for help.

WAGE BASICS

The Wage Decision

Davis-Bacon labor standards stipulate the wage payment requirements for skilled workers, operators, truck drivers, and laborers—for example: carpenters, electricians, plumbers, roofers, rollers, screeds, bulldozers, water wagons, dump trucks, and other construction work classifications that may be needed for the project. The Davis-Bacon wage decision that applies to the project contains a schedule of work classifications and wage rates that must be followed.

Remember, the wage decision is contained in the contract specifications along with the labor standards clauses. See 5.12 in the Agency Guide.

The work classifications and wage rates

A Davis-Bacon wage decision is simply a listing of different work classifications and the minimum wage rates that must be paid to anyone performing work in those classifications.

You'll want to make sure that the work classifications you need are contained in the wage decision, and make certain that you know exactly what wage rate(s) you will need to pay. Some wage decisions cover several counties and/or types of construction work (e.g., residential and commercial work) and can be lengthy and difficult to read. The contract administrator (HUD Labor Standards field staff or local agency staff) is available to assist with any trouble reading the wage decision or finding the applicable work classification(s).

To make reading lengthy wage decisions easier, a contract administrator may prepare a Project Wage Sheet (HUD-4720). This sheet is a one-page transcript that will show only the classifications and wage rates for a project. A blank copy of a Project Wage Rate Sheet is provided in the Appendix.

RESOURCE

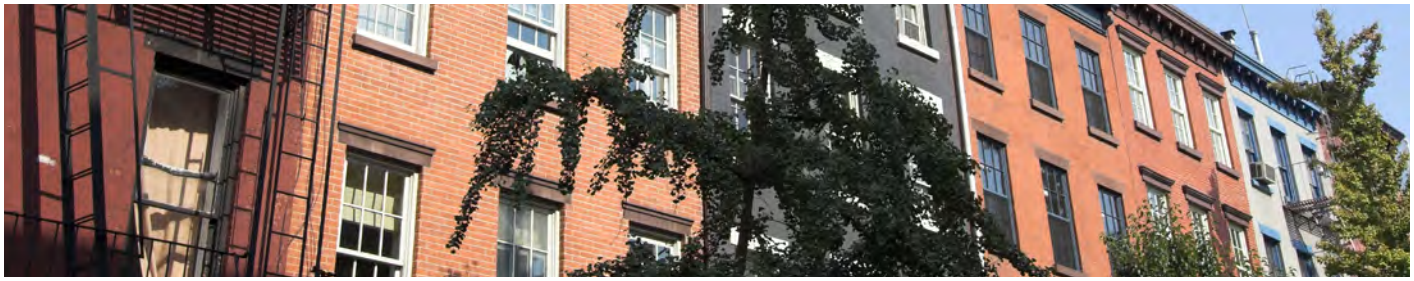
A fillable version of this form is available online at HUDClips www.hud.gov/program_offices/administration/hudclips/forms Contact the contract administrator monitoring the project for assistance with a Project Wage Rate.

Posting the wage decision, Davis-Bacon poster, and Additional Classifications wages

The prime contractor is responsible for posting a copy of the wage decision (or the Project Wage Rate Sheet), a copy of the DOL Davis-Bacon poster titled Employee Rights Under the Davis-Bacon Act (Form WH-1321), and Additional Classifications wages at the job site in a place that is easily accessible to all the construction workers employed on the project and where the wage decision and poster will not be destroyed by wind, rain, etc. The purpose of this posting is to provide information to the construction laborers and mechanics working on the project about their entitlement to the prevailing wage for their trade, and to advise them whom to contact (the contract administrator) if they have any questions or want to file a complaint.

RESOURCE

The Employee Rights Under the Davis Bacon Act poster replaces the Notice To All Employees. The new poster is available in English and Spanish online at: www.hud.gov/program_offices/davis_bacon_and_labor_standards/olrmk13.



REVIEWING PAYROLLS

Certified Payroll Reports (CPRs)

To demonstrate compliance with labor standards requirements, each employer shall prepare, certify, and submit payroll reports for each week to the sponsor, applicant, or owner for any contract work that is performed. See 29 CFR § 5.5(a)(3)(ii) for information on CPRs.

CPR format

Employers on an FHA project are required to use the HUD-authorized Electronic Payroll System (EPS) to submit CPR reports. If an approved electronic payroll reporting system is not being used by the LCA,, the employer must ensure that all information from DOL Payroll Form WH-347 is included and that the LSS can reasonably interpret it. Form WH-347 is available online at www.dol.gov/whd/forms/wh347.pdf.

Submission requirements

Each employer shall submit payroll reports beginning with the first week such employer performs work on the site of the work. Employers shall submit reports promptly following the close of each such pay week.

"No Work" payrolls

Employers are not required to submit reports for weeks during which no work was performed at the site of work, provided that the payroll reports are numbered sequentially or that the employer has provided written notice that its work on the project has been suspended.

Weekly payroll certification

Each weekly payroll submitted shall be accompanied by a "Statement of Compliance" that bears the original signature of the owner, executive/corporate officer, or a designee authorized by the owner or officer. The signature must be in ink; pencil is not acceptable. Signature stamps, photocopies, and facsimiles are not acceptable. The employer may utilize the reverse side of the DOL Payroll Form WH-347 as its Statement of Compliance or another document that contains the same language prescribed on the reverse of the WH-347.

False Submissions

The falsification of any of the above certifications may subject the employer to civil or criminal prosecution under § 1001 of Title 18 and § 231 of Title 31 of the United States Code (USC).

Payroll Review and Submission

The prime contractor should review each subcontractor's payroll reports for compliance prior to submitting the reports to the contract administrator. Remember, the prime contractor is responsible for the full compliance of all subcontractors on the contract and will be held accountable for any wage restitution that may be found due to any laborer or mechanic that is underpaid and for any liquidated damages that may be assessed for O/T violations. All the payroll reports for any project must be submitted to the contract administrator through the prime contractor.

An alert prime contractor that reviews subcontractor payroll submissions can detect any misunderstandings early, prevent costly underpayments, and protect itself from financial loss should underpayments occur.

Payroll Retention

Every contractor (including every subcontractor) must keep a complete set of their own payrolls and other basic records—such as employee addresses and full SSNs, time cards, tax records, evidence of fringe benefit payments—for a Davis-Bacon project for at least three years after the project is completed. The prime contractor must keep a complete set of all the payrolls for every contractor (including subcontractors) for at least three years after completion of the project.

Payroll Inspection

In addition to submitting payrolls to the contract administrator, every contractor (including subcontractors) must make their own copy of the payrolls and other basic records available for review or copying to any authorized representative from HUD or DOL.

REPORTING PAYROLLS

Completing a Payroll Report

Each employer shall maintain payroll records with respect to their own workforce employed at the site of the work. The prime contractor shall maintain such records relative to all laborers and mechanics working at the site of the work during the course of the construction work for at least three years following the completion of the work. Such records shall contain:

Project and contractor/subcontractor information

Each payroll must identify the contractor or subcontractor's name and address, the project name and number, and the week ending date. Week dates must be indicated in the spaces provided. Numbering payrolls is optional but strongly recommended.

Employee information

The name and an individually identifying 4-digit number for each laborer and mechanic. Employers must always maintain each employee's address and full Social Security number (SSN) during the construction of the project and for no less than three years following completion. This information must be made available to the prime contractor, HUD, and/or the LCA upon request.

Employers (prime contractors and subcontractors) must maintain the current address and full SSN for each employee and must provide this information upon request to the contracting agency or other authorized representative responsible for Federal labor standards compliance monitoring. Prime contractors may require a subcontractor to provide this information for the prime contractor's records. DOL has modified form WH-347, Payroll, to accommodate these reporting requirements.

Work classification

Each employee must be classified in accordance with the wage decision based on the type of work they perform.

Apprentices or trainees

The first payroll on which any apprentice or trainee appears must be accompanied by a copy of that apprentice's or trainee's registration in a registered or approved program. A copy of the portions of the registered or approved program pertaining to the wage rates and ratios shall also accompany the first payroll on which the first apprentice or trainee appears.

Split classifications

For an employee that worked in a split classification, make a separate entry for each classification of work performed, distributing the hours of work to each classification accordingly, and reflecting the rate of pay and gross earnings for each classification. Deductions and net pay may be based upon the total gross amount earned for all classifications.

Hours worked

The payroll should show only the regular and O/T hours worked on one particular project. The employer must show both the daily and total weekly hours for each employee. If an employee performs work at job sites other than the project for which the payroll is prepared, those "other job" hours should not be reported on the payroll. In these cases, employers should list the employee's name, classification, hours for this project only, the rate of pay and gross earnings for this project, and the gross earned for all projects. Deductions and net pay may be based upon the employee's total earnings (for all projects) for the week.

Rate of pay

Employers must show the basic hourly rate of pay for each employee for one particular project. If the wage decision includes a fringe benefit and the employer does not participate in approved fringe benefit programs, the employer must add the fringe benefit rate to the basic hourly rate of pay, and must list the O/T rate if O/T hours were worked.

Piece-work

For any piece-work employees, the employer must compute an effective hourly rate for each employee each week based upon the employee's piece-work earnings for that week. To compute the effective hourly rate, divide the piece-work earnings by the total number of hours worked, including consideration for any O/T hours.

The effective hourly rate must be reflected on the certified payroll. This hourly rate may be no less than the wage rate (including fringe benefits, if any) on the wage decision for the classification of work performed. It does not matter that the effective hourly rate changes from week to week, only that the rate is no less than the rate on the wage decision for the classification of work performed.

Remember, the O/T rate is computed at one and one-half times the basic rate of pay plus any fringe benefits. For example, if the wage decision requires $10/hour basic plus $5/hour fringe benefits, the O/T rate would be: ($10 x 1.5) + $5 = $20/hour.

Gross wages earned

Show the gross amount of wages earned for work performed on a particular project. Note: Employees with work hours and earnings on other projects may show gross wages for a particular project over gross earnings from all projects (e.g., $425.40/$764.85) and base deductions and net pay on the "all projects" earnings.

Deductions

Show the amounts of any deductions from the gross earnings. "Other" deductions should be identified (e.g., Savings Account or Loan Repayment). Any voluntary deduction (i.e., not required by law or by an order of a proper authority) must be authorized in writing by the employee or provided for in a collective bargaining (union) agreement. A short note signed by the employee is all that is needed and should accompany the first payroll on which the other deduction appears. The note needs to show the type, amount, and frequency of the deduction. A new deduction authorization is required when any of the aforementioned items change.

MORE INFO

Only one employee authorization is needed for recurring (e.g., weekly) "other" deductions. Written employee authorization is not required for income tax and Social Security deductions.

Net pay

Show the net amount of wages paid.

Statement of Compliance

The Statement of Compliance is the certification. It is located on the reverse side of a standard payroll form (WH-347). Employers must be sure to complete the identifying information at the top, particularly if attaching the Statement of Compliance to an alternate payroll form such as a computer payroll. Also, the employer must check either 4(a) or 4(b) if the wage decision contains a fringe benefit. Checking 4(a) indicates that the employer is paying required fringe benefits to approved plans or programs; and 4(b) indicates that the employer is paying any required fringe benefit amounts directly to the employee by adding the fringe benefit rate to the basic hourly rate of pay. If the employer is paying a portion of the required fringe benefit to programs and the balance directly to the employee, the employer must explain those differences in box 4(c).

Signature

For paper payrolls submitted, the payroll is signed with an original signature in ink. The payroll must be signed by a principal of the firm (owner or officer such as the president, treasurer, or payroll administrator) or by an authorized agent (a person authorized by a principal in writing to sign the payroll reports). Signature authorization (for persons other than a principal) should be submitted with the first payroll signed by such an agent. For paper payrolls, signatures in pencil, signature stamps, Xerox copies, PDFs, and other facsimiles are not acceptable.

MORE INFO

Only one Statement of Compliance is required for each employ er's weekly payroll no matter how many pages are needed to re port the employee data.

ADDITIONAL WORK CLASSIFICATION AND WAGE RATES

After contract award, if it is determined that additional work classifications are required because the wage decision lacks all the necessary classifications and wage rates, the prime contractor and, if applicable, its subcontractors employing workers in such classifications shall request an additional work classification and propose a wage rate and fringe benefits for such classification on form SF-1444, Request for Authorization of Additional Classification and Rate. The contractor or subcontractor shall make its request for a final decision through the LSS or LCA, as appropriate, to DOL at whd-cbaconformance_incoming@dol.gov. The LSS/LCA shall assist the employer in preparing the request and, if necessary, provide guidance on the policies and procedures involved.

Note: Additional work classifications and wage rates may be requested only after the effective wage decision "lock-in" date. (See DOL Regulations at 29 CFR Part 5 § 5.5(a)(1)(ii).)

Additional Work Classification and Wage Rate Parameters

Signature

Additional work classifications must be signed by DBLS for FHA-insured projects managed by HUD and signed by the LCA contracting officer for projects managed by LCAs, then forwarded to DOL with the applicable wage decision where:

The requested work classification is used in the area of the project by the construction industry;

The work that will be performed by the requested work classification is not performed by a work classification that is already contained within the applicable wage decision;

The proposed wage rate for the requested work classification bears a reasonable relationship to the wage rates on the wage decision; and

The workers that will be employed in the requested work classification (if it is known who the workers are or will be) or the workers' representatives agree with the proposed wage rate.

General guide

The wage rate and fringe benefits proposed for any classification must be in accordance with the guidance available in All Agency Memorandum 213. The proposed wage rate and fringe benefits should bear a reasonable relationship to the entirety of the rates within the relevant category. There are four basic categories: skilled crafts, laborers, truck drivers, and power equipment operators. Additional classifications proposed for power equipment operators must specify the type(s) of power equipment involved.

Making the Request

Although a request for additional work classification and wage rate may be prompted following an LSS/LCA review, the proposal must originate with the prime contractor/employer that will utilize the work classification. The prime contractor/employer must submit the request in writing. A basic request must identify the contract/project involved, the work classification requested, and the wage rate, including any bona fide fringe benefits proposed. In some cases, it may be necessary for the prime contractor/employer to describe the work that the requested work classification would perform. The prime contractor/employer should use form SF-1444, Request for Authorization of Additional Classification and Rate, to submit the request.

LSS/LCA Review of Request

The LSS/LCA will review the prime contractor/employer's request to determine if it satisfies the approval criteria at 5.12.1.9.2. The LSS/LCA will contact the prime contractor/employer if clarification or additional information is needed to complete the review.

Signing the request, reporting to DOL

If the LSS/LCA review finds that the requested work classifications and wage rate/fringe benefits meet the criteria at 5.12.1.9.2, the LSS/LCA submits the completed SF-1444, related documentation, and the applicable wage decision to the DOL National Office for final decision using DOL's dedicated email address:

whd-cbaconformance_incoming@dol.gov.

Disagreement with the request; referring for DOL decision

If the LSS/LCA review finds that the requested work classification and wage rate/fringe benefits fails to meet the approval criteria or if the parties do not agree on the proper classification or wage rate/fringe benefits for the work described, the LSS/LCA shall prepare an SF-1444 and a written report explaining the results of the review and any issues in dispute among the parties, and shall forward these along with a copy of the applicable wage decision to the DOL National Office for its decision using the same dedicated DOL email address.

DOL decision

DOL regulations permit 30 days for DOL to respond to the SF-1444. DOL will notify the LSS/LCA in writing of its decision.

DOL approval

When DOL approves the requested additional work classification and wage rate/fringe benefits, the LSS/LCA shall provide a copy of the DOL notice of approval to the prime contractor/employer with instructions that the additional work classification and wage rate/fringe benefits must be posted on the job site with the wage decision.

DOL disapproval

When DOL disapproves the requested work classification and wage rate/fringe benefits, DOL will notify the LSS/LCA in writing of the reasons why the request cannot be approved. DOL may also indicate what work classifications/wage rate/fringe benefits could be approved for the work involved if a modified request is submitted.

Notification to the prime contractor/employer

The LSS/LCA will notify the prime contractor/employer in writing of the results of the LSS/LCA review and/or DOL decision and provide a copy of the DOL notice.

Requests for DOL reconsideration

The LSS/LCA, the prime contractor/employer, or other interested parties may request reconsideration of the DOL decision on a requested additional work classification and wage rate/fringe benefits. Such requests must be made in writing accompanied by a full statement of the interested party's views and any supporting wage data or other pertinent information.

SANCTIONS AND RESTITUTION

Introduction

Even in the best of circumstances, things can go wrong. In a Davis-Bacon context, "things going wrong" usually means there's a difference of opinion or a dispute about whether and to what extent underpayments have occurred. These disputes are usually between the contract administrator and one or more employers (the prime contractor and/or a subcontractor). The dispute may involve something simple such as an additional classification request that is pending before DOL, or something as significant as investigative findings following a complaint of underpayment. This chapter discusses some of the things you might expect, and what you can do to make your views known and to lessen any delays in resolving the problem or issue.

Administrative Review on Labor Standards Disputes

The labor standards clauses in the contract and DOL regulations provide for administrative review of issues where there is a difference of views between the contract administrator and any employer. The most common circumstances include:

Additional classifications and wage rates

Additional classification and wage rate requests are sometimes denied by DOL. An employer that is dissatisfied with the denial can request reconsideration by the DOL Wage and Hour Administrator. The employer may continue to pay the wage rate, as requested, until a final decision is rendered on the matter. When the final decision is known, the employer will be required to pay any additional wages that may be necessary to satisfy the wage rate that is established.

Reconsideration

DOL normally identifies the reasons for denial in its response to the request. Any interested person (e.g., the contract administrator, employer, or representatives of the employees) may request reconsideration of the decision on the additional classification request.

The request for reconsideration must be made in writing and must thoroughly address the denial reasons identified by DOL. Employer requests for reconsideration should be made through the contract administrator but may be made directly to DOL. (See DOL Regulations 29 CFR § 1.8.) All requests initiated by or made through the contract administrator or HUD must be submitted through HQLS (Headquarters Office Davis-Bacon and Labor Standards).

Administrative Review Board

Any interested party may request a review of the Administrator's decision on reconsideration by DOL's Administrative Review Board. DOL regulations 29 CFR Part 7 explain the procedures for such reviews. (See also 29 CFR § 1.9.)

Findings of underpayment

Compliance reviews and other follow-up enforcement actions may result in findings of underpayment. The primary goal in every case and at every step in this process is to reach agreements about who may have been underpaid and how much wage restitution may be due, and to promptly deliver restitution to any underpaid workers. The contract administrator will usually work informally with employers to reach such agreements.

Rulings and interpretations unrelated to findings of underpayment

DOL is the authority for rulings and interpretations unrelated to findings of underpayments. This includes disputes concerning the prevailing wage rates as determined by DOL, DBRA applicability, character of work decisions, and interpretation and application of DOL regulations at 29 CFR Parts 1, 3, and 5. These and other such matters must be referred to the DOL Wage and Hour Administrator for their ruling and/or interpretation per 29 CFR § 5.13. Any request for a ruling or an interpretation from the DOL Administrator via DBLS must be submitted through HQLS with a copy to the local LSS.

Disputes concerning findings of underpayment

Underpayments usually occur when a contractor or subcontractor does not properly pay wages according to the approved wage determination and it has been identified as part of a Davis-Bacon and DBLS enforcement action. There may be other situations that also create underpayments, and they can originate from the employer, prime contractor, or any other interested party. Any underpayment decision by DBLS will include a formal decision letter with a Notice of Right to Appeal.

DOL review

DOL will review the contract administrator's report and the arguments against the findings presented in the hearing request. DOL may affirm or modify the findings based upon the materials presented. You will be notified in writing by DOL of the results of its review. If DOL concludes that violations have occurred, you will be given an opportunity to correct any underpayments or to request a hearing before a DOL ALJ. (See DOL Regulations 29 CFR § 5.11 (b) and 29 CFR Part 6, Rules of Practice for Administrative Proceedings.)

Administrative Review Board

Contractors and/or subcontractors may request a review by the Administrative Review Board of the decision(s) rendered by the DOL ALJ in the administrative hearing process. See DOL regulations 29 CFR Part 7 for more information about this proceeding.

Withholding

The contract administrator shall cause the withholding of payments due to the prime contractor to ensure the payment of wages that are believed to be due and unpaid (e.g., if wage underpayments or other violations are not corrected within 30 days after written notification to the prime contractor). DOL may also direct the withholding of contract payments for alleged wage underpayments. Withholding is serious and is not taken unless warranted. If withholding is deemed necessary, the contractor will be notified in writing. Only the amounts needed to meet the contractor's (and/or subcontractors') liability shall be withheld.

Deposits and Escrows

In some situations, certain labor standards issues are not or cannot be resolved in time to meet project closeout schedules. In order to permit a final closing/closeout to proceed while certain labor issues are outstanding, a deposit account (HUD-administered projects, e.g. multifamily housing-insured and grant programs) or an escrow account (LCA-administered projects, e.g., CDBG, HOME, HOPE VI (Housing Opportunities for People Everywhere)) may be established as a guarantee to ensure the payment of any wages that have been or may be found due to workers that were employed in the construction of the project. Deposit and escrow accounts may also hold fringe benefits payments that are due to plans or programs and/or liquidated damages that are assessed for violations of CWHSSA O/T provisions. The deposit or escrow account is controlled by the contract administrator. When a final decision is rendered, the contract administrator makes disbursements from the account in accordance with the decision. Deposit/escrow accounts are established for one or more of the following reasons:

MORE INFO

Remember, the prime contractor is responsible and will be held liable for any wage restitution that is due to any worker employed in the construction of the project, including workers employed by subcontractors and any lower-tier subcontractors. See 3.2, Responsibilities of the Principal Contractor, and 12.4, Restitution for Underpayment of Wages, in the Agency Guide.

Where the parties have agreed to amounts of wage restitution that are due, but the employer hasn't furnished evidence yet that all the underpaid workers have received their back wages (e.g., unfound workers)

The amount of the deposit is equal to the total gross amount of restitution due to workers lacking payment evidence. As these workers are paid and proper documentation is provided to the contract administrator, amounts corresponding to the documented payments are returned to the depositor. Amounts for any workers who cannot be located are held in the deposit/escrow account for three years and disposed as described in Section 11.4.1 of this Guide;

Sometimes, wage restitution cannot be paid to an affected employee because, for example, the employee has moved and cannot be located. After wage restitution has been paid to all the workers who could be located, the employer must submit a list of any workers who could not be found and paid (unfound workers). See 12.4.6 in the Agency Guide for more information.

Where underpayments are suspected or alleged and an investigation has not yet been completed

The deposit is equal to the amount of wage restitution and any liquidated damages, if applicable, that are estimated to be due. If the final determination of wages due is less than the amount estimated and placed in the escrow account, the escrow will be reduced to the final amount and the difference will be returned to the depositor. If the parties agree to the investigative findings, the amounts due to the workers will be paid by the employer. As these workers are paid and proper

documentation is provided to the contract administrator, the gross amounts corresponding to the documented payments are returned to the depositor;

If the employer is unable to make the payments to the workers (e.g., lacks the funds necessary), the contract administrator may make disbursements directly to the workers in the net amounts calculated by the employer. The amounts withheld from the workers for tax deduction will be returned to the employer as payments to workers are made. The employer shall be responsible for reporting and transmitting withholdings to the appropriate agencies.

If the employer is not cooperating in the resolution, the contract administrator shall make disbursements to the workers in accordance with the schedule of wages due. Amounts for unfound workers will be retained as described in Section 13.4.6 in the Agency Guide.

If the parties do not agree and an administrative hearing is requested, the escrow will be maintained.

MORE INFO

Remember, if you have any questions or need assistance con cerning labor standards requirements, help is always available. Contact the contract administrator for the project you're work ing on or the HUD Field Labor Standards staff in your area.

Where the parties are waiting for the outcome of an administrative hearing that has been or will be requested contesting a final determination of wages due

The deposit shall be equal to the amount of wage restitution and liquidated damages, if applicable, that have been determined due. Once a final decision is rendered, disbursements from the escrow account are made in accordance with the decision.

Administrative Sanctions

Contractors and/or subcontractors that violate the labor standards provisions may face administrative sanctions imposed by HUD and/or DOL.

DOL debarment

Contractors and/or subcontractors that are found by the Secretary of Labor to be in aggravated or willful violation of the labor standards provisions of the DBRA will be ineligible (debarred) to participate in any DBRA or Davis-Bacon Act contracts for up to three years. Debarment includes the contractor or subcontractor and any firm, corporation, partnership, or association in which the contractor or subcontractor has a substantial interest. Debarment proceedings can be recommended by the contract administrator or initiated by DOL. Debarment proceedings are described in DOL regulations 29 CFR § 5.12.

HUD sanctions

HUD sanctions may include Limited Denials of Participation (LDPs), debarments, and suspensions.

Limited Denial of Participation

HUD may issue to the employer an LDP, which prohibits the employer from further participation in HUD programs for a period of up to one year. The LDP is usually effective for the HUD program in which the violation occurred and for the geographic jurisdiction of the issuing HUD Office. HUD regulations concerning LDPs are found at 24 CFR §§ 24.700-24.714.

Debarment and suspensions

In certain circumstances, HUD may initiate its own debarment or suspension proceedings against a contractor and/or subcontractor in connection with improper actions regarding Davis-Bacon obligations. For example, HUD may initiate debarment where a contractor has been convicted for making false statements (such as false statements on certified payrolls or other prevailing wage certifications), or initiate suspension where a contractor has been indicted for making false statements. HUD regulations concerning debarment and suspension are found at 24 CFR Part 24.

Falsification of Certified Payroll Reports

Cases that involve certified payroll falsification may be referred to DOL for its investigation at the outset or referred to DOL for administrative review/hearings or other sanctions.

All referrals suggesting consideration for criminal prosecution must be submitted through the established hierarchy:

States may submit any such recommendation to DOL directly.

MORE INFO

Remember, if you have any questions or need assistance concerning labor standards requirements, help is always available. Contact the contract administrator for the project you're working on or the HUD Field Labor Standards staff in your area.

SECTION 01021

SECTION 3 FREQUENTLY ASKED QUESTIONS

YWCA GREATER NEW ORLEANS
NEW DAYCARE, EDUCATION & COUNSELING BUILDING

(Published: March 25, 2021)

"Best Efforts" and "To the Greatest Extent Feasible"

ATTACHMENT A
FREQUENTLY ASKED QUESTIONS
for
SECTION 3

Published: March 25, 2021

The following is a guidance document published by the Department of Housing and Urban Development Office of Field Policy and Management for the purpose of providing answers to frequently asked questions about Section 3 of the HUD Act of 1968 (12 U.S.C § 1701u) and its associated regulations (24 C.F.R. Part 75). This document is intended to provide guidance for Section 3 funding recipients, subrecipients, contractors, subcontractors, workers, and other stakeholders.

This guidance document covers questions in several topic areas and is divided into parts that contain questions on that part's topic.

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1. What is Section 3?
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3. What Does "Section 3 Worker" Mean?
4. What Does "Targeted Section 3 Worker" Mean?
5. What Does "Section 3 Business Concern" mean?
6. How are low-income and very low-income determined?
7. What is YouthBuild?
8. As a funding recipient, what are my Section 3 reporting goals?
9. How does Section 3 differ from the Minority Business Enterprise/Women Business Enterprise programs?
10. What is a Section 3 project?
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I. GENERAL QUESTIONS REGARDING SECTION 3:

1. What is Section 3?

Section 3 is a provision of the Housing and Urban Development Act of 1968. The purpose of Section 3 is to ensure that employment and other economic opportunities generated by certain HUD financial assistance shall, to the greatest extent feasible, and consistent with existing Federal, State, and local laws and regulations, be directed to low- and very low-income persons, particularly those who are recipients of government assistance for housing, and to business concerns which provide economic opportunities to low- and very low-income persons.

2. What Do "Best Efforts" and "to the Greatest Extent Feasible" Mean?

"Best efforts" and "greatest extent feasible" are statutory terms, used in the statute in different contexts. As such, HUD uses both terms to track compliance, and there are many ways to interpret the language. Traditionally, HUD has used the terms interchangeably, as referenced in the statute, and will continue to be consistent with the statutory language. See 12 U.S.C. 1701u (b)-(d). These terms are integral to the statutory intent and provide flexibility, rather than administrative burden, to grantees or recipients of HUD funding.

HUD acknowledges that some perceive "best efforts" to be the more rigorous standard, while others perceive "greatest extent feasible" to be the more rigorous standard. HUD has determined not to define the difference between these two terms but rather to increase the emphasis on outcomes as a result of these efforts. A recipient's reported results will be compared to the outcome metrics defined in the benchmark notice. HUD program staff will evaluate the level of effort expended by those recipients that fail to meet the benchmark safe harbor, and thus will ensure that the statutory terms are being properly enforced. HUD included a list of examples in the regulation at 24 CFR §§ 75.15 and 75.25, including engagement in outreach efforts to generate job applicants who are Targeted Section 3 workers, providing training or apprenticeship opportunities, and providing technical assistance to help Section 3 workers compete for jobs (e.g., resume assistance, coaching).

3. What Does "Section 3 Worker" Mean?

A Section 3 worker is any worker who currently fits, or when hired within the past five years fit, at least one of the following categories, as documented:

1. The worker's income for the previous or annualized calendar year is below the income limit established by HUD (see Question 6 of this part I of these FAQs, below);

2. The worker is employed by a Section 3 business concern (see Question 5 of part I, below); or
3. The worker is a YouthBuild participant.

4. What Does "Targeted Section 3 Worker" Mean?

A Section 3 targeted worker for Public Housing Financial Assistance projects is a Section 3 worker who:

(1) is employed by a Section 3 business concern; or

(2) currently fits or when hired fit at least one of the following categories, as documented within the past five years:

(i) A resident of public housing or Section 8-assisted housing;

(ii) A resident of other public housing projects or Section 8-assisted housing managed by the PHA that is providing the assistance; or

(iii) A YouthBuild participant.

A Section 3 targeted worker for Housing and Community Development Financial Assistance projects is a Section 3 worker who:

(1) is employed by a Section 3 business concern; or

(2) currently fits or when hired fit at least one of the following categories, as documented within the past five years:

(i) Living within the service area or the neighborhood of the project, as defined in 24 CFR § 75.5; or

(ii) A YouthBuild participant.

5. What Does "Section 3 Business Concern" mean?

A Section 3 business concern is a business that meets at least one of the following criteria, documented within the last six-month period:

1. At least 51 percent owned and controlled by low- or very low-income persons;
2. Over 75 percent of the labor hours performed for the business over the prior three-month period are performed by Section 3 workers; or
3. A business at least 51 percent owned and controlled by current public housing residents or residents who currently live in Section 8-assisted housing.

6. How are low-income and very low-income determined?

Low- and very low-income limits are defined in Section 3(b) (2) of the Housing Act of 1937 and are determined annually by HUD. These limits are typically established at 80 percent and 50 percent of the area median individual income. HUD income limits may be obtained from: https://www.huduser.gov/portal/datasets/il.html.

7. What is YouthBuild?

YouthBuild is a community-based pre-apprenticeship program that provides job training and educational opportunities for at-risk youth ages 16-24 who have previously dropped out of high school.

YouthBuild participants learn vocational skills in construction, as well as in other in-demand industries that include health care, information technology, and hospitality. Youth also provide community service through the required construction or rehabilitation of affordable housing for low-income or homeless families in their own neighborhoods.

The Division of Youth Services within the Employment and Training Administration's Office of Workforce Investment at the U.S. Department of Labor administers the YouthBuild program. Each year, more than 6,000 youth participate in approximately 210 YouthBuild programs in more than 40 states. More information can be found here: https://www.dol.gov/agencies/eta/youth/youthbuild.

8. As a funding recipient, what are my Section 3 reporting goals?

Your Section 3 reporting goals depend on the type of assistance you are receiving, whether public housing financial assistance or housing and community development financial assistance.

For public housing financial assistance, the benchmark for Section 3 workers is set at 25 percent or more of the total number of labor hours worked by all workers employed with public housing financial assistance in the PHA's or other recipient's fiscal year. The benchmark for Targeted Section 3
workers is set at 5 percent or more of the total number of labor hours worked by all workers employed with public housing financial assistance in the PHA's or other recipient's fiscal year. This means that the 5 percent is included as part of the 25 percent threshold.

For housing and community development financial assistance projects, the benchmark for Section 3 workers is set at 25 percent or more of the total number of labor hours worked by all workers on a Section 3 project. The benchmark for Targeted Section 3 workers is set at 5 percent or more of the total number of labor hours worked by all workers on a Section 3 project. This means that the 5 percent is included as part of the 25 percent threshold.

9. How does Section 3 differ from the Minority Business Enterprise/Women Business Enterprise programs?

Section 3 is both race and gender neutral. The standards provided under this regulation are based on income-level and location. Section 3 regulations were designed to encourage recipients of HUD funding to direct employment, training, and contracting opportunities to low-income individuals, and the businesses that employ these persons within their community regardless of race and/or gender.

Minority Business Enterprise (MBE) means a business enterprise that is at least 51% owned and controlled by one or more minority or socially and economically disadvantaged persons. Such disadvantage may arise from cultural, racial, chronic economic circumstances or other similar causes.

Women's Business Enterprise (WBE) is an independent business concern that is at least 51% owned and controlled by one or more women who are U.S. citizens or Legal Resident Aliens; whose business formation and principal place of business are in the U.S. or its territories; and whose management and daily operation is controlled by a woman with industry expertise.

Section 3 standards are race and gender neutral. A minority and/or woman owned business enterprise must provide evidence that it meets at least one criterion of a Section 3 business concern outlined above in order to receive preference under Section 3. However, the Department anticipates that Section 3 will serve to support, and not impede, contract opportunities for minority business enterprises.

The MBE designation may provide preferences promoted by other statutes and regulations, such as goals for MBEs and other socially and economically disadvantaged businesses.

To learn more about the Minority Business Enterprise and Women Business Enterprise programs, please contact HUD's Office of Small and Disadvantaged Business Utilization at 202-708-1428, or visit their website, located at: https://www.hud.gov/program_offices/sdb.

10. What is a Section 3 project?

Section 3 projects are housing rehabilitation, housing construction, and other public construction projects assisted under HUD programs that provide housing and community development financial assistance when the total amount of assistance to the project exceeds a threshold of $200,000. The threshold is $100,000 where the assistance is from the Lead Hazard Control and Healthy Homes programs, as authorized by Sections 501 or 502 of the Housing and Urban Development Act of 1970 (12 U.S.C. 1701z–1 or 1701z–2), the Lead-Based Paint Poisoning Prevention Act (42 U.S.C 4801 et seq.,; and/or the Residential Lead-Based Paint Hazard Reduction Act of 1992 (42 U.S.C. 4851 et seq.). (See Question 12 of this part I of these FAQs for more detail regarding Lead Hazard Control and Healthy Homes programs.)

The project is the site or sites together with any building(s) and improvements located on the site(s) that are under common ownership, management, and financing. The requirements of Part 75 apply to an entire Section 3 project, regardless of whether the project is fully or partially assisted under HUD programs that provide housing and community development financial assistance.

11. Who is considered a recipient of Section 3 funding?

A recipient is any entity that receives directly from HUD public housing financial assistance or housing and community development assistance that funds Section 3 projects, including, but not limited to, any State, local government, instrumentality, PHA, or other public agency, public or private nonprofit organization. It does not include contractors or any intended beneficiary under the HUD program to which Section 3 applies, such as a homeowner or a Section 3 worker.

12. What are funding thresholds and how do they apply to Section 3 covered financial assistance?

Funding thresholds are minimum dollar amounts that trigger Section 3 requirements. There are no thresholds for public housing programs. The requirements of Section 3 apply to all programs receiving public housing financial assistance regardless of the amount of assistance received from HUD. Section 3 also applies to the entirety of a mixed-finance development project as described in 24 CFR 905.604, regardless of whether the project is fully or partially assisted with public housing financial assistance.

Section 3 projects are housing rehabilitation, housing construction, and other public construction projects assisted under HUD programs that provide housing and community development financial assistance when the total amount of assistance to the project exceeds a threshold of $200,000 (Lead Hazard Control and Healthy Homes (LHCHH) assistance is not included in calculating whether the assistance exceeds the $200,000 threshold).

The threshold is $100,000 when the assistance is from the Lead Hazard Control and Healthy Homes programs, as authorized by Sections 501 or 502 of the Housing and Urban Development Act of 1970, the Lead-Based Paint Poisoning Prevention Act, and the Residential Lead-Based Paint Hazard Reduction Act of 1992. LHCHH programs require Section 3 compliance if there is over $100,000 of LHCHH funding for the project (neither HUD public housing financial assistance nor HUD housing and community development financial assistance is included in calculating whether the assistance exceeds the $100,000 threshold). Recipients of LHCHH funding will also be required to comply with Section 3 regulations and report on the entirety of the project when the total amount of HUD housing and community development financial assistance to the project exceeds $200,000 (LHCHH

funding is not included in calculating whether the total assistance exceeds the $200,000 threshold), or if any public housing financial assistance is provided.

13. Which recipient agencies (or sources of HUD financial assistance) are required to comply with Section 3?

For public housing financial assistance, Public Housing Authorities (PHAs), regardless of size or number of public housing units, are required to comply with Section 3 and its reporting requirements. However, small PHAs (fewer than 250 units) are permitted to report qualitatively as permitted under 24 CFR § 75.15(d). Some examples of those qualitative efforts are listed in the answer to Question 15.

As previously stated, Section 3 also applies to projects with more than $200,000 in funding from housing and community development financial assistance programs. The following is a list of examples of such funds:

- Community Development Block Grant (CDBG)
- HOME Investment Partnership
- Housing Trust Fund (HTF)
- Neighborhood Stabilization Program Grants (NSP 1, 2 & 3)
- Housing Opportunities for Persons with AIDS (HOPWA)
- Emergency Solutions Grants (ESG)
- University Partnership Grants
- Economic Stimulus Funds
- 202/811 Grants
- Lead Hazard Control Grants ($100,000 threshold; see Question 12, above, in this part I of these FAQs)
- Healthy Homes Production Grants ($100,000 threshold; see Question 12, above, in this part I)
- Rental Assistance Demonstration (RAD) (see most recent RAD Notice, found through HUD's RAD website, www.hud.gov/rad/)

*Note: The requirements of Section 3 typically apply to recipients of HUD funds that will be used for housing construction, rehabilitation, or other public construction. Contact Section3@hud.gov to determine applicability to a particular project/activity.

14. Can a non-profit organization be considered a business concern for the purposes of Section 3?

Yes. A non-profit organization can be a business concern. Non-profit organizations must meet the criteria of a Section 3 business concern as defined at 24 CFR § 75.5 in order to receive Section 3 preference. See response to Question 5 above.

15. What is a "Service Area" or "Neighborhood of the project"?

"Service area" or the "neighborhood of the project" means an area within one mile of the Section 3 project or, if fewer than 5,000 people live within one mile of a Section 3 project, within a circle centered on the Section 3 project that is sufficient to encompass a population of 5,000 people according to the most recent U.S. Census.

16. What if my agency does not meet all benchmark goals for employment or contracting?

If reporting indicates that the agency has not met the Section 3 benchmarks, the agency must report in a method prescribed by HUD program offices on the qualitative nature of its activities and those its contractors and subcontractors pursued per 24 CFR § 75.15(b) and § 75.25(b).

Such qualitative efforts may, for example, include but are not limited to the following:

- Engaged in outreach efforts to generate job applicants who are Targeted Section 3 workers.
- Provided training or apprenticeship opportunities.
- Provided technical assistance to help Section 3 workers compete for jobs (e.g., resume assistance, coaching).
- Provided or connected Section 3 workers with assistance in seeking employment including: drafting resumes, preparing for interviews, and finding job opportunities connecting residents to job placement services.
- Held one or more job fairs.
- Provided or referred Section 3 workers to services supporting work readiness and retention (e.g., work readiness activities, interview clothing, test fees, transportation, childcare).
- Provided assistance to apply for/or attend community college, a four-year educational institution, or vocational/technical training.
- Assisted Section 3 workers to obtain financial literacy training and/or coaching.
- Engaged in outreach efforts to identify and secure bids from Section 3 business concerns.
- Provided technical assistance to help Section 3 business concerns understand and bid on =contracts.
- Divided contracts into smaller jobs to facilitate participation by Section 3 business concerns.
- Provided bonding assistance, guaranties, or other efforts to support viable bids from Section 3 business concerns.
- Promoted use of business registries designed to create opportunities for disadvantaged and small businesses.
- Outreach, engagement, or referrals with the state one-stop system as defined in Section 121(e) (2) of the Workforce Innovation and Opportunity Act

17. My agency has met all benchmark goals for employment and contracting, does this mean that we are considered in compliance with Section 3?

Yes. Recipients will be considered to have complied with Section 3 requirements, in the absence of evidence to the contrary, if they meet all benchmark goals and certify compliance with prioritization requirements found in 24 CFR § 75.9 or §75.19. However, if subsequent HUD enforcement activities reveal that the recipient has failed to comply with the recipient responsibilities set forth at 24 CFR §75.13 or §75.23, this compliance determination may be rescinded.

II. APPLICABILITY: /

1. What HUD assistance does Section 3 apply to?

Section 3 applies to both:

a) Public Housing Financial Assistance –

(i) Development assistance provided pursuant to Section 5 of the United States Housing Act of
1937 (the 1937 Act);

(ii) Operations and management assistance provided pursuant to Section 9(e) of the 1937 Act;

(iii) Development, modernization, and management assistance provided pursuant to Section

9(d) of the 1937 Act; and

(iv) The entirety of a mixed-finance development project as described in 24 CFR 905.604, regardless of whether the project is fully or partially assisted with public housing financial assistance as defined in subsections (i) through (iii).

b) Housing and Community Development Financial Assistance expended for housing rehabilitation, housing construction, or other public construction. See Question #2 below for applicability thresholds.

2. Do the requirements of Section 3 apply to grantees on a per project basis?

Yes, for housing and community development financial assistance projects. Section 3 projects are housing rehabilitation, housing construction, and other public construction projects assisted under HUD programs that provide housing and community development financial assistance when the total amount of assistance to the project exceeds a threshold of $200,000. The threshold is $100,000 where the assistance is from the Lead Hazard Control and Healthy Homes programs. See Question 12 of part I of these FAQs.

Section 3 applies to all public housing financial assistance funds, regardless of the amount of assistance from HUD.

3. If a project is funded with non-HUD assistance, do the requirements of Section 3 still apply?

Section 3 applies to projects that are fully or partially funded with HUD financial assistance. Projects that are financed with state, local or private matching or leveraged funds used in conjunction with HUD funds are covered by Section 3 if the amount of HUD funding for the project exceeds the regulatory thresholds (listed in Section I, Question #11).

For RAD projects, Section 3 applies regardless of what money is used to pay for repairs. Per the RAD Notice, "While most RAD conversions do not utilize funding covered by Section 3, HUD has established the alternative requirement that any Work required by the conversion after the RAD Closing that involves housing rehabilitation or housing construction is subject to the Section 3 requirements applicable to housing and community development activities as set forth in 12 U.S.C. 1701u(c)(2) and (d)(2) and the regulations derived from such provisions except that, with the exception of transactions receiving HUD housing and community development assistance, such as CDBG (24 CFR part 570) or HOME (24 CFR part 92), first priority for employment and other economic opportunities shall be given to residents of public housing or Section 8 assisted housing. Otherwise, the receipt of Section 8 rental assistance does not, in itself, trigger the applicability of Section 3."

4. What recordkeeping responsibilities do contractors/subcontractors have if they receive Section 3 covered contracts?

Recordkeeping requirements for recipients are found at 24 CFR § 75.31. Recipients are required to maintain documentation to demonstrate compliance with the regulations and are responsible for requiring their contractors/subcontractors to maintain or provide any documentation that will assist recipients in demonstrating compliance, including documentation that shows hours worked by Section 3 workers, Targeted Section 3 workers, and any qualitative efforts to comply with Section 3. Examples of documentation can be found in 24 CFR §75.31.

5. Do the Section 3 requirements apply to material only contracts?

No. Section 3 does not apply to material only contracts or those that do not require any labor. For example, a contract for office or janitorial supplies would not be covered by Section 3. In this example, Section 3 would be encouraged but not required. However, a contract to replace windows that includes the removal of existing windows and the installation of new windows would be covered due to the involvement of labor.

6. Do the Section 3 requirements apply to Section 8 project-based rental assistance contracts?

No. Section 8 project-based voucher or project-based rental assistance housing assistance payment contracts, are not covered by the statute, including properties converted through the Rental Assistance Demonstration (RAD).

7. Are maintenance projects covered by Section 3?

Yes, but only for PIH funded programs administered by Public Housing Authorities.

8. Does the reduction and abatement of lead-based paint hazards constitute housing rehabilitation?

No, reduction and abatement of lead-based paint hazards focuses on mitigating lead paint hazards only, not conducting general rehabilitation activities.

9. Are demolition projects covered by the requirements of Section 3?

Yes. Recipients of assistance covered by Section 3 should, where feasible, comply with Section 3 benchmarks.

10. Are professional service contracts required to be reported under Section 3?

No, professional service contracts for non-construction services that require an advanced degree or professional licensing are not required to be reported as a part of total Section 3 labor hours. However, this exclusion does not cover all non-construction services.

However, professional services staff labor hours are permitted to be reported and PHAs will be given credit for reporting opportunities created for professional services by including professional services labor hours in the numerator, and not in the denominator, of the reported outcome ratios. The reporting structure in the rule allows a recipient to count any work performed by a professional services Section 3 worker or Targeted Section 3 worker as Section 3 labor hours and as Targeted Section 3 labor hours (i.e., in the numerator of the calculation), even when the professional services as a whole are not counted in the baseline reporting (i.e., in the denominator of the calculation). The effect of this reporting structure is to give a recipient a bonus if they are able to report Section 3 hires in the professional services context.

11. Does Section 3 apply to labor hours by a CDBG-Entitlement recipient?

Yes. If the recipient intends to use its HUD grant to perform housing construction, rehabilitation, or other public construction and the total HUD assistance to the project exceeds $200,000, then Section 3 applies to the project.

12. Does Section 3 apply to labor hours by a Public Housing Authority?

Yes. Section 3 applies to all Public Housing capital, operating, or development funds.

III. CONSISTENCY WITH OTHER LAWS:

1. Are recipients required to comply with Federal/state/local laws in addition to Section 3?

Yes. Compliance with Section 3 shall be achieved, to the greatest extent feasible, consistent with existing Federal, state and local laws and regulations. Accordingly, recipients of Section 3-covered assistance are required to develop strategies for meeting both the regulatory requirements at 24 CFR part 75 and any other applicable statutes or regulations.

2. What is the relationship between Section 3 and Davis Bacon requirements?

Compliance with Section 3 must be achieved consistent with the requirements of Davis-Bacon. Certain construction contracts are subject to compliance with the requirement to pay prevailing wages determined under the Davis-Bacon Act (40 U.S.C. 3141 et seq.) and implementing U.S. Department of Labor regulations in 29 CFR Part 5. Additionally, certain HUD-assisted rehabilitation and maintenance activities on public housing projects are subject to compliance with the requirement to pay prevailing wage rates, as determined or adopted by HUD, to laborers and mechanics employed in this work.
(24 CFR § 965.101).

3. What does the new rule mean for Tribes and Tribally Designated Housing Entities?

After the Section 3 new rule went into effect on November 30, 2020, Tribes and Tribally Designated Housing Entities under the Indian Housing Block Grant and Indian Community Development Block Grant programs are no longer required comply with Section 3 requirements.

The new rule at 24 CFR part 75 provides that contracts, subcontracts, grants, or subgrants subject to Section 7(b) of the Indian Self-Determination and Education Assistance Act (25 U.S.C. 5307(b)) or subject to tribal preference requirements as authorized under 101(k) of the Native American Housing Assistance and Self-Determination Act (25 U.S.C. 4111(k)) must provide preferences in employment, training, and business opportunities to Indians and Indian organizations, and are therefore not subject to the requirements of 24 CFR Part 75.

IV. RECIPIENT RESPONSIBILITIES:

1. What are the responsibilities of recipient agencies under Section 3?

Recipients are required to ensure their own compliance and the compliance of their contractors/subcontractors with the Section 3 regulations, as outlined at 24 CFR part 75. These responsibilities include but are not limited to the following:

Designing and implementing procedures to comply with the requirements of Section 3: Recipient agencies must take an active role in ensuring Section 3 compliance. The first step is implementing procedures to ensure that all parties, including residents, businesses, contractors, and subcontractors, comply with Section 3 and maintain records verifying that compliance.

Facilitating the training and employment of Section 3 workers: The recipient agency must act as a facilitator, connecting Section 3 workers to training and employment opportunities.

Facilitating the award of contracts to Section 3 business concerns: The recipient agency must also work to link developers and contractors with capable Section 3 business concerns. Additionally, recipient agencies, when necessary, may direct Section 3 business concerns to organizations that provide capacity-building training.

Ensuring Contractor and Subcontractor Awareness of and Compliance with Section 3 Benchmarks and responsibilities: The recipient agency is responsible for ensuring that contractors and subcontractors are aware of, and in compliance with, Section 3 requirements.

Ensuring Compliance and Meeting Numerical Benchmarks: Recipient agencies shall ensure compliance with Section 3 by assessing the hiring and subcontracting needs of contractors; regularly monitoring contractor compliance; assisting and actively cooperating with the Secretary of HUD in obtaining the compliance of contractors; penalizing non-compliance; providing incentives for good performance; and refraining from entering into contracts with any contractor that previously failed to comply with the requirements of Section 3.

Reporting Requirements: Recipient agencies must document all actions taken to comply with the requirements of Section 3 and report these activities either through the Section 3 Performance Evaluation and Registration System (SPEARS), for Public Housing financial assistance, or any reporting system designated by program areas overseeing other funding.

2. What are the reporting requirements for legacy contracts entered into under the old Part 135 rule?

On and after November 30, 2020, Section 3 regulations codified at 24 CFR Part 135 (the old rule) have not applied and will not apply to new grants, commitments, contracts, or projects. Contracts executed or projects for which assistance or funds were committed prior to November 30, 2020 are still required to adhere to the requirements of the old rule. Recipients of such assistance or funds will still be expected to maintain records of Section 3 statutory, regulatory, and contractual compliance but will no longer be required to report Section 3 compliance to HUD in SPEARS. HUD does not require funding recipients to change or alter contracts that were in place prior to the new Section 3 requirements becoming effective on November 30, 2020.

3. What are the reporting requirements for Section 3 projects for which assistance or funds are committed during the transition period?

Projects for which assistance or funds are committed between November 30, 2020 and July 1, 2021 are subject to the new Section 3 regulations found in 24 CFR part 75, and HUD expects that funding recipients will begin following this final rule's requirements for new grants, commitments, and contracts. Recipients will be expected to maintain records of statutory, regulatory, and contractual compliance with Section 3 for these projects but will not be required to report to HUD on the requirements found in 24 CFR part 75.

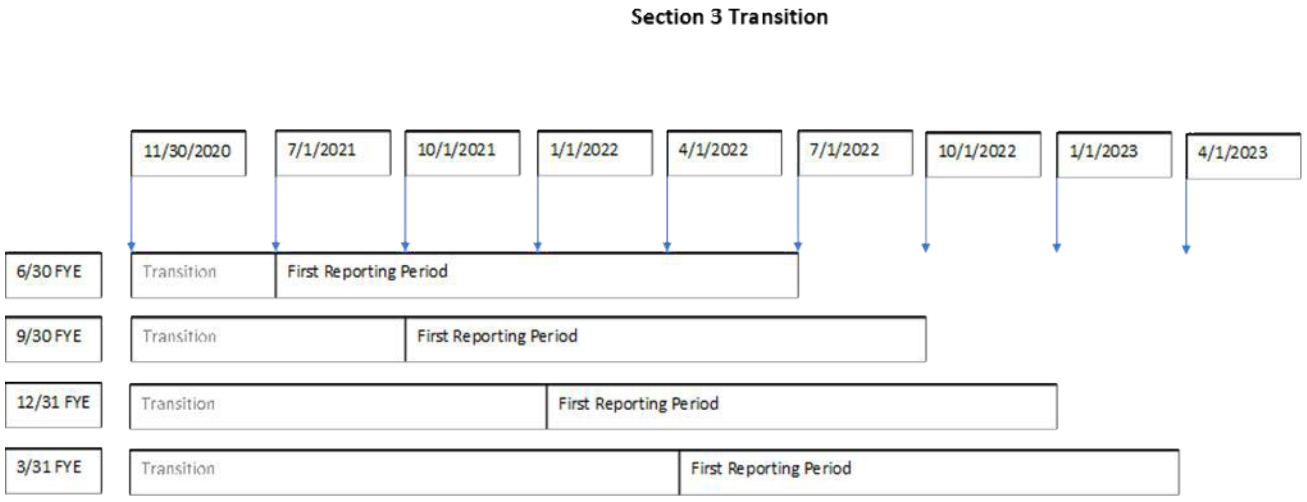
During the transition period between November 30, 2020 and July 1, 2021, recipients are expected to plan and revise processes, systems, and documents to comply with the new rule's requirements. During this time, funding recipients are still required to comply with Section 3's statutory requirements by ensuring that, to the greatest extent feasible, recipients continue to direct economic opportunities generated by certain HUD financial assistance to low- and very low-income persons and businesses that provide economic opportunities to low- and very low-income persons.

Recipients and employers should use this time to update policies and procedures for tracking labor hours and other requirements to ensure compliance with the new rules for projects for which funds are committed on or after July 1, 2021.

4. What is the reporting timeline for Public Housing Authorities and other recipients of public housing financial assistance?

As of November 30, 2020, PHAs' requirement to report their Section 3 activities and efforts starts 60 days after the end of their first fiscal year that begins after July 1, 2021. Please see the charts below for examples of PHA reporting schedules:

Fiscal Year End	New Reporting Period Begins	New Reporting Period Ends
6/30/21	7/1/21	6/30/22
9/30/21	10/1/21	9/30/22
12/31/21	1/1/22	12/13/22
3/31/22	4/1/22	3/31/23



5. What are the reporting requirements for Public Housing Authorities and other recipients of public housing financial assistance during the transition period?

All recipients of public housing financial assistance are required to follow the new Section 3 regulations found in 24 CFR part 75 beginning on November 30, 2020, and HUD expects that funding recipients and employers will begin following this final rule's requirements for new grants, commitments, and contracts on and after this date. Recipients will be expected to maintain records of statutory, regulatory, and contractual compliance with Section 3 but will not be required to report in SPEARS on the requirements found in 24 CFR part 75 until the recipient's first full fiscal year after July 1, 2021, as indicated in Question #4 above.

During the transition period between November 30, 2020 and a PHA or other recipient's required reporting start date, employers and grantees are expected to plan and revise processes, systems, and documents to comply with the new rule's requirements. During this time, PHAs and other recipients are still required to comply with Section 3's statutory requirements by ensuring that, to the greatest extent feasible, PHA's continue to direct economic opportunities generated by certain HUD financial assistance to low- and very low-income persons, tenants of public and assisted housing, and businesses that provide economic opportunities to low- and very low-income persons.

6. What are good strategies for targeting Section 3 workers and businesses?

In order to successfully target Section 3 workers and businesses for employment and contracting opportunities, recipients must establish and maintain an effective Section 3 program. HUD has found that hiring a Section 3 coordinator or assigning one individual the responsibility of coordinating all Section 3 related activities is instrumental in reaching Section 3's employment and contracting goals.

It is recommended that recipient agencies establish procedures to certify Section 3 workers and Section 3 business concerns for employment and contracting opportunities. Thereafter, they should maintain a list of eligible workers and businesses by skill, capacity or interest and contact them on a periodic basis when employment and contracting opportunities are available. Refer to the Section 3 regulations at 24 CFR § 75.15(b) and § 75.25(b) for a listing of qualitative efforts.

7. Are funds provided to recipients so that they can comply with the requirements of Section 3?

No. Funding has not been appropriated for Section 3 compliance. Section 3 requirements are only triggered when the normal expenditure of covered funds results in employment, training, or contracting opportunities.

8. Are Section 3 workers or business concerns guaranteed employment or contracting opportunities under Section 3?

Section 3 is not an entitlement program; therefore, employment and contracts are not guaranteed. Low- and very low-income individuals and Section 3 business concerns must be able to demonstrate that they have the ability or capacity to perform the specific job or successfully complete the contract that they are seeking.

9. Are recipients, developers, and contractors required to provide long- term employment opportunities, and not simply seasonal or temporary employment?

Recipients, developers, and contractors are required, to the greatest extent feasible, to direct employment opportunities to low- and very low-income persons, including seasonal and temporary employment opportunities. Benchmark goals include the calculation of all Section 3 worker and Targeted Section 3 Worker labor hours as a percentage of all labor hours worked on a project.

Recipients, developers, and contractors are encouraged to provide long-term employment to ensure that they meet the benchmark goals.

10. When might a recipient agency be exempt from the quantitative reporting requirements of Section 3?

A Small Public Housing Agency (less than 250 units) may elect to not report on labor hours. If the agency does elect not to report on labor hours, it is required to report solely on qualitative efforts as permitted in 24 CFR § 75.15(d).

11. Are recipients required to request developers or contractors to make payments into Section 3 training or implementation funds?

No. Recipients are not required to request contractors to make payments into a fund.

V. SECTION 3 CERTIFICATION:

1. How can a prospective Section 3 worker or business concern certify that they meet the eligibility requirements?

The individual or business must contact the agency or developer from which they are seeking employment or contracting opportunities (e.g.., the PHA, city, or local government). They should identify themselves as a Section 3 worker, Targeted Section 3 worker, or Section 3 business concern and provide whatever documentation that the recipient agency requires under their certification procedures. Prospective Section 3 workers and business concerns may self-certify that they meet the requirements as defined in the regulations. HUD recipients, contractors and subcontractors may also establish their own system to certify Section 3 workers and business concerns.

2. What documentation must be maintained by HUD recipients, subrecipients, contractors, and/or subcontractors certifying that low- and very-low individuals and business concerns meet the regulatory definitions under Section 3?

There are many ways that a worker can be certified as either a Section 3 Worker or Targeted Section 3 Worker under 24 CFR part 75:

For a worker to qualify as a Section 3 worker, one of the following must be maintained:

(i) A worker's self-certification that their income is below the income limit from the prior calendar year;
(ii) A worker's self-certification of participation in a means-tested program such as public housing or Section 8-assisted housing;
(iii) Certification from a PHA, or the owner or property manager of project-based Section 8-assisted housing, or the administrator of tenant-based Section 8-assisted housing that the worker is a participant in one of their programs;
(iv) An employer's certification that the worker's income from that employer is below the income limit when based on an employer's calculation of what the worker's wage rate would translate to if annualized on a full-time basis; or
(v) An employer's certification that the worker is employed by a Section 3 business concern.

(2) For a worker to qualify as a Targeted Section 3 worker, one of the following must be

maintained:

For Public Housing Financial Assistance projects:

(i) A worker's self-certification of participation in public housing or Section 8-assisted housing programs;
(ii) Certification from a PHA, or the owner or property manager of project-based Section 8 – assisted housing, or the administrator of tenant-based Section 8-assisted housing that the worker is a participant in one of their programs;
(iii) An employer's certification that the worker is employed by a Section 3 business concern; or
(iv) A worker's certification that the worker is a YouthBuild participant.

For Housing and Community Development Financial Assistance projects:

(i) An employer's confirmation that a worker's residence is within one mile of the work site or, if fewer than 5,000 people live within one mile of a work site, within a circle centered on the work site that is sufficient to encompass a population of 5,000 people
according to the most recent U.S. Census;

(ii) An employer's certification that the worker is employed by a Section 3 business concern; or

(iii) A worker's self-certification that the worker is a YouthBuild participant.

The documentation must be maintained for the time period required for record retentions in accordance with applicable program regulations or, in the absence of applicable program regulations, in accordance with 2 CFR § 200.334, Retention Requirements for Records (www.ecfr.gov/cgi-bin/retrieveECFR?n=se2.1.200_1334), which provides for retaining records for at least three years, as described in detail in that regulation..

A PHA or recipient may report on Section 3 workers and Targeted Section 3 workers for five years from when their certification as a Section 3 worker or Targeted Section 3 worker is established.

3. What are examples of acceptable evidence to determine eligibility as a Section 3 worker?

HUD does not prescribe that any specific forms of evidence to establish Section 3 eligibility.

Acceptable documentation includes, but is not limited to the following:

- Proof of residency in a public housing project; or
- Evidence of participation in the YouthBuild program.

4. What are examples of acceptable evidence for determining eligibility as a Section 3 business concern?

HUD does not prescribe that any specific forms of evidence be required to establish Section 3 eligibility. The business seeking the preference must be able to demonstrate that they meet one of the following criteria:

1. At least 51 percent owned and controlled by low- or very low-income persons;
2. Over 75 percent of the labor hours performed for the business over the prior three-month period are performed by Section 3 workers; or
3. A business at least 51 percent owned and controlled by current public housing residents or residents who currently live in Section 8-assisted housing.

5. Are all public housing residents considered Section 3 workers regardless of their income?

No. To qualify as a Section 3 Worker, an individual must meet one of the following criteria:

1. The worker's income for the previous or annualized calendar year is below the income limit established by HUD;
2. The worker is employed by a Section 3 business concern; or
3. The worker is a YouthBuild participant.

6. Does qualifying as a Section 3 businesses mean that the business will be selected if it meets the technical requirements of the bid, regardless of bid price?

No. As provided in 2 CFR 200.318, contract awards shall only be made to responsible contractors possessing the ability to perform under the terms and conditions of the proposed contract. In order to meet the requirements of Section 3 and Federal and state procurement laws, recipient agencies must develop procedures that are consistent with all applicable regulations.

7. Can contracting with MBE/WBE businesses count towards Section 3 benchmarks?

It depends. Section 3 is race and gender neutral. Only MBEs/WBEs that meet the eligibility criteria as a Section 3 business concern set forth in the regulation can be counted towards the Section 3 labor hour calculation.

8. Does a business have to be incorporated to be considered a Section 3 eligible business?

No. A Section 3 business concern can be any type of business, such as a sole proprietorship, partnership, or a corporation, properly licensed and meeting all legal requirements to perform the contract under consideration.

VI. ECONOMIC OPPORTUNITIES NUMERICAL BENCHMARKS:

1. How can low- and very low-income persons and businesses locate recipient agencies that are required to comply with Section 3 in their area?

To find local recipients' agencies, Section 3 residents or businesses should contact their local HUD office. To find your closest office, visit: www.hud.gov/localoffices.

2. How can I find Section 3 business concerns in my area?

Contact local recipient agencies to find Section 3 business concerns in your area. Section 3 business concerns that have registered in the Section 3 Business Registry are also available at: https://portalapps.hud.gov/Sec3BusReg/BRegistry/BRegistryHome.

3. Do the benchmark requirements only count toward new hires?

No, the rule does not apply to only new hires, but if someone is currently on staff and qualifies as a Section 3 resident under 24 CFR part 135, they will need to re-certify as either a Section 3 worker or Targeted Section 3 worker under 24 CFR part 75.

4. Should PHA's report on staff hours?

Yes, but not all PHA staff qualify as Section 3 workers. Only PHA staff that meet the definition of a Section 3 worker or Targeted Section 3 worker would qualify to be counted toward total Section 3 or Targeted Section 3 labor hours. Once a PHA determines that a Section 3 worker or Targeted Section 3 worker is hired or currently employed, the PHA would just report those hours as the numerator over the total labor hours funded with public housing financial assistance as the denominator.

5. What category of PHA Staff should be included?

Both salaried and hourly workers need to be reported. There is a limited good faith assessment exception for PHAs and other recipient employers of hourly and salaried workers that are not subject to requirements specifying time and attendance reporting and do not have systems already in place to track labor hours. This exception is to address employers that do not already track labor hours without making changes in time and attendance or payroll.

6. Are recipient agencies required to meet the Section 3 benchmarks, or are they optional?

The Section 3 benchmarks are minimum targets that must be reached in order for the Department to consider a recipient in compliance. Recipient agencies are required to make best efforts, or to the greatest extent feasible, to achieve the benchmarks required for the number of labor hours performed by both Section 3 workers and Targeted Section 3 workers. If an agency fails to fully meet the Section 3 benchmarks, they must adequately document the efforts taken to meet the numerical goals (see Question #9 for a discussion of safe harbor.)

7. Will there be changes to the benchmark requirements?

The Secretary of Housing and Urban Development is required in the Benchmark Notice published in the Federal Register to review and update the Benchmarks by Federal Register notice no less frequently than once every three years.

8. What is considered "other" public construction?

Other public construction includes infrastructure work, such as extending water and sewage lines, sidewalk repairs, site preparation, and installing conduits for utility services.

9. What is the meaning of the safe harbor determination?

Recipients will be considered to have complied with the Section 3 requirements and met the safe harbor, in the absence of evidence to the contrary, if they certify that they have followed the required prioritization of effort and met or exceeded the applicable Section 3 benchmarks.

If a recipient agency or contractor does not meet the benchmark requirements but can provide evidence that they have made a number of qualitative efforts to assist low- and very low-income persons with employment and training opportunities, the recipient or contractor is considered to be in compliance with Section 3, absent evidence to the contrary (i.e., evidence or findings obtained from a Section 3 compliance review).

VII. SECTION 3 COMPLAINTS:

1. How should complaints be made?

Complaints alleging failure of compliance with this part may be reported to the HUD program office responsible for the public housing financial assistance or the Section 3 project, or to the local HUD field office. These offices can be found through the HUD website, www.hud.gov/.

2. Where else can I file complaints alleging denied employment and contracting opportunities?

You may be eligible to bring complaints under other federal laws. The U.S. Equal Employment Opportunity Commission (EEOC) is responsible for enforcing federal laws that make it illegal to discriminate against a job applicant or an employee because of the person's race, color, religion, sex (including pregnancy), national origin, age (40 or older), disability or genetic information (medical history or predisposition to disease). For more information about your rights, please contact EEOC at: www.EEOC.gov.

The Department of Labor Office of Federal Contract Compliance Programs (OFCCP) enforces, for the benefit of job seekers and wage earners, the contractual promise of affirmative action and equal employment opportunity required of those who do business with the Federal government. More information about the services they provide can be obtained at: http://www.dol.gov/ofccp/.

SECTION 01022

CERTIFICATION OF **PRIME CONTRACTOR** REGARDING SECTION 3 AND SEGREGATED FACILITIES

YWCA GREATER NEW ORLEANS
NEW DAYCARE, EDUCATION & COUNSELING BUILDING

Name of Prime Contractor	Project Name

The undersigned hereby certifies that:

a) Section 3 provisions are included in the Contract;

b) To the greatest extent feasible economic opportunities, most importantly employment, generated by this project shall be directed to low- and very low-income persons, particularly those who are recipients of government assistance for housing or residents of YWCA Greater New Orleans.

c) No segregated facilities will be maintained as required by Title VI of the Civil Rights Act of 1964.

Typed Name and Title of Authorized Representative	Company (Prime Contractor)
Signature of Authorized Representative	Date

SECTION 01023

CERTIFICATION OF **SUBCONTRACTOR** REGARDING SECTION 3 AND SEGREGATED FACILITIES

YWCA GREATER NEW ORLEANS
NEW DAYCARE, EDUCATION & COUNSELING BUILDING

Name of Subcontractor	Project Name

The undersigned hereby certifies that:

a) Section 3 provisions are included in the Contract;

b) To the greatest extent feasible economic opportunities, most importantly employment, generated by this project shall be directed to low- and very low-income persons, particularly those who are recipients of government assistance for housing or residents of YWCA Greater New Orleans.

c) No segregated facilities will be maintained as required by Title VI of the Civil Rights Act of 1964.

Typed Name and Title of Authorized Representative	Company (Prime Contractor)
Signature of Authorized Representative	Date

SECTION 01024

CONTRACTOR SECTION 3 PLAN

YWCA GREATER NEW ORLEANS
NEW DAYCARE, EDUCATION & COUNSELING BUILDING

[Name of Contractor], Contractor, agrees to ensure, to the greatest extent feasible, that economic opportunities, most importantly employment, generated by CDBG financial assistance shall be directed to low- and very low-income persons, particularly those who are recipients of government assistance for housing or residents of the community in which the CDBG financial assistance is spent.

Goals

To the greatest extent feasible, and consistent with existing Federal, state, and local laws and regulations, the Contractor agrees to comply with the employment and training, and contract prioritization efforts of 24 CFR 75.19. The goals of this Plan are, where feasible, to:

- Provide employment opportunities and training to Section 3 workers, participants in YouthBuild programs.
- Provide contacting opportunities to qualified Section 3 business concerns.
- Give priority for employment opportunities and training to Section 3 workers residing within the service area of the project and participants in YouthBuild Programs.

On this project, the Contractor and its subcontractors will collectively strive to meet the following Section 3 minimum labor hour benchmarks:

Labor Hour Standard	Ratio Formula	Minimum %
Section 3 Workers	Section 3 Worker Hours ÷ Total Labor Hours	25%
Targeted Section 3 Workers	Targeted Section 3 Worker Hours ÷ Total Labor Hours	5%

Reporting

To document the Contractor's and subcontractor's efforts to achieve the benchmarks and comply with the reporting requirements set forth in 24 CFR 75.25(a), the Contractor and its subcontractors will complete and submit the following certifications and reports[1] as applicable:

- Section 3 Employee Data Form and Self-Certification.
- Section 3 Business Concern Contractor/Subcontractor Certification.
- Section 3 Activity and Good Faith Efforts Report (quarterly).
- Section 3 Employee Roster-Job specific
- Section 3 Utilization Report (final)

Contract Provisions

In compliance with 24 CFR 75.27, the Contractor will include contract provisions in all subcontract agreements that require the subcontractor to meet the requirements of 24 CFR 75.19 as outlined above.

The undersigned declares that the Contractor agrees to implement this Section 3 Plan for the above-named Section 3 covered project.

Printed Name and Title	Authorized Signature	Date

[1] The Contractor may substitute an internal computer-generated employee registry in lieu of completing a specific form or report provided it includes the worker's name, worker's address, employer, hours worked and indicates Section 3/targeted Section 3 Status.

SECTION 01025

SECTION 3 WORKER SELF CERTIFICATION

YWCA GREATER NEW ORLEANS
NEW DAYCARE, EDUCATION & COUNSELING BUILDING

To be completed by Employee:

Employee General Information

1. Name of Employer _____
2. Name of Employee _____
3. Street Address of Employee _____
4. City and Zip Code of Employee _____
5. Phone Number and Email _____
6. Date of Employment _____

The purpose of this form is to comply with Section 3 of the HUD Act of 1968 employer certification requirements listed in 24 CFR § 75.31. To qualify as a Section 3 worker, any United States legal resident's annual income must not exceed the HUD income limits for the year before the worker was hired, or the individual's current income annualized on a full-time basis for the year must be below the HUD income limit. Additionally, an individual can qualify as a Section 3 worker if they are a YouthBuild participant or employee of a Section 3 Business concern.

SECTION 3 WORKER QUALIFICATIONS

To qualify as a Section 3 Worker, you must meet **one** of the following requirements **OR** have your employer certify that you are employed by a Section 3 Business Concern.

• Income for the previous calendar year is below the income limit* • A participant in a means-tested program such as public housing or Section 8-assisted housing • A YouthBuild Participant*	Income limit $XX,XXX

* Currently or at the time of hire if hired within the past 5 years

Income Limit is the HUD 80% One Person Income Limit for Parish for which employee resides. Income limits may be obtained at: Income Limits | HUD USER

☐ I meet at least one of the requirements in the box above and therefore qualify to be counted as a Section 3 Worker under 24 CFR § 75.

TARGETED SECTION 3 WORKER QUALIFICATIONS

If applicable, please indicate which requirement you meet to be considered a Targeted Section 3 worker in the box below. If you select "Living within the service area or neighborhood of the project," that selection will have to be confirmed by your employer. If you do not meet any of these requirements or do not know if you meet any of the requirements listed below, you may leave this section blank.

___	Living within the service area or neighborhood of the project (requires employer confirmation)*
___	YouthBuild participant*

*Currently or at the time of hire if hired within the past 5 years

Service area or the neighborhood of the project means an area within one mile of the Section 3 project or, if fewer than 5,000 people live within one mile of a Section 3 project, within a circle centered on the Section 3 project that is sufficient to encompass a population of 5,000 people according to the most recent U.S. Census.

☐ In addition to qualifying as a Section 3 Worker, I meet at least one of the requirements in the box above and therefore qualify to be counted as a Targeted Section 3 Worker under 24 CFR § 75.

I/We, the undersigned, certify under penalty of perjury that the information provided above is true and correct and certifies that the worker identified above meets the definition of a Section 3 worker. WARNING: Anyone who knowingly submits a false claim or makes a false statement is subject to criminal and/or civil penalties, including confinement for up to 5 years, fines, and civil and administrative penalties. (18 U.S.C. §§ 287, 1001, 1010, 1012; 31 U.S.C. §3729, 3802)

_____ _____

Signature Date

SECTION 01026

SECTION 3 WORKER EMPLOYER CERTIFICATION FORM

YWCA GREATER NEW ORLEANS
NEW DAYCARE, EDUCATION & COUNSELING BUILDING

To be completed by Employer:

A. Employer General Information

1. Name of Employer _____
2. Street Address of Employer _____
3. City and Zip Code of Employer _____
4. Phone Number and Email _____

The purpose of this form is to comply with Section 3 of the HUD Act of 1968 employer certification requirements listed in 24 CFR § 75.31. To qualify as a Section 3 worker, the United States legal resident's annual income must not exceed the HUD income limits for the year before the worker was hired, or the individual's current income annualized on a full-time basis for the year must be below the HUD income limit. Additionally, an individual can qualify as a Section 3 worker and Targeted Section 3 worker, if an employee of a Section 3 Business Concern. To qualify as a Targeted Section 3 worker, an employer can confirm that the employee lives within the service area or neighborhood of the project.

B. Employee General Information

1. Name of Employee _____
2. Street Address of Employee _____
3. City and Zip Code of Employee _____
4. Phone Number and Email _____

SECTION 3 WORKER AND TARGETED SECTION 3 WORKER QUALIFICATIONS

Please indicate which of the following is true for the worker listed above: (Select ALL that apply)

___ Worker's income from your employment is below the income limit based on a calculation of what the worker's wage rate would translate to if annualized on a full-time basis* ___ Worker is employed by a Section 3 Business Concern (Select if your business qualifies as a Section 3 Business Concern) ___ Worker's residence is within the service area or neighborhood of the project *	Income Limit $XX,XXX

*Currently or at the time of hire if hired within the past 5 years

Income Limit is the HUD 80% One Person Income Limit for Parish for which employee resides. Income limits may be obtained at: Income Limits | HUD USER

Service area or the neighborhood of the project means an area within one mile of the Section 3 project or, if fewer than 5,000 people live within one mile of a Section 3 project, within a circle centered on the Section 3 project that is sufficient to encompass a population of 5,000 people according to the most recent U.S. Census.

I/We, the undersigned, certify under penalty of perjury that the information provided above is true and correct and certifies that the worker identified above meets the definition of a Section 3 worker. WARNING: Anyone who knowingly submits a false claim or makes a false statement is subject to criminal and/or civil penalties, including confinement for up to 5 years, fines, and civil and administrative penalties. (18 U.S.C. §§ 287, 1001, 1010, 1012; 31 U.S.C. §3729, 3802)

Employer Signature _____ Date _____

SECTION 01027

SECTION 3 BUSINESS CONCERN CONTRACTOR/SUBCONTRACTOR CERTIFICATION

YWCA GREATER NEW ORLEANS
NEW DAYCARE, EDUCATION & COUNSELING BUILDING

Name of Business:_____

Name of Business Owner:_____

Address of Business:_____

Phone Number:_____

Email Address:_____

Type of Business: ____ Corporation ____ Partnership ____ Sole Proprietorship ____ Joint Venture

The undersigned hereby certifies that **(select any that apply):**

_____ The business is at least 51% owned and controlled by low or very low income persons; **or**

_____ Over 75% of the labor hours performed for the business over the previous 3 month period are preformed by Section 3 workers; **or**

_____ The business is at least 51% owned and controlled by current resident of public housing or Section 8 assisted housing.

Business Concern Affirmation

I affirm and certify that the above statements are true, complete, and correct to the best of my knowledge and belief. I understand that businesses who misrepresent themselves as Section 3 business concerns and report false information may have their contracts terminated as default and be barred from ongoing and future considerations for contracting opportunities. I hereby certify, under penalty of law, that all information provided is correct to the best of my knowledge.

_____
Name & Title of Company Representative (Print or Type)

_____ _____
Signature Date

FOR ADMINISTRATIVE USE ONLY

Qualifies as Section 3 Business Concern: _____ Yes _____ No
By: _____ Date: _____

*This certification expires six (6) months after date of signature.

SECTION 01028

SECTION 3 ACTIVITY AND GOOD FAITH EFFORTS QUARTERLY REPORT

YWCA GREATER NEW ORLEANS
NEW DAYCARE, EDUCATION & COUNSELING BUILDING

General Contractor: _____

Subcontractor (If applicable): _____

Reporting Period: _____ **Report Type: Quarterly**

Quarterly
January – March: Due April 15th
April – June: Due July 15th
July – September: Due October 15th
October – December: Due January 15th

Contractor Section 3 Point of Contact: _____

Phone: _____ Email: _____

Section 3 Goals

Section 3 is a provision of the Housing and Urban Development (HUD) Act of 1968 that helps foster local economic development, neighborhood economic improvement, and individual self-sufficiency. The Section 3 program requires recipients of certain HUD financial assistance to provide job training, employment, and contracting, to the greatest extent feasible, for low- or very low-income residents in connection with projects andactivities in their neighborhoods. Section 3 is race and gender-neutral and is NOT the same as WBE/MBE.

Projects over $200,000 trigger Section 3. When triggered, best efforts must be made to extend Section 3 opportunities to verified Section 3 residents and business concerns to meet these *minimum* numeric goals:

1. Twenty-five percent (25%) of the total hours on a Section 3 project worked by Section 3 workers; and
2. Five percent (5%) of the total hours on a Section 3 project worked by Targeted Section 3 workers.

Programmatic Responsibilities

Contractors and/or Subcontractors are expected to meet the minimum goals listed above, to the greatest extent feasible. All efforts to utilize Section 3 businesses and workers should be documented.

PART 1: SECTION 3 COMPLIANCE (See Sample Labor Hour Tracker for example of information to be compiled for reporting – Page 6 of 6)		
I. SECTION 3 HOURS WORKED – *Report the number of Section 3 hours for this reporting period.*		
A. Total hours worked this period by all workers	B. Number of Section 3 hours worked this period	% Section 3 hours (Divide column B by column A)
II. TARGETED SECTION 3 HOURS WORKED – *Report the number of targeted Section 3 hours for this reporting period*		
A. Total hours worked this period by all workers	B. Number of targeted Section 3 hours worked this period	% Targeted Section 3 hours (Divide column B by column A)

PART 2: SUBCONTRACTOR INFORMATION

- ☐ This project WILL NOT utilize subcontractors.
- ☐ This project MAY utilize the following subcontractors:

No.	Sect3 Bus.	Subcontractor Name	Subcontractor Address and Phone Number	Trade	Subcontract Amount
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					
25					
26					
27					
28					

PART 3: PERMANENT EMPLOYEES (On This Project Only)

Please list all current permanent employees (both full and part-time) employed by your company (or local/regional office) as of the signature date on Section 001020 – Certification of Prime Contractor Regarding Section 3 and Segregated Facilities, as well as employees of all subcontractors working on this project. Use additional sheets as necessary. A computer-generated employee registry can be provided in lieu of this form if it includes the worker's name, employer and job category and indicates Section 3/targeted Section 3 status.

No.	Name of Worker	Employer	Job Category/Trade	Section 3 Worker (Y/N)	Targeted Section 3 Worker (Y/N)
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					
25					
26					
27					
28					
29					
30					
31					
32					
33					
34					
35					
36					
37					
38					

PART 4: DOCUMENTATION OF QUALITATIVE EFFORTS

Describe efforts to provide Sec 3 Workers and Section 3 Business Concerns with first consideration for employment and contracting opportunities, and all outreach activities performed. If no activity, explain why*

1. Describe all efforts made to direct the employment and other economic opportunities generated by HUD financial assistance for housing and community development programs, to the greatest extent feasible, to Section 3 workers. Attach additional pages if needed.

   Attach supporting documentation such as:

   - Copies of all publications, notices, pictures of posted notices, and other outreach materials.
   - List of all Section 3 workers that responded to your responded to your outreach efforts (e.g., submitted job applications, phone logs, etc.); were any of them hired? If not, please explain why.

2. Describe all efforts made to notify Section 3 businesses of any subcontracting opportunities generated by HUD financial assistance for this project, to the greatest extent feasible. Attach additional pages if needed.

   Attach supporting documentation such as:

   - Section 3 Business List used in any solicitation.
   - List of Section 3 business included in any solicitation and documentation of efforts (emails, letters, phone, logs, etc.).
   - List of Section 3 businesses that responded to your solicitation and/or outreach efforts; were any ofthem hired? If not, please explain why.
   - Copies of all publications, notices, pictures of posted notices, and any other outreach material utilized.

.

3. Describe all additional qualitative efforts made to comply with Section 3 requirements. See below for examples. Attach all applicable supporting documentation.

4. If there are employment opportunities associated with your project, include a draft of the proposed signage. Section 3 signage should be posted at the construction site. Signage must be large enough to be visible from the street. The sign must (a) identify the name of the project, (b) state the project is a HUD Section 3 Project, and (c) include the name, phone number and email address of an appropriate point of contact regarding employment opportunities.

Examples of Qualitative Efforts

- Engage in outreach efforts to generate job applicants who are Targeted Section 3 workers
- Provide training or apprenticeship opportunities
- Provide technical assistance to help Section 3 workers compete for jobs (e.g., resume assistance, coaching)
- Assist or connect Section 3 workers with drafting resumes, preparing for interviews, and finding job opportunities
- Hold one or more job fairs
- Provide or refer Section 3 workers to services supporting work readiness and retention (e.g., work readiness activities, interview clothing, test fees, transportation, childcare)
- Provide assistance to apply for or attend community college, a four-year educational institution, or vocational/technical training
- Help Section 3 workers to obtain financial literacy training and/or coaching
- Engage in outreach efforts to identify and secure bids from Section 3 business concerns
- Provide technical assistance to help Section 3 business concerns understand and bid on contracts
- Divide contracts into smaller jobs to facilitate participation by Section 3 business concerns
- Provide bonding assistance, guaranties, or other efforts to support viable bids from Section 3 business concerns
- Promote use of business registries designed to create opportunities for disadvantaged and small businesses
- Outreach, engagement, or referrals with the state one-stop system as defined in Section 121(e)(2) of the Workforce Innovation and Opportunity Act

I declare that all statements contained in this report and any accompanying documents are true and correct, and made with full knowledge that all statements given are subject to investigation and that any false or dishonest answer to any question may be grounds for denial or revocation of funding or other penalties as prescribed under 18 U.S. Code § 1001.

Typed/Printed Name and Title of Company Representative

Signature of Company Representative **Date**

YWCA GREATER NEW ORLEANS

NEW DAYCARE, EDUCATION & COUNSELING BUILDING

LABOR HOURS TRACKER

Contractor:

Subcontractor:

Employee Name	Status				Hours Worked per Pay Period							
	Existing	New	Sec 3 Worker	Sec 3 Targeted Worker	PR #1	PR #2	PR #3	PR #4	PR #5	PR #6	PR #7	PR #8

LWI - 3/28/23

(Reporting and Compliance Form)

Section 3 Labor Hour Tracker Methodology

(Sample)

SECTION 01029

SECTION 3 UTILIZATION FINAL REPORT

YWCA GREATER NEW ORLEANS
NEW DAYCARE, EDUCATION & COUNSELING BUILDING

(To Be Completed By the Prime Contractor and Include Data for All Sub-Contractors and Submitted to Owner and Owner's Grant Manager After Substantial Completion**)**

A. Section 3 Employee Labor Information

1. Total number of Labor Hours on the project: _____

2. Total number of Section 3 Labor Hours on the project: _____

Percent of Total Labor Hours: _____

3. Total number of Targeted Section 3 Labor Hour on the project: _____

Percent of Total Labor Hours: _____

4. Number of Section 3 Employees Utilized on the Project by Prime Contractor: _____

5. Number of Section 3 Employees Utilized on the Project by Subcontractors: _____

6. Total Number of Section 3 Employees Utilized on Project: _____

7. Names of all subcontractors *(attach additional sheet if necessary)*:

_____ _____ _____

_____ _____ _____

B. Certification of Prime Contractor

General Contractor: _____

Address: _____

Phone: _____

As an officer and representative of the Company, I hereby certify that the above information is true and accurate and is reported fully for this construction project. It is understood final payment from the Owner for this project cannot be made until this report is submitted to the owner or authorized designee.

_____
Name & Title of Company Representative (Print or Type)

_____ _____
Signature Date

(Reporting and Compliance Form)

DIRECTIONS FOR COMPLETION OF SECTION 3 UTILIZATION REPORT

1. Determine the level of Section 3 participation in the construction project.
   a) All employees of the Prime Contractor and all subcontractors must fill out an Employee Information Form, to be retained by the Prime Contractor with copies submitted to the Owner's Compliance Officer. All new hires during the construction project must also complete the Employee Information Form.
   b) Distribute copies of the Employee Information Form to **all** subcontractors you engage for the project, for completion by all employees to be submitted to the prime for retention, with copies submitted to the Owner's Compliance Officer.
   c) Determine Section 3 eligibility for all employees in order to track labor hours performed (tracking spreadsheet provided separately)
2. Complete **(A) Section 3 Employee Information** area of the report.
   a) Enter the total number of labor hours on the project on Line 2.
   b) Enter the number of labor hours for Section 3 Workers, on Line 3; calculate the percentage (Line 2 divided by Line 3)
   c) Enter the number of labor hours for Targeted Section 3 Workers on Line 4; calculate the percentage (Line 2 divided by Line 4)
   d) Enter number of Section 3 Employees utilized by Prime Contractor on Line 5
   e) Enter number of Section 3 Employees utilized by subcontractors on Line 6
   f) Enter total number Section 3 Employees utilized on the project on Line 7 (Line 5 + Line 6)
   g) List all subcontractors on Line 8 (insert additional pages as needed)
3. Complete **(B) Certification by Prime Contractor** section of the report
   a) List name, address, and telephone of your company (prime contractor)
   b) Print or type the name and title of authorized company representative
   c) Have authorized company representative sign and date the Report

Important Reminder

Final payment of retainage funds will not be made until Section 3 Utilization Report is submitted to the Owner or Owner's Compliance Officer.

EXHIBIT C

REQUIRED CONTRACT PROVISIONS

REQUIRED CONTRACT PROVISIONS

FEMA REQUIRED CLAUSES ADDENDUM.

THE CONTRACT PROVISIONS REQUIRED BY FEMA AS DESCRIBED HEREIN ARE HEREBY INCORPORATED INTO THE STANDARD FORM OF AGREEMENT BETWEEN OWNER AND CONTRACTOR AIA DOCUMENT A101 -2017 BETWEEN Owner, YWCA Greater New Orleans ("YWCA") AND Contractor:

EQUAL EMPLOYMENT OPPORTUNITY.

Standard.

Except as otherwise provided under 41 C.F.R. Part 60, all contracts that meet the definition of "federally assisted construction contract" in 41 C.F.R. § 60- 1.3 must include the equal opportunity clause provided under 41 C.F.R. § 60-1.4(b), in accordance with Executive Order 11246**,** *Equal Employment Opportunity* (30 Fed. Reg. 12319, 12935, 3 C.F.R. Part, 1964-1965 Comp., p. 339), as amended by Executive Order 11375, *Amending Executive Order 11246 Relating to Equal Employment Opportunity*, and implementing regulations at 41 C.F.R. Part 60 (Office of Federal Contract Compliance Programs, Equal Employment Opportunity, Department of Labor). See 2 C.F.R. Part 200, Appendix II, ¶ C.

Key Definitions.

Federally Assisted Construction Contract. The regulation at 41 C.F.R. § 60-1.3 defines a "federally assisted construction contract" as any agreement or modification thereof between any applicant and a person for construction work which is paid for in whole or in part with funds obtained from the Government or borrowed on the credit of the Government pursuant to any Federal program involving a grant, contract, loan, insurance, or guarantee, or undertaken pursuant to any Federal program involving such grant, contract, loan, insurance, or guarantee, or any application or modification thereof approved by the Government for a grant, contract, loan, insurance, or guarantee under which the applicant itself participates in the construction work.

Contractor _____Owner _____

Construction Work. The regulation at 41 C.F.R. § 60-1.3 defines "construction work" as the construction, rehabilitation, alteration, conversion, extension, demolition or repair of buildings, highways, or other changes or improvements to real property, including facilities providing utility services. The term also includes the supervision, inspection, and other onsite functions incidental to the actual construction.

Applicability. This requirement applies to all FEMA grant and cooperative agreement programs.

The regulation at 41 C.F.R. Part 60-1.4(b) requires the insertion of the following contract clause:

"**During the performance of this contract, the contractor agrees as follows:**

(1) The contractor will not discriminate against any employee or applicant for employment because of race, color, religion, sex, sexual orientation, gender identity, or national origin. The contractor will take affirmative action to ensure that applicants are employed, and that employees are treated during employment without regard to their race, color, religion, sex, sexual orientation, gender identity, or national origin. Such action shall include, but not be limited to the following:
Employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. The contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided setting forth the provisions of this nondiscrimination clause.

(2) The contractor will, in all solicitations or advertisements for employees placed by or on behalf of the contractor, state that all qualified applicants will receive consideration for employment without regard to race, color, religion, sex, sexual orientation, gender identity, or national origin.

(3) The contractor will not discharge or in any other manner discriminate against any employee or applicant for employment because such employee or applicant has inquired about, discussed, or disclosed the compensation of the employee or applicant or another employee or applicant. This provision shall not apply to instances in which an employee who has access to the compensation information of other employees or applicants as a part of such employee's essential job functions discloses the compensation of such other employees or applicants to individuals who do not otherwise have access to such information, unless such disclosure is in response to a formal complaint

or charge, in furtherance of an investigation, proceeding, hearing, or action, including an investigation conducted by the employer, or is consistent with the contractor's legal duty to furnish information.

(4) The contractor will send to each labor union or representative of workers with which he has a collective bargaining agreement or other contract or understanding, a notice to be provided advising the said labor union or workers' representatives of the contractor's commitments under this section, and shall post copies of the notice in conspicuous places available to employees and applicants for employment.

(5) The contractor will comply with all provisions of Executive Order 11246 of September 24, 1965, and of the rules, regulations, and relevant orders of the Secretary of Labor.

(6) The contractor will furnish all information and reports required by Executive Order 11246 of September 24, 1965, and by rules, regulations, and orders of the Secretary of Labor, or pursuant thereto, and will permit access to his books, records, and accounts by the administering agency and the Secretary of Labor for purposes of investigation to ascertain compliance with such rules, regulations, and orders.

(7) In the event of the contractor's noncompliance with the nondiscrimination clauses of this contract or with any of the said rules, regulations, or orders, this contract may be canceled, terminated, or suspended in whole or in part and the contractor may be declared ineligible for further Government contracts or federally assisted construction contracts in accordance with procedures authorized in Executive Order 11246 of September 24, 1965, and such other sanctions may be imposed and remedies invoked as provided in Executive Order 11246 of September 24, 1965, or by rule, regulation, or order of the Secretary of Labor, or as otherwise provided by law.

(8) The contractor will include the portion of the sentence immediately preceding paragraph (1) and the provisions of paragraphs (1) through (8) in every subcontract or purchase order unless exempted by rules, regulations, or orders of the Secretary of Labor issued pursuant to section 204 of Executive Order 11246 of September 24, 1965, so that such provisions will be binding upon each subcontractor or vendor. The contractor will take such action with respect to any subcontract or purchase order as the administering agency may direct as a means of enforcing such provisions, including sanctions for noncompliance:

Provided, however, that in the event a contractor becomes involved in, or is threatened with, litigation with a subcontractor or vendor as a result of such direction by the administering agency, the contractor may request the United States to enter into such litigation to protect the interests of the United States.

The applicant further agrees that it will be bound by the above equal opportunity clause with respect to its own employment practices when it

participates in federally assisted construction work: Provided, That if the applicant so participating is a State or local government, the above equal opportunity clause is not applicable to any agency, instrumentality or subdivision of such government which does not participate in work on or under the contract.

The applicant agrees that it will assist and cooperate actively with the administering agency and the Secretary of Labor in obtaining the compliance of contractors and subcontractors with the equal opportunity clause and the rules, regulations, and relevant orders of the Secretary of Labor, that it will furnish the administering agency and the Secretary of Labor such information as they may require for the supervision of such compliance, and that it will otherwise assist the administering agency in the discharge of the agency's primary responsibility for securing compliance.

The applicant further agrees that it will refrain from entering into any contract or contract modification subject to Executive Order 11246 of September 24, 1965, with a contractor debarred from, or who has not demonstrated eligibility for, Government contracts and federally assisted construction contracts pursuant to the Executive Order and will carry out such sanctions and penalties for violation of the equal opportunity clause as may be imposed upon contractors and subcontractors by the administering agency or the Secretary of Labor pursuant to Part II, Subpart D of the Executive Order. In addition, the applicant agrees that if it fails or refuses to comply with these undertakings, the administering agency may take any or all of the following actions: Cancel, terminate, or suspend in whole or in part this grant (contract, loan, insurance, guarantee); refrain from extending any further assistance to the applicant under the program with respect to which the failure or refund occurred until satisfactory assurance of future compliance has been received from such applicant; and refer the case to the Department of Justice for appropriate legal proceedings

CONTRACT WORK HOURS AND SAFETY STANDARDS ACT

1. Applicability: This requirement applies to all FEMA grant and cooperative agreement programs.

2. Where applicable (see 40 U.S.C §3701), all contracts awarded by the non-federal entity in excess of $100,000.00 that involve the employment of mechanics or labors must include a provision for compliance with 40 U.S.C.§ 3702 and 3704 as supplemented by Department of Labor regulations at 29 C.F.R. Part 5 See 2 C.F.R Part 200, Appendix II ¶ E

3. Under 40 U.S.C. § 3702, each contractor must be required to compute the wage of every mechanic and laborer on the basis of a stand work week of 40 hours. Work in excess of the standard work week is permissible provided that the worker is compensated at a rate of not less than one and half times the basic rate of pay for all hours worked in excess of 40 hours in the work week.

Contractor _____Owner _____

4. The requirements of 40 U.S.C. § 3704 are applicable to construction work and prove that no laborer or mechanic must be required to work in surroundings or under working conditions which are unsanitary, hazardous or dangerous. These requirements do not apply to the purchases of supplies or materials or articles ordinarily available on the open market, or contracts for transportation or transmission of intelligence.

5. The regulation at 29 C.F.R § 5.5 (b) provides the required contract clause concerning compliance with the Contract Work Hours and Safety Standards Act:

"Compliance with the Contract Work Hours and Safety Standards Act"

(1) *Overtime requirements.* ***YWCA Greater New Orleans will pay no overtime on this contract. This contract is a Lump Sum contract****.* No contractor or subcontractor contracting for any part of the contract work which may require or involve the employment of laborers or mechanics shall require or permit any such laborer or mechanic in any workweek in which he or she is employed on such work to work in excess of forty hours in such workweek unless such laborer or mechanic receives compensation at a rate not less than one and one-half times the basic rate of pay for all hours worked in excess of forty hours in such workweek.

(2) *Violation; liability for unpaid wages; liquidated damages.* In the event of any violation of the clause set forth in paragraph (b)(1) of this section the contractor and any subcontractor responsible therefor shall be liable for the unpaid wages. In addition, such contractor and subcontractor shall be liable to the United States (in the case of work done under contract for the District of Columbia or a territory, to such District or to such territory), for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer or mechanic, including watchmen and guards, employed in violation of the clause set forth in paragraph (b)(1) of this section, in the sum of $27 for each calendar day on which such individual was required or permitted to work in excess of the standard workweek of forty hours without payment of the overtime wages required by the clause set forth in paragraph (b)(1) of this section.

(3) *Withholding for unpaid wages and liquidated damages. YWCA* shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld, from any moneys payable on account of work performed by the contractor or subcontractor under any such contract or any other Federal contract with the same prime

Contractor _____Owner _____

contractor, or any other federally-assisted contract subject to the Contract Work Hours and Safety Standards Act, which is held by the same prime contractor, such sums as may be determined to be necessary to satisfy any liabilities of such contractor or subcontractor for unpaid wages and liquidated damages as provided in the clause set forth in paragraph (b)(2) of this section.

(4) *Subcontracts.* The contractor or subcontractor shall insert in any subcontracts the clauses set forth in paragraph (b)(1) through (4) of this section and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for compliance by any subcontractor or lower tier subcontractor with the clauses set forth in paragraphs (b)(1) through (4) of this section.

TERMINATION OF THIS CONTRACT FOR CAUSE

YWCA Greater New Orleans may terminate this Contract for cause as set forth in Article 14.2 of the General Conditions of the Contract for Construction," AIA Document A201-2017, as modified by the Supplementary Conditions, Document 00 73 00.

TERMINATION OF THIS CONTRACT FOR CONVENIENCE

YWCA may terminate this Contract at any time for convenience as set forth in Article 14.4 of the General Conditions of the Contract for Construction," AIA Document A201-2017, as modified by the Supplementary Conditions, Document 00 73 00.

OWNERSHIP

All records, reports, documents, or other material related to this contract and/or obtained or prepared by Contractor in connection with the performance of the services contracted for herein shall become the property of YWCA, and shall, upon request, be returned by Contractor to YWCA, at Contractor's expense, at termination or expiration of this contract.

All records, reports, documents and other material delivered or transmitted to Contractor by the YWCA shall remain the property of the YWCA, and shall be returned by Contractor to the YWCA at Contractor's expense, at termination or expiration of this contract.

CONTRACT CONTROVERSIES

A. ADMINISTRATIVE REMEDIES

1. **False Claims:** Contractor acknowledges that 31 U.S.C Chap. 38 § 3802 (Administrative Remedies for False Claims and Statements) applies to Contractor's actions pertaining to this Contract.

Contractor _____Owner _____

2. **Compensation:** The Contractor acknowledges that FEMA financial assistance will be used to fund the Agreement. Contractor will comply with all applicable federal law, regulations, executive orders, FEMA policies, procedures and directives. Compensation shall be governed by the Standard Form of Agreement Between Owner and Contractor, the General Conditions of the Contract for Construction," AIA Document A201-2017, as modified by the Supplementary Conditions, Document 00 73 00, and the other Contract Documents.

3. **Remedies:** Remedies, including contractual, administrative and legal remedies, for breach of the Contract and penalties therefore, shall be governed by the Standard Form of Agreement Between Owner and Contractor, the General Conditions of the Contract for Construction," AIA Document A201-2017, as modified by the Supplementary Conditions, Document 00 73 00, and the other Contract Documents.

B. PROVISIONS FOR CONTRACTUAL REMEDIES (44 C.F.R. § 13.36 (i ((1))

1. SUSPENSION OF WORK

1. YWCA may suspend the Work under this Contract as set forth in Article 14.3 of the General Conditions of the Contract for Construction," AIA Document A201-2017, as modified by the Supplementary Conditions, Document 00 73 00.

RIGHT TO AUDIT

The State Legislative auditor, DHS-OIG, FEMA and federal auditors and GOSHEP or State internal auditors shall have the option to audit all accounts directly pertaining to the contract for a period of three (3) years from the date of final payment or as required by applicable State and Federal Law. Records shall be made available during normal working hours for this purpose.

Access to Records. The following access to records requirements apply to this contract:

(1) The contractor agrees to provide GOHSEP, YWCA, the FEMA Administrator, the Comptroller General of the United States, or any of their authorized representatives access to any books, documents, papers, and records of the Contractor which are directly pertinent to this contract for the purposes of making audits, examinations, excerpts, and transcriptions.
(2) The Contractor agrees to permit any of the foregoing parties to reproduce by any means whatsoever or to copy excerpts and transcriptions as reasonably needed.
(3) The contractor agrees to provide the FEMA Administrator or his authorized representatives access to construction or other work sites pertaining to the work being completed under the contract.

CONTRACTOR'S CERTIFICATION OF NO FEDERAL SUSPENSION OR DEBARMENT

Contractor _____Owner _____

Contractor has a continuing obligation to disclose any suspensions or debarment by any government entity, including but not limited to General Services Administration (GSA). Failure to disclose may constitute grounds for suspension and/or termination of this Contract and debarment from future contracts.

COMPLIANCE WITH CIVIL RIGHTS LAWS

During the performance of this contract, the contractor agrees as follows:

(1) The contractor will not discriminate against any employee or applicant for employment because of race, color, religion, sex, or national origin. The contractor will take affirmative action to ensure that applicants are employed, and that employees are treated during employment without regard to their race, color, religion, sex, or national origin. Such action shall include, but not be limited to the following: Employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. The contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided setting forth the provisions of this nondiscrimination clause.

(2) The contractor will, in all solicitations or advertisements for employees placed by or on behalf of the contractor, state that all qualified applicants will receive considerations for employment without regard to race, color, religion, sex, or national origin.

(3) The contractor will send to each labor union or representative of workers with which he has a collective bargaining agreement or other contract or understanding, a notice to be provided advising the said labor union or workers' representatives of the contractor's commitments under this section, and shall post copies of the notice in conspicuous places available to employees and applicants for employment.

(4) The contractor will comply with all provisions of Executive Order 11246 of September 24, 1965, and of the rules, regulations, and relevant orders of the Secretary of Labor.

(5) The contractor will furnish all information and reports required by Executive Order 11246 of September 24, 1965, and by rules, regulations, and orders of the Secretary of Labor, or pursuant thereto, and will permit access to his books, records, and accounts by the administering YWCA and the Secretary of Labor for purposes of investigation to ascertain compliance with such rules, regulations, and orders.

(6) In the event of the contractor's noncompliance with the nondiscrimination clauses of this contract or with any of the said rules, regulations, or orders, this contract may be canceled, terminated, or suspended in whole or in part and the contractor may be declared ineligible for further Government contracts or federally assisted construction contracts in accordance with procedures authorized in Executive Order 11246 of September 24, 1965, and such other sanctions as may be imposed and remedies invoked as provided in Executive Order 11246 of September 24, 1965, or by rule, regulation, or order of the Secretary of Labor, or as otherwise provided by law.

Contractor _____Owner _____

(7) The contractor will include the portion of the sentence immediately preceding paragraph (1) and the provisions of paragraphs (1) through (7) in every subcontract or purchase order unless exempted by rules, regulations, or orders of the Secretary of Labor issued pursuant to section 204 of Executive Order 11246 of September 24, 1965, so that such provisions will be binding upon each subcontractor or vendor. The contractor will take such action with respect to any subcontract or purchase order as the administering YWCA may direct as a means of enforcing such provisions, including sanctions for noncompliance: Provided, however, That in the event a contractor becomes involved in, or is threatened with, litigation with a subcontractor or vendor as a result of such direction by the administering YWCA the contractor may request the United States to enter into such litigation to protect the interests of the United States.

RECORD RETENTION

The Contractor shall maintain all records in relation to this contract for a period of at least THREE (3) years after final payment.

CLEAN AIR ACT

(1) The contractor agrees to comply with all applicable standards, orders or regulations issued pursuant to the Clean Air Act, as amended, 42 U.S.C.§ 7401 et seq.

(2) The contractor agrees to report each violation to the YWCA and understands and agrees that the YWCA will, in turn, report each violation as required to assure notification to GOHSEP, FEMA, and the appropriate Environmental Protection Regional Office.

(3) The contractor agrees to include these requirements in each subcontract exceeding $150,000 financed in whole or in part with Federal assistance provided by FEMA.

ENERGY POLICY AND CONSERVATION ACT

The Contractor hereby recognizes the mandatory standards and policies relating to energy efficiency which are contained in the State energy conservation plan issued in compliance with the Energy Policy and Conservation Act (P.L. 94-163).

CLEAN WATER ACT

The Contractor hereby agrees to adhere to the provisions which require compliance with all applicable standards, orders, or requirements issued under Section 508 of the Clean Water Act which prohibits the use under non-exempt Federal contracts, grants or loans of facilities included on the EPA List of Violating Facilities.

FEDERAL WATER POLLUTION CONTROL ACT

(1) The contractor agrees to comply with all applicable standards, orders or regulations issued pursuant to the Federal Water Pollution Control Act, as amended, 33 U.S.C. 7401 et seq.

(2) The contractor agrees to report each violation to the YWCA and understands and agrees that the YWCA will, in turn, report each violation as required to assure notification to FEMA and the appropriate Environmental Protection Regional Office.

Contractor _____Owner _____

(3) The contractor agrees to include these requirements in each subcontract exceeding $150,000 financed in whole or in part with Federal assistance provided by FEMA."

ANTI-LOBBYING AND DEBARMENT ACT

The Contractor will be expected to comply with Federal statutes required in the Anti-Lobbying Act and the Debarment Act.

The Contractor hereby agrees to adhere to the mandate dictated by the Copeland "Anti-Kickback" Act which provides that each Contractor or subgrantee shall be prohibited from inducing, by any means, any person employed in the completion of work, to give up any part of the compensation to which he is otherwise entitled.

Suspension and Debarment

(1) This contract is a covered transaction for purposes of 2 C.F.R. pt. 180 and 2 C.F.R. pt. 3000. As such the contractor is required to verify that none of the contractor, its principals (defined at 2 C.F.R. § 180.995), or its affiliates (defined at 2 C.F.R. § 180.905) are excluded (defined at 2 C.F.R.
§ 180.940) or disqualified (defined at 2 C.F.R. § 180.935).

(2) The contractor must comply with 2 C.F.R. pt. 180, subpart C and 2 C.F.R. pt. 3000, subpart C and must include a requirement to comply with these regulations in any lower tier covered transaction it enters into.

(3) This certification is a material representation of fact relied upon by YWCA. If it is later determined that the contractor did not comply with 2 C.F.R. pt. 180, subpart C and 2 C.F.R. pt. 3000, subpart C, in addition to remedies available to State of Louisiana and YWCA, the Federal Government may pursue available remedies, including but not limited to suspension and/or debarment.

(4) The bidder or proposer agrees to comply with the requirements of 2 C.F.R. pt. 180, subpart C and 2 C.F.R. pt. 3000, subpart C while this offer is valid and throughout the period of any contract that may arise from this offer. The bidder or proposer further agrees to include a provision requiring such compliance in its lower tier covered transactions."

"Byrd Anti-Lobbying Amendment, 31 U.S.C. § 1352 (as amended)

The Contractor will be expected to comply with Federal statutes required in the Anti-Lobbying Act. Contractors who apply or bid for an award of $100,000 or more shall file the required certification. Each tier certifies to the tier above that it will not and has not used Federal appropriated funds to pay any person or organization for influencing or attempting to influence an officer or employee of any agency, a member of Congress, officer or employee of Congress, or an employee of a member of Congress in connection with obtaining any Federal contract, grant, or any other award covered by 31 U.S.C. § 1352. Each tier shall also disclose any lobbying with non-Federal funds that takes place in connection with obtaining any Federal award. Such disclosures are forwarded from tier to tier up to the recipient who in turn will forward the certification(s) to the federal awarding agency.

Certification for Contracts, Grants, Loans and Cooperative Agreements

Contractor _____Owner _____

The undersigned certifies, to the best of his or her knowledge and belief, that:

(1) No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of an agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.

(2) If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form-LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions.

(3) The undersigned shall require that the language of this certification be included in the award documents for all subawards at all tiers (including subcontracts, subgrants, and contracts under grants, loans, and cooperative agreements) and that all subrecipients shall certify and disclose accordingly.

This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by section 1352, title 31, U.S. Code. Any person who fails to file the required certification shall be subject to a civil penalty of not less than $10,000 and not more than $100,000 for each such failure.

The Contractor**,** certifies or affirms the truthfulness and accuracyof each statement of its certification and disclosure, if any. In addition, the Contractor understands and agrees that the provisions of 31 U.S.C. § 3801 *et seq*., apply to this certification and disclosure, if any

_____
_____

Signature of Contractor's Authorize Official: Date:

_____

Name and Title of Contractor's Authorized Official

PROCUREMENT OF RECOVERED MATERIALS

Contractor _____Owner _____

(1) In the performance of this contract, the Contractor shall make maximum use of products containing recovered materials that are EPA- designated items unless the product cannot be acquired—

(i) Competitively within a timeframe providing for compliance with the contract performance schedule;
(ii) Meeting contract performance requirements; or
(iii) At a reasonable price.

(2) Information about this requirement, along with the list of EPA-designate items, is available at EPA's Comprehensive Procurement Guidelines web site, https://www.epa.gov/smm/comprehensive-procurement-guideline-cpg-program.

PROHIBITION ON CONTRACTING FOR COVERED TELECOMMUNICATIONS EQUIPMENT OR SERVICES.

(a) *Definitions.* As used in this clause, the terms backhaul; covered foreign country; covered telecommunications equipment or services; interconnection arrangements; roaming; substantial or essential component; and telecommunications equipment or services have the meaning as defined in FEMA Policy 405-143-1, Prohibitions on Expending FEMA Award Funds for Covered Telecommunications Equipment or Services (Interim), as used in this clause—

(b) *Prohibitions.*

(1) Section 889(b) of the John S. McCain National Defense Authorization Act for Fiscal Year 2019, Pub. L. No. 115-232, and 2 C.F.R. § 200.216 prohibit the head of an executive agency on or after Aug.13, 2020, from obligating or expending grant, cooperative agreement, loan, or loan guarantee funds on certain telecommunications products or from certain entities for national security reasons.

(2) Unless an exception in paragraph (c) of this clause applies, the contractor and its subcontractors may not use grant, cooperative agreement, loan, or loan guarantee funds from the Federal Emergency Management Agency to:

(i) Procure or obtain any equipment, system, or service that uses covered telecommunications equipment or services as a substantial or essential component of any system, or as critical technology of any system;

(ii) Enter into, extend, or renew a contract to procure or obtain any equipment, system, or service that uses covered telecommunications equipment or services as a substantial or essential component of any system, or as critical technology of any system;

(iii) Enter into, extend, or renew contracts with entities that use covered telecommunications equipment or services as a substantial or essential component of any system, or as critical technology as part of any system; or

(iv) Provide, as part of its performance of this contract, subcontract, or other contractual instrument, any equipment, system, or service that uses covered telecommunications equipment or services as a substantial or essential component of any system, or as critical technology as part of any system.

(c) *Exceptions.*

(1) This clause does not prohibit contractors from providing—
(i) A service that connects to the facilities of a third-party, such as backhaul, roaming, or interconnection arrangements; or
(ii) Telecommunications equipment that cannot route or redirect user data traffic or permit visibility into any user data or packets that such equipment transmits or otherwise handles.

(2) By necessary implication and regulation, the prohibitions also do not apply to:
(i) Covered telecommunications equipment or services that:
i. Are *not used* as a substantial or essential component of any system; *and*
ii. Are *not used* as critical technology of any system.
(ii) Other telecommunications equipment or services that are not considered covered telecommunications equipment or services.

(d) *Reporting requirement.*

(1) In the event the contractor identifies covered telecommunications equipment or services used as a substantial or essential component of any system, or as critical technology as part of any system, during contract performance, or the contractor is notified of such by a subcontractor at any tier or by any other source, the contractor shall report the information in paragraph (d)(2) of this clause to the recipient or subrecipient, unless elsewhere in this contract are established procedures for reporting the information.

(2) The Contractor shall report the following information pursuant to paragraph (d)(1) of this clause:

(i) Within one business day from the date of such identification or notification: The contract number; the order number(s), if applicable; supplier name; supplier unique entity identifier (if known); supplier Commercial and Government Entity (CAGE) code (if known); brand; model number (original equipment manufacturer number, manufacturer part number, or wholesaler number); item description; and any readily available information about mitigation actions undertaken or recommended.

(ii) Within 10 business days of submitting the information in paragraph (d)(2)(i) of this clause: Any further available information about mitigation actions undertaken or recommended. In addition, the contractor shall describe the efforts it undertook to prevent use or submission of covered telecommunications equipment or services, and any additional efforts that will be incorporated to prevent future use or submission of covered telecommunications equipment or services.

(e) *Subcontracts.* The Contractor shall insert the substance of this clause, including this paragraph (e), in all subcontracts and other contractual instruments.

DOMESTIC PREFERENCES FOR PROCUREMENTS.

As appropriate, and to the extent consistent with law, the contractor should, to the greatest extent practicable, provide a preference for the purchase, acquisition, or use of goods, products, or materials produced in the United States. This includes, but is not limited to iron, aluminum, steel, cement, and other manufactured products.

Contractor _____Owner _____

For purposes of this clause:
Produced in the United States means, for iron and steel products, that all manufacturing processes, from the initial melting stage through the application of coatings, occurred in the United States.
Manufactured products mean items and construction materials composed in whole or in part of non-ferrous metals such as aluminum; plastics and polymer-based products such as polyvinyl chloride pipe; aggregates such as concrete; glass, including optical fiber; and lumber.

CHANGES

a. Standard. To be eligible for FEMA assistance under the non-Federal entity's FEMA grant or cooperative agreement, the cost of the change, modification, change order, or constructive change must be allowable, allocable, within the scope of its grant or cooperative agreement, and reasonable for the completion of project scope.
b. Therefore, changes to the Agreement between YWCA and Contractor
shall be only as specifically set forth in the Agreement, including but not limited to Article 7 of the General Conditions as amended by the Supplementary Conditions.

DHS SEAL, LOGO AND FLAGS

The contractor shall not use the DHS seal(s), logos, crests, or reproductions of flags or likenesses of DHS or YWCA officials without specific FEMA pre- approval.

COMPLIANCE WITH FEDERAL EXECUTIVE ORDERS

This is an acknowledgement that FEMA financial assistance will be used to fund the contract. The contractor will comply will all applicable federal law, regulations, executive orders, FEMA policies, procedures, and directives.

NO OBLIGATION BY FEDERAL GOVERNMENT

The Federal Government is not a party to this contract and is not subject to any obligations or liabilities to the non-Federal entity, contractor, or any other party pertaining to any matter resulting from the contract.

COMPLIANCE WITH FEDERAL LAW, REGULATIONS, AND EXECUTIVE ORDERS.

All non-Federal entities must place into their contracts an acknowledgement that FEMA financial assistance will be used to fund the contract along with the requirement that the contractor will comply with all applicable federal law, regulations, executive orders, and FEMA policies, procedures, and directives.

Contractor _____Owner _____

The following provides a contract clause regarding Compliance with Federal Law, Regulations, and Executive Orders: "This is an acknowledgement that FEMA financial assistance will be used to fund the contract only. The contractor will comply will all applicable federal law, regulations, executive orders, FEMA policies, procedures, and directives."

NO OBLIGATION BY FEDERAL GOVERNMENT.

The non-Federal entity must include a provision in its contract that states that the Federal Government is not a party to the contract and is not subject to any obligations or liabilities to the non-Federal entity, contractor, or any other party pertaining to any matter resulting from the contract.

The following provides a contract clause regarding no obligation by the Federal Government: "The Federal Government is not a party to this contract and is not subject to any obligations or liabilities to the non-Federal entity, contractor, or any other party pertaining to any matter resulting from the contract."

PROGRAM FRAUD AND FALSE OR FRAUDULENT STATEMENTS OR RELATED ACTS.

The non-Federal entity must include a provision in its contract that the contractor acknowledges that 31 U.S.C. Chap. 38 (Administrative Remedies for False Claims and Statements) applies to its actions pertaining to the contract.

The following provides a contract clause regarding Fraud and False or Fraudulent or Related Acts: "The contractor acknowledges that 31 U.S.C. Chap. 38 (Administrative Remedies for False Claims and Statements) applies to the contractor's actions pertaining to this contract."

CONTRACTING WITH SMALL AND MINORITY BUSINESSES, WOMEN'S BUSINESS ENTERPRISES, AND LABOR SURPLUS AREA FIRMS.

(a) Any party to this contract must take all necessary affirmative steps to assure that minority businesses, women's business enterprises, and labor surplus area firms are used when possible. These steps are also required for the hiring of any subcontractors under this contract.

(b) Affirmative steps must include:

(1) Placing qualified small and minority businesses and women's business enterprises on solicitation lists;

(2) Assuring that small and minority businesses, and women's business enterprises are solicited whenever they are potential sources;

(3) Dividing total requirements, when economically feasible, into smaller tasks or quantities to permit maximum participation by small and minority businesses, and women's business enterprises;

Contractor _____Owner _____

(4) Establishing delivery schedules, where the requirement permits, which encourage participation by small and minority businesses, and women's business enterprises; and

(5) Using the services and assistance, as appropriate, of such organizations as the Small Business Administration and the Minority Business Development Agency of the Department of Commerce.

COPYRIGHT AND DATA RIGHTS

The Contractor grants to the YWCA a paid-up, royalty-free, nonexclusive, irrevocable, worldwide license in data first produced in the performance of this contract to reproduce, publish, or otherwise use, including prepare derivative works, distribute copies to the public, and perform publicly and display publicly such data. For data required by the contract but not first produced in the performance of this contract, the Contractor will identify such data and grant to the YWCA or acquires on its behalf a license of the same scope as for data first produced in the performance of this contract. Data, as used herein, shall include any work subject to copyright under 17 U.S.C. § 102, for example, any written reports or literary works, software and/or source code, music, choreography, pictures or images, graphics, sculptures, videos, motion pictures or other audiovisual works, sound and/or video recordings, and architectural works. Upon or before the completion of this contract, the Contractor will deliver to the YWCA data first produced in the performance of this contract and data required by the contract but not first produced in the performance of this contract in formats acceptable by the YWCA.

Contractor _____Owner _____

EXHIBIT D

CONTRACTOR STATEMENT OF ASSURANCES & AGREEMENT REGARDING INSURANCES

Exhibit "D"

Contractor Statement of Assurances and Agreement Regarding Insurance

("**Contractor**") hereby assures and certifies to the State of Louisiana, Division of Administration, Office of Community Development ("OCD") that in connection with the construction of the new building for the YWCA Greater New Orleans to be located at 601-605 South Norman C. Francis Parkway, New Orleans LA 70119 (the construction and completion of the building being referred to herein as the "**Project**"), in relation to labor standards, it will comply with:

a. Section 110 of the Housing and Community Development Act of 1974, as amended and as set forth in 24 CFR §570.603.

b. Davis-Bacon Act, as amended (40 U.S.C. §3141 et seq.).

c. Contract Work Hours and Safety Standards Act (40 U.S.C. §327 et seq.).

d. Federal Fair Labor Standards Act (29 U.S.C. §201 et seq.)

The foregoing is not in limitation of but is rather in addition to CDBG Compliance Provisions for Construction Contracts (a copy of which is attached hereto) that have been a made a part of and included in the contract with the owner, YWCA Greater New Orleans, and hereby assures and certifies to the State of Louisiana that it will comply with all of those provisions and has initialed each page of the attachment.

Signing this Statement means that the Contractor agrees that failure to comply with provisions applicable to it can result in serious audit and/or monitoring findings that require repayment of funds to the State or expending Borrower or Contractor funds to correct deficiencies.

Contractor _____Owner _____

Contractor further agrees and acknowledges that it is required to (and hereby agrees to) have the State of Louisiana, Division of Administration, Office of Community Development ***named as an additional insured*** on each of its Commercial General Liability, Automobile Liability and Excess Liability policies, which may be accomplished by special endorsement or by an existing blanket endorsement sufficient to accomplish the same.

Executed this ____ day of _____, 2023

Contractor

By: _____
Name: _____
Title:_____

REFER TO

CDBG COMPLIANCE PROVISIONS
for
CONSTRUCTION CONTRACTS
INCLUDED IN BID DOCUMENTS

Contractor _____Owner _____

EXHIBIT E

CERTIFICATION REGARDING LOBBYING

Exhibit "E"

APPENDIX A, 44 C.F.R. PART 18 – CERTIFICATION REGARDING LOBBYING

Certification for Contracts, Grants, Loans, and Cooperative Agreements

The undersigned certifies, to the best of his or her knowledge and belief, that:

1. No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of an agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.

2. If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form-LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions.

3. The undersigned shall require that the language of this certification be included in the award documents for all subawards at all tiers (including subcontracts, subgrants, and contracts under grants, loans, and cooperative agreements) and that all subrecipients shall certify and disclose accordingly.

Contractor _____Owner _____

This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by section 1352, title 31, U.S. Code. Any person who fails to file the required certification shall be subject to a civil penalty of not less than $10,000 and not more than $100,000 for each such failure.

The Contractor, certifies or affirms the truthfulness and accuracy of each statement of its certification and disclosure, if any. In addition, the Contractor understands and agrees that the provisions of 31 U.S.C. Chap. 38, Administrative Remedies for False Claims and Statements, apply to this certification and disclosure, if any.

_____ _____

Date

Contractors

Contractor _____Owner _____

AIA 201

GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION

DRAFT

AIA® Document A201™ – 2017

General Conditions of the Contract for Construction

for the following PROJECT:
(Name and location or address)

YWCA Greater New Orleans
601- 605 South Norman C. Francis Parkway
New Orleans, LA 70119

THE OWNER:
(Name, legal status and address)

YWCA Greater New Orleans
601- 605 South Norman C. Francis Parkway
New Orleans, LA 70119

THE ARCHITECT:
(Name, legal status and address)

«Trapolin-Peer Architects»«, A Professional Corporation»
«850 Tchoupitoulas Street
New Orleans, LA 70130»

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ADDITIONS AND DELETIONS: The author of this document has added information needed for its completion. The author may also have revised the text of the original AIA standard form. An *Additions and Deletions Report* that notes added information as well as revisions to the standard form text is available from the author and should be reviewed.

This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

For guidance in modifying this document to include supplementary conditions, see AIA Document A503™, Guide for Supplementary Conditions.

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DRAFT

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ARTICLE 1 GENERAL PROVISIONS

§ 1.1 Basic Definitions

§ 1.1.1 The Contract Documents

The Contract Documents are enumerated in the Agreement between the Owner and Contractor (hereinafter the Agreement) and consist of the Agreement, Conditions of the Contract (General, Supplementary and other Conditions), Drawings, Specifications, Addenda issued prior to execution of the Contract, other documents listed in the Agreement, and Modifications issued after execution of the Contract. A Modification is (1) a written amendment to the Contract signed by both parties, (2) a Change Order, (3) a Construction Change Directive, or (4) a written order for a minor change in the Work issued by the Architect. Unless specifically enumerated in the Agreement, the Contract Documents do not include the advertisement or invitation to bid, Instructions to Bidders, sample forms, other information furnished by the Owner in anticipation of receiving bids or proposals, the Contractor's bid or proposal, or portions of Addenda relating to bidding or proposal requirements.

§ 1.1.2 The Contract

The Contract Documents form the Contract for Construction. The Contract represents the entire and integrated agreement between the parties hereto and supersedes prior negotiations, representations, or agreements, either written or oral. The Contract may be amended or modified only by a Modification. The Contract Documents shall not be construed to create a contractual relationship of any kind (1) between the Contractor and the Architect or the Architect's consultants, (2) between the Owner and a Subcontractor or a Sub-subcontractor, (3) between the Owner and the Architect or the Architect's consultants, or (4) between any persons or entities other than the Owner and the Contractor. The Architect shall, however, be entitled to performance and enforcement of obligations under the Contract intended to facilitate performance of the Architect's duties.

§ 1.1.3 The Work

The term "Work" means the construction and services required by the Contract Documents, whether completed or partially completed, and includes all other labor, materials, equipment, and services provided or to be provided by the Contractor to fulfill the Contractor's obligations. The Work may constitute the whole or a part of the Project.

§ 1.1.4 The Project

The Project is the total construction of which the Work performed under the Contract Documents may be the whole or a part and which may include construction by the Owner and by Separate Contractors.

§ 1.1.5 The Drawings

The Drawings are the graphic and pictorial portions of the Contract Documents showing the design, location and dimensions of the Work, generally including plans, elevations, sections, details, schedules, and diagrams.

§ 1.1.6 The Specifications

The Specifications are that portion of the Contract Documents consisting of the written requirements for materials, equipment, systems, standards and workmanship for the Work, and performance of related services.

§ 1.1.7 Instruments of Service

Instruments of Service are representations, in any medium of expression now known or later developed, of the tangible and intangible creative work performed by the Architect and the Architect's consultants under their respective professional services agreements. Instruments of Service may include, without limitation, studies, surveys, models, sketches, drawings, specifications, and other similar materials.

§ 1.1.8 Initial Decision Maker

The Initial Decision Maker is the person identified in the Agreement to render initial decisions on Claims in accordance with Section 15.2. The Initial Decision Maker shall not show partiality to the Owner or Contractor and shall not be liable for results of interpretations or decisions rendered in good faith.

§ 1.2 Correlation and Intent of the Contract Documents

§ 1.2.1 The intent of the Contract Documents is to include all items necessary for the proper execution and completion of the Work by the Contractor. The Contract Documents are complementary, and what is required by one shall be as binding as if required by all; performance by the Contractor shall be required only to the extent consistent with the Contract Documents and reasonably inferable from them as being necessary to produce the indicated results.

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§ 1.2.1.1 The invalidity of any provision of the Contract Documents shall not invalidate the Contract or its remaining provisions. If it is determined that any provision of the Contract Documents violates any law, or is otherwise invalid or unenforceable, then that provision shall be revised to the extent necessary to make that provision legal and enforceable. In such case the Contract Documents shall be construed, to the fullest extent permitted by law, to give effect to the parties' intentions and purposes in executing the Contract.

§ 1.2.2 Organization of the Specifications into divisions, sections and articles, and arrangement of Drawings shall not control the Contractor in dividing the Work among Subcontractors or in establishing the extent of Work to be performed by any trade.

§ 1.2.3 Unless otherwise stated in the Contract Documents, words that have well-known technical or construction industry meanings are used in the Contract Documents in accordance with such recognized meanings.

§ 1.3 Capitalization

Terms capitalized in these General Conditions include those that are (1) specifically defined, (2) the titles of numbered articles, or (3) the titles of other documents published by the American Institute of Architects.

§ 1.4 Interpretation

In the interest of brevity the Contract Documents frequently omit modifying words such as "all" and "any" and articles such as "the" and "an," but the fact that a modifier or an article is absent from one statement and appears in another is not intended to affect the interpretation of either statement.

§ 1.5 Ownership and Use of Drawings, Specifications, and Other Instruments of Service

§ 1.5.1 The Architect and the Architect's consultants shall be deemed the authors and owners of their respective Instruments of Service, including the Drawings and Specifications, and retain all common law, statutory, and other reserved rights in their Instruments of Service, including copyrights. The Contractor, Subcontractors, Sub-subcontractors, and suppliers shall not own or claim a copyright in the Instruments of Service. Submittal or distribution to meet official regulatory requirements or for other purposes in connection with the Project is not to be construed as publication in derogation of the Architect's or Architect's consultants' reserved rights.

§ 1.5.2 The Contractor, Subcontractors, Sub-subcontractors, and suppliers are authorized to use and reproduce the Instruments of Service provided to them, subject to any protocols established pursuant to Sections 1.7 and 1.8, solely and exclusively for execution of the Work. All copies made under this authorization shall bear the copyright notice, if any, shown on the Instruments of Service. The Contractor, Subcontractors, Sub-subcontractors, and suppliers may not use the Instruments of Service on other projects or for additions to the Project outside the scope of the Work without the specific written consent of the Owner, Architect, and the Architect's consultants.

§ 1.6 Notice

§ 1.6.1 Except as otherwise provided in Section 1.6.2, where the Contract Documents require one party to notify or give notice to the other party, such notice shall be provided in writing to the designated representative of the party to whom the notice is addressed and shall be deemed to have been duly served if delivered in person, by mail, by courier, or by electronic transmission if a method for electronic transmission is set forth in the Agreement.

§ 1.6.2 Notice of Claims as provided in Section 15.1.3 shall be provided in writing and shall be deemed to have been duly served only if delivered to the designated representative of the party to whom the notice is addressed by certified or registered mail, or by courier providing proof of delivery.

§ 1.7 Digital Data Use and Transmission

The parties shall agree upon protocols governing the transmission and use of Instruments of Service or any other information or documentation in digital form. The parties will use AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, to establish the protocols for the development, use, transmission, and exchange of digital data.

§ 1.8 Building Information Models Use and Reliance

Any use of, or reliance on, all or a portion of a building information model without agreement to protocols governing the use of, and reliance on, the information contained in the model and without having those protocols set forth in AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, and the requisite AIA Document G202™–2013, Project Building Information Modeling Protocol Form, shall be at the using or

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relying party's sole risk and without liability to the other party and its contractors or consultants, the authors of, or contributors to, the building information model, and each of their agents and employees.

ARTICLE 2 OWNER

§ 2.1 General

§ 2.1.1 The Owner is the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The Owner shall designate in writing a representative who shall have express authority to bind the Owner with respect to all matters requiring the Owner's approval or authorization. Except as otherwise provided in Section 4.2.1, the Architect does not have such authority. The term "Owner" means the Owner or the Owner's authorized representative.

§ 2.1.2 The Owner shall furnish to the Contractor, within fifteen days after receipt of a written request, information necessary and relevant for the Contractor to evaluate, give notice of, or enforce mechanic's lien rights. Such information shall include a correct statement of the record legal title to the property on which the Project is located, usually referred to as the site, and the Owner's interest therein.

§ 2.2 Evidence of the Owner's Financial Arrangements

§ 2.2.1 Prior to commencement of the Work and upon written request by the Contractor, the Owner shall furnish to the Contractor reasonable evidence that the Owner has made financial arrangements to fulfill the Owner's obligations under the Contract. The Contractor shall have no obligation to commence the Work until the Owner provides such evidence. If commencement of the Work is delayed under this Section 2.2.1, the Contract Time shall be extended appropriately.

§ 2.2.2 Following commencement of the Work and upon written request by the Contractor, the Owner shall furnish to the Contractor reasonable evidence that the Owner has made financial arrangements to fulfill the Owner's obligations under the Contract only if (1) the Owner fails to make payments to the Contractor as the Contract Documents require; (2) the Contractor identifies in writing a reasonable concern regarding the Owner's ability to make payment when due; or (3) a change in the Work materially changes the Contract Sum. If the Owner fails to provide such evidence, as required, within fourteen days of the Contractor's request, the Contractor may immediately stop the Work and, in that event, shall notify the Owner that the Work has stopped. However, if the request is made because a change in the Work materially changes the Contract Sum under (3) above, the Contractor may immediately stop only that portion of the Work affected by the change until reasonable evidence is provided. If the Work is stopped under this Section 2.2.2, the Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable costs of shutdown, delay and start-up, plus interest as provided in the Contract Documents.

§ 2.2.3 After the Owner furnishes evidence of financial arrangements under this Section 2.2, the Owner shall not materially vary such financial arrangements without prior notice to the Contractor.

§ 2.2.4 Where the Owner has designated information furnished under this Section 2.2 as "confidential," the Contractor shall keep the information confidential and shall not disclose it to any other person. However, the Contractor may disclose "confidential" information, after seven (7) days' notice to the Owner, where disclosure is required by law, including a subpoena or other form of compulsory legal process issued by a court or governmental entity, or by court or arbitrator(s) order. The Contractor may also disclose "confidential" information to its employees, consultants, sureties, Subcontractors and their employees, Sub-subcontractors, and others who need to know the content of such information solely and exclusively for the Project and who agree to maintain the confidentiality of such information.

§ 2.3 Information and Services Required of the Owner

§ 2.3.1 Except for permits and fees that are the responsibility of the Contractor under the Contract Documents, including those required under Section 3.7.1, the Owner shall secure and pay for necessary approvals, easements, assessments and charges required for construction, use or occupancy of permanent structures or for permanent changes in existing facilities.

§ 2.3.2 The Owner shall retain an architect lawfully licensed to practice architecture, or an entity lawfully practicing architecture, in the jurisdiction where the Project is located. That person or entity is identified as the Architect in the Agreement and is referred to throughout the Contract Documents as if singular in number.

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§ 2.3.3 If the employment of the Architect terminates, the Owner shall employ a successor to whom the Contractor has no reasonable objection and whose status under the Contract Documents shall be that of the Architect.

§ 2.3.4 The Owner shall furnish surveys describing physical characteristics, legal limitations and utility locations for the site of the Project, and a legal description of the site. The Contractor shall be entitled to rely on the accuracy of information furnished by the Owner but shall exercise proper precautions relating to the safe performance of the Work.

§ 2.3.5 The Owner shall furnish information or services required of the Owner by the Contract Documents with reasonable promptness. The Owner shall also furnish any other information or services under the Owner's control and relevant to the Contractor's performance of the Work with reasonable promptness after receiving the Contractor's written request for such information or services.

§ 2.3.6 Unless otherwise provided in the Contract Documents, the Owner shall furnish to the Contractor one copy of the Contract Documents for purposes of making reproductions pursuant to Section 1.5.2.

§ 2.4 Owner's Right to Stop the Work

If the Contractor fails to correct Work that is not in accordance with the requirements of the Contract Documents as required by Section 12.2 or repeatedly fails to carry out Work in accordance with the Contract Documents, the Owner may issue a written order to the Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, the right of the Owner to stop the Work shall not give rise to a duty on the part of the Owner to exercise this right for the benefit of the Contractor or any other person or entity, except to the extent required by Section 6.1.3.

§ 2.5 Owner's Right to Carry Out the Work

If the Contractor defaults or neglects to carry out the Work in accordance with the Contract Documents and fails within a ten-day period after receipt of notice from the Owner to commence and continue correction of such default or neglect with diligence and promptness, the Owner may, without prejudice to other remedies the Owner may have, correct such default or neglect. Such action by the Owner and amounts charged to the Contractor are both subject to prior approval of the Architect and the Architect may, pursuant to Section 9.5.1, withhold or nullify a Certificate for Payment in whole or in part, to the extent reasonably necessary to reimburse the Owner for the reasonable cost of correcting such deficiencies, including Owner's expenses and compensation for the Architect's additional services made necessary by such default, neglect, or failure. If current and future payments are not sufficient to cover such amounts, the Contractor shall pay the difference to the Owner. If the Contractor disagrees with the actions of the Owner or the Architect, or the amounts claimed as costs to the Owner, the Contractor may file a Claim pursuant to Article 15.

ARTICLE 3 CONTRACTOR

§ 3.1 General

§ 3.1.1 The Contractor is the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The Contractor shall be lawfully licensed, if required in the jurisdiction where the Project is located. The Contractor shall designate in writing a representative who shall have express authority to bind the Contractor with respect to all matters under this Contract. The term "Contractor" means the Contractor or the Contractor's authorized representative.

§ 3.1.2 The Contractor shall perform the Work in accordance with the Contract Documents.

§ 3.1.3 The Contractor shall not be relieved of its obligations to perform the Work in accordance with the Contract Documents either by activities or duties of the Architect in the Architect's administration of the Contract, or by tests, inspections or approvals required or performed by persons or entities other than the Contractor.

§ 3.2 Review of Contract Documents and Field Conditions by Contractor

§ 3.2.1 Execution of the Contract by the Contractor is a representation that the Contractor has visited the site, become generally familiar with local conditions under which the Work is to be performed, and correlated personal observations with requirements of the Contract Documents.

§ 3.2.2 Because the Contract Documents are complementary, the Contractor shall, before starting each portion of the Work, carefully study and compare the various Contract Documents relative to that portion of the Work, as well as

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the information furnished by the Owner pursuant to Section 2.3.4, shall take field measurements of any existing conditions related to that portion of the Work, and shall observe any conditions at the site affecting it. These obligations are for the purpose of facilitating coordination and construction by the Contractor and are not for the purpose of discovering errors, omissions, or inconsistencies in the Contract Documents; however, the Contractor shall promptly report to the Architect any errors, inconsistencies or omissions discovered by or made known to the Contractor as a request for information in such form as the Architect may require. It is recognized that the Contractor's review is made in the Contractor's capacity as a contractor and not as a licensed design professional, unless otherwise specifically provided in the Contract Documents.

§ 3.2.3 The Contractor is not required to ascertain that the Contract Documents are in accordance with applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of public authorities, but the Contractor shall promptly report to the Architect any nonconformity discovered by or made known to the Contractor as a request for information in such form as the Architect may require.

§ 3.2.4 If the Contractor believes that additional cost or time is involved because of clarifications or instructions the Architect issues in response to the Contractor's notices or requests for information pursuant to Sections 3.2.2 or 3.2.3, the Contractor shall submit Claims as provided in Article 15. If the Contractor fails to perform the obligations of Sections 3.2.2 or 3.2.3, the Contractor shall pay such costs and damages to the Owner, subject to Section 15.1.7, as would have been avoided if the Contractor had performed such obligations. If the Contractor performs those obligations, the Contractor shall not be liable to the Owner or Architect for damages resulting from errors, inconsistencies or omissions in the Contract Documents, for differences between field measurements or conditions and the Contract Documents, or for nonconformities of the Contract Documents to applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities.

§ 3.3 Supervision and Construction Procedures

§ 3.3.1 The Contractor shall supervise and direct the Work, using the Contractor's best skill and attention. The Contractor shall be solely responsible for, and have control over, construction means, methods, techniques, sequences, and procedures, and for coordinating all portions of the Work under the Contract. If the Contract Documents give specific instructions concerning construction means, methods, techniques, sequences, or procedures, the Contractor shall evaluate the jobsite safety thereof and shall be solely responsible for the jobsite safety of such means, methods, techniques, sequences, or procedures. If the Contractor determines that such means, methods, techniques, sequences or procedures may not be safe, the Contractor shall give timely notice to the Owner and Architect, and shall propose alternative means, methods, techniques, sequences, or procedures. The Architect shall evaluate the proposed alternative solely for conformance with the design intent for the completed construction. Unless the Architect objects to the Contractor's proposed alternative, the Contractor shall perform the Work using its alternative means, methods, techniques, sequences, or procedures.

§ 3.3.2 The Contractor shall be responsible to the Owner for acts and omissions of the Contractor's employees, Subcontractors and their agents and employees, and other persons or entities performing portions of the Work for, or on behalf of, the Contractor or any of its Subcontractors.

§ 3.3.3 The Contractor shall be responsible for inspection of portions of Work already performed to determine that such portions are in proper condition to receive subsequent Work.

§ 3.4 Labor and Materials

§ 3.4.1 Unless otherwise provided in the Contract Documents, the Contractor shall provide and pay for labor, materials, equipment, tools, construction equipment and machinery, water, heat, utilities, transportation, and other facilities and services necessary for proper execution and completion of the Work, whether temporary or permanent and whether or not incorporated or to be incorporated in the Work.

§ 3.4.2 Except in the case of minor changes in the Work approved by the Architect in accordance with Section 3.12.8 or ordered by the Architect in accordance with Section 7.4, the Contractor may make substitutions only with the consent of the Owner, after evaluation by the Architect and in accordance with a Change Order or Construction Change Directive.

§ 3.4.3 The Contractor shall enforce strict discipline and good order among the Contractor's employees and other persons carrying out the Work. The Contractor shall not permit employment of unfit persons or persons not properly skilled in tasks assigned to them.

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§ 3.5 Warranty

§ 3.5.1 The Contractor warrants to the Owner and Architect that materials and equipment furnished under the Contract will be of good quality and new unless the Contract Documents require or permit otherwise. The Contractor further warrants that the Work will conform to the requirements of the Contract Documents and will be free from defects, except for those inherent in the quality of the Work the Contract Documents require or permit. Work, materials, or equipment not conforming to these requirements may be considered defective. The Contractor's warranty excludes remedy for damage or defect caused by abuse, alterations to the Work not executed by the Contractor, improper or insufficient maintenance, improper operation, or normal wear and tear and normal usage. If required by the Architect, the Contractor shall furnish satisfactory evidence as to the kind and quality of materials and equipment.

§ 3.5.2 All material, equipment, or other special warranties required by the Contract Documents shall be issued in the name of the Owner, or shall be transferable to the Owner, and shall commence in accordance with Section 9.8.4.

§ 3.6 Taxes

The Contractor shall pay sales, consumer, use and similar taxes for the Work provided by the Contractor that are legally enacted when bids are received or negotiations concluded, whether or not yet effective or merely scheduled to go into effect.

§ 3.7 Permits, Fees, Notices and Compliance with Laws

§ 3.7.1 Unless otherwise provided in the Contract Documents, the Contractor shall secure and pay for the building permit as well as for other permits, fees, licenses, and inspections by government agencies necessary for proper execution and completion of the Work that are customarily secured after execution of the Contract and legally required at the time bids are received or negotiations concluded.

§ 3.7.2 The Contractor shall comply with and give notices required by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities applicable to performance of the Work.

§ 3.7.3 If the Contractor performs Work knowing it to be contrary to applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of public authorities, the Contractor shall assume appropriate responsibility for such Work and shall bear the costs attributable to correction.

§ 3.7.4 Concealed or Unknown Conditions

If the Contractor encounters conditions at the site that are (1) subsurface or otherwise concealed physical conditions that differ materially from those indicated in the Contract Documents or (2) unknown physical conditions of an unusual nature that differ materially from those ordinarily found to exist and generally recognized as inherent in construction activities of the character provided for in the Contract Documents, the Contractor shall promptly provide notice to the Owner and the Architect before conditions are disturbed and in no event later than 14 days after first observance of the conditions. The Architect will promptly investigate such conditions and, if the Architect determines that they differ materially and cause an increase or decrease in the Contractor's cost of, or time required for, performance of any part of the Work, will recommend that an equitable adjustment be made in the Contract Sum or Contract Time, or both. If the Architect determines that the conditions at the site are not materially different from those indicated in the Contract Documents and that no change in the terms of the Contract is justified, the Architect shall promptly notify the Owner and Contractor, stating the reasons. If either party disputes the Architect's determination or recommendation, that party may submit a Claim as provided in Article 15.

§ 3.7.5 If, in the course of the Work, the Contractor encounters human remains or recognizes the existence of burial markers, archaeological sites or wetlands not indicated in the Contract Documents, the Contractor shall immediately suspend any operations that would affect them and shall notify the Owner and Architect. Upon receipt of such notice, the Owner shall promptly take any action necessary to obtain governmental authorization required to resume the operations. The Contractor shall continue to suspend such operations until otherwise instructed by the Owner but shall continue with all other operations that do not affect those remains or features. Requests for adjustments in the Contract Sum and Contract Time arising from the existence of such remains or features may be made as provided in Article 15.

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§ 3.8 Allowances

§ 3.8.1 The Contractor shall include in the Contract Sum all allowances stated in the Contract Documents. Items covered by allowances shall be supplied for such amounts and by such persons or entities as the Owner may direct, but the Contractor shall not be required to employ persons or entities to whom the Contractor has reasonable objection.

§ 3.8.2 Unless otherwise provided in the Contract Documents,

- **.1** allowances shall cover the cost to the Contractor of materials and equipment delivered at the site and all required taxes, less applicable trade discounts;
- **.2** Contractor's costs for unloading and handling at the site, labor, installation costs, overhead, profit, and other expenses contemplated for stated allowance amounts shall be included in the Contract Sum but not in the allowances; and
- **.3** whenever costs are more than or less than allowances, the Contract Sum shall be adjusted accordingly by Change Order. The amount of the Change Order shall reflect (1) the difference between actual costs and the allowances under Section 3.8.2.1 and (2) changes in Contractor's costs under Section 3.8.2.2.

§ 3.8.3 Materials and equipment under an allowance shall be selected by the Owner with reasonable promptness.

§ 3.9 Superintendent

§ 3.9.1 The Contractor shall employ a competent superintendent and necessary assistants who shall be in attendance at the Project site during performance of the Work. The superintendent shall represent the Contractor, and communications given to the superintendent shall be as binding as if given to the Contractor.

§ 3.9.2 The Contractor, as soon as practicable after award of the Contract, shall notify the Owner and Architect of the name and qualifications of a proposed superintendent. Within 14 days of receipt of the information, the Architect may notify the Contractor, stating whether the Owner or the Architect (1) has reasonable objection to the proposed superintendent or (2) requires additional time for review. Failure of the Architect to provide notice within the 14-day period shall constitute notice of no reasonable objection.

§ 3.9.3 The Contractor shall not employ a proposed superintendent to whom the Owner or Architect has made reasonable and timely objection. The Contractor shall not change the superintendent without the Owner's consent, which shall not unreasonably be withheld or delayed.

§ 3.10 Contractor's Construction and Submittal Schedules

§ 3.10.1 The Contractor, promptly after being awarded the Contract, shall submit for the Owner's and Architect's information a Contractor's construction schedule for the Work. The schedule shall contain detail appropriate for the Project, including (1) the date of commencement of the Work, interim schedule milestone dates, and the date of Substantial Completion; (2) an apportionment of the Work by construction activity; and (3) the time required for completion of each portion of the Work. The schedule shall provide for the orderly progression of the Work to completion and shall not exceed time limits current under the Contract Documents. The schedule shall be revised at appropriate intervals as required by the conditions of the Work and Project.

§ 3.10.2 The Contractor, promptly after being awarded the Contract and thereafter as necessary to maintain a current submittal schedule, shall submit a submittal schedule for the Architect's approval. The Architect's approval shall not be unreasonably delayed or withheld. The submittal schedule shall (1) be coordinated with the Contractor's construction schedule, and (2) allow the Architect reasonable time to review submittals. If the Contractor fails to submit a submittal schedule, or fails to provide submittals in accordance with the approved submittal schedule, the Contractor shall not be entitled to any increase in Contract Sum or extension of Contract Time based on the time required for review of submittals.

§ 3.10.3 The Contractor shall perform the Work in general accordance with the most recent schedules submitted to the Owner and Architect.

§ 3.11 Documents and Samples at the Site

The Contractor shall make available, at the Project site, the Contract Documents, including Change Orders, Construction Change Directives, and other Modifications, in good order and marked currently to indicate field changes and selections made during construction, and the approved Shop Drawings, Product Data, Samples, and

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similar required submittals. These shall be in electronic form or paper copy, available to the Architect and Owner, and delivered to the Architect for submittal to the Owner upon completion of the Work as a record of the Work as constructed.

§ 3.12 Shop Drawings, Product Data and Samples

§ 3.12.1 Shop Drawings are drawings, diagrams, schedules, and other data specially prepared for the Work by the Contractor or a Subcontractor, Sub-subcontractor, manufacturer, supplier, or distributor to illustrate some portion of the Work.

§ 3.12.2 Product Data are illustrations, standard schedules, performance charts, instructions, brochures, diagrams, and other information furnished by the Contractor to illustrate materials or equipment for some portion of the Work.

§ 3.12.3 Samples are physical examples that illustrate materials, equipment, or workmanship, and establish standards by which the Work will be judged.

§ 3.12.4 Shop Drawings, Product Data, Samples, and similar submittals are not Contract Documents. Their purpose is to demonstrate how the Contractor proposes to conform to the information given and the design concept expressed in the Contract Documents for those portions of the Work for which the Contract Documents require submittals. Review by the Architect is subject to the limitations of Section 4.2.7. Informational submittals upon which the Architect is not expected to take responsive action may be so identified in the Contract Documents. Submittals that are not required by the Contract Documents may be returned by the Architect without action.

§ 3.12.5 The Contractor shall review for compliance with the Contract Documents, approve, and submit to the Architect, Shop Drawings, Product Data, Samples, and similar submittals required by the Contract Documents, in accordance with the submittal schedule approved by the Architect or, in the absence of an approved submittal schedule, with reasonable promptness and in such sequence as to cause no delay in the Work or in the activities of the Owner or of Separate Contractors.

§ 3.12.6 By submitting Shop Drawings, Product Data, Samples, and similar submittals, the Contractor represents to the Owner and Architect that the Contractor has (1) reviewed and approved them, (2) determined and verified materials, field measurements and field construction criteria related thereto, or will do so, and (3) checked and coordinated the information contained within such submittals with the requirements of the Work and of the Contract Documents.

§ 3.12.7 The Contractor shall perform no portion of the Work for which the Contract Documents require submittal and review of Shop Drawings, Product Data, Samples, or similar submittals, until the respective submittal has been approved by the Architect.

§ 3.12.8 The Work shall be in accordance with approved submittals except that the Contractor shall not be relieved of responsibility for deviations from the requirements of the Contract Documents by the Architect's approval of Shop Drawings, Product Data, Samples, or similar submittals, unless the Contractor has specifically notified the Architect of such deviation at the time of submittal and (1) the Architect has given written approval to the specific deviation as a minor change in the Work, or (2) a Change Order or Construction Change Directive has been issued authorizing the deviation. The Contractor shall not be relieved of responsibility for errors or omissions in Shop Drawings, Product Data, Samples, or similar submittals, by the Architect's approval thereof.

§ 3.12.9 The Contractor shall direct specific attention, in writing or on resubmitted Shop Drawings, Product Data, Samples, or similar submittals, to revisions other than those requested by the Architect on previous submittals. In the absence of such notice, the Architect's approval of a resubmission shall not apply to such revisions.

§ 3.12.10 The Contractor shall not be required to provide professional services that constitute the practice of architecture or engineering unless such services are specifically required by the Contract Documents for a portion of the Work or unless the Contractor needs to provide such services in order to carry out the Contractor's responsibilities for construction means, methods, techniques, sequences, and procedures. The Contractor shall not be required to provide professional services in violation of applicable law.

§ 3.12.10.1 If professional design services or certifications by a design professional related to systems, materials, or equipment are specifically required of the Contractor by the Contract Documents, the Owner and the Architect will

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specify all performance and design criteria that such services must satisfy. The Contractor shall be entitled to rely upon the adequacy and accuracy of the performance and design criteria provided in the Contract Documents. The Contractor shall cause such services or certifications to be provided by an appropriately licensed design professional, whose signature and seal shall appear on all drawings, calculations, specifications, certifications, Shop Drawings, and other submittals prepared by such professional. Shop Drawings, and other submittals related to the Work, designed or certified by such professional, if prepared by others, shall bear such professional's written approval when submitted to the Architect. The Owner and the Architect shall be entitled to rely upon the adequacy and accuracy of the services, certifications, and approvals performed or provided by such design professionals, provided the Owner and Architect have specified to the Contractor the performance and design criteria that such services must satisfy. Pursuant to this Section 3.12.10, the Architect will review and approve or take other appropriate action on submittals only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents.

§ 3.12.10.2 If the Contract Documents require the Contractor's design professional to certify that the Work has been performed in accordance with the design criteria, the Contractor shall furnish such certifications to the Architect at the time and in the form specified by the Architect.

§ 3.13 Use of Site

The Contractor shall confine operations at the site to areas permitted by applicable laws, statutes, ordinances, codes, rules and regulations, lawful orders of public authorities, and the Contract Documents and shall not unreasonably encumber the site with materials or equipment.

§ 3.14 Cutting and Patching

§ 3.14.1 The Contractor shall be responsible for cutting, fitting, or patching required to complete the Work or to make its parts fit together properly. All areas requiring cutting, fitting, or patching shall be restored to the condition existing prior to the cutting, fitting, or patching, unless otherwise required by the Contract Documents.

§ 3.14.2 The Contractor shall not damage or endanger a portion of the Work or fully or partially completed construction of the Owner or Separate Contractors by cutting, patching, or otherwise altering such construction, or by excavation. The Contractor shall not cut or otherwise alter construction by the Owner or a Separate Contractor except with written consent of the Owner and of the Separate Contractor. Consent shall not be unreasonably withheld. The Contractor shall not unreasonably withhold, from the Owner or a Separate Contractor, its consent to cutting or otherwise altering the Work.

§ 3.15 Cleaning Up

§ 3.15.1 The Contractor shall keep the premises and surrounding area free from accumulation of waste materials and rubbish caused by operations under the Contract. At completion of the Work, the Contractor shall remove waste materials, rubbish, the Contractor's tools, construction equipment, machinery, and surplus materials from and about the Project.

§ 3.15.2 If the Contractor fails to clean up as provided in the Contract Documents, the Owner may do so and the Owner shall be entitled to reimbursement from the Contractor.

§ 3.16 Access to Work

The Contractor shall provide the Owner and Architect with access to the Work in preparation and progress wherever located.

§ 3.17 Royalties, Patents and Copyrights

The Contractor shall pay all royalties and license fees. The Contractor shall defend suits or claims for infringement of copyrights and patent rights and shall hold the Owner and Architect harmless from loss on account thereof, but shall not be responsible for defense or loss when a particular design, process, or product of a particular manufacturer or manufacturers is required by the Contract Documents, or where the copyright violations are contained in Drawings, Specifications, or other documents prepared by the Owner or Architect. However, if an infringement of a copyright or patent is discovered by, or made known to, the Contractor, the Contractor shall be responsible for the loss unless the information is promptly furnished to the Architect.

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§ 3.18 Indemnification

§ 3.18.1 To the fullest extent permitted by law, the Contractor shall indemnify and hold harmless the Owner, Architect, Architect's consultants, and agents and employees of any of them from and against claims, damages, losses, and expenses, including but not limited to attorneys' fees, arising out of or resulting from performance of the Work, provided that such claim, damage, loss, or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself), but only to the extent caused by the negligent acts or omissions of the Contractor, a Subcontractor, anyone directly or indirectly employed by them, or anyone for whose acts they may be liable, regardless of whether or not such claim, damage, loss, or expense is caused in part by a party indemnified hereunder. Such obligation shall not be construed to negate, abridge, or reduce other rights or obligations of indemnity that would otherwise exist as to a party or person described in this Section 3.18.

§ 3.18.2 In claims against any person or entity indemnified under this Section 3.18 by an employee of the Contractor, a Subcontractor, anyone directly or indirectly employed by them, or anyone for whose acts they may be liable, the indemnification obligation under Section 3.18.1 shall not be limited by a limitation on amount or type of damages, compensation, or benefits payable by or for the Contractor or a Subcontractor under workers' compensation acts, disability benefit acts, or other employee benefit acts.

ARTICLE 4 ARCHITECT

§ 4.1 General

§ 4.1.1 The Architect is the person or entity retained by the Owner pursuant to Section 2.3.2 and identified as such in the Agreement.

§ 4.1.2 Duties, responsibilities, and limitations of authority of the Architect as set forth in the Contract Documents shall not be restricted, modified, or extended without written consent of the Owner, Contractor, and Architect. Consent shall not be unreasonably withheld.

§ 4.2 Administration of the Contract

§ 4.2.1 The Architect will provide administration of the Contract as described in the Contract Documents and will be an Owner's representative during construction until the date the Architect issues the final Certificate for Payment. The Architect will have authority to act on behalf of the Owner only to the extent provided in the Contract Documents.

§ 4.2.2 The Architect will visit the site at intervals appropriate to the stage of construction, or as otherwise agreed with the Owner, to become generally familiar with the progress and quality of the portion of the Work completed, and to determine in general if the Work observed is being performed in a manner indicating that the Work, when fully completed, will be in accordance with the Contract Documents. However, the Architect will not be required to make exhaustive or continuous on-site inspections to check the quality or quantity of the Work. The Architect will not have control over, charge of, or responsibility for the construction means, methods, techniques, sequences or procedures, or for the safety precautions and programs in connection with the Work, since these are solely the Contractor's rights and responsibilities under the Contract Documents.

§ 4.2.3 On the basis of the site visits, the Architect will keep the Owner reasonably informed about the progress and quality of the portion of the Work completed, and promptly report to the Owner (1) known deviations from the Contract Documents, (2) known deviations from the most recent construction schedule submitted by the Contractor, and (3) defects and deficiencies observed in the Work. The Architect will not be responsible for the Contractor's failure to perform the Work in accordance with the requirements of the Contract Documents. The Architect will not have control over or charge of, and will not be responsible for acts or omissions of, the Contractor, Subcontractors, or their agents or employees, or any other persons or entities performing portions of the Work.

§ 4.2.4 Communications

The Owner and Contractor shall include the Architect in all communications that relate to or affect the Architect's services or professional responsibilities. The Owner shall promptly notify the Architect of the substance of any direct communications between the Owner and the Contractor otherwise relating to the Project. Communications by and with the Architect's consultants shall be through the Architect. Communications by and with Subcontractors and suppliers shall be through the Contractor. Communications by and with Separate Contractors shall be through the Owner. The Contract Documents may specify other communication protocols.

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§ 4.2.5 Based on the Architect's evaluations of the Contractor's Applications for Payment, the Architect will review and certify the amounts due the Contractor and will issue Certificates for Payment in such amounts.

§ 4.2.6 The Architect has authority to reject Work that does not conform to the Contract Documents. Whenever the Architect considers it necessary or advisable, the Architect will have authority to require inspection or testing of the Work in accordance with Sections 13.4.2 and 13.4.3, whether or not the Work is fabricated, installed or completed. However, neither this authority of the Architect nor a decision made in good faith either to exercise or not to exercise such authority shall give rise to a duty or responsibility of the Architect to the Contractor, Subcontractors, suppliers, their agents or employees, or other persons or entities performing portions of the Work.

§ 4.2.7 The Architect will review and approve, or take other appropriate action upon, the Contractor's submittals such as Shop Drawings, Product Data, and Samples, but only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents. The Architect's action will be taken in accordance with the submittal schedule approved by the Architect or, in the absence of an approved submittal schedule, with reasonable promptness while allowing sufficient time in the Architect's professional judgment to permit adequate review. Review of such submittals is not conducted for the purpose of determining the accuracy and completeness of other details such as dimensions and quantities, or for substantiating instructions for installation or performance of equipment or systems, all of which remain the responsibility of the Contractor as required by the Contract Documents. The Architect's review of the Contractor's submittals shall not relieve the Contractor of the obligations under Sections 3.3, 3.5, and 3.12. The Architect's review shall not constitute approval of safety precautions or of any construction means, methods, techniques, sequences, or procedures. The Architect's approval of a specific item shall not indicate approval of an assembly of which the item is a component.

§ 4.2.8 The Architect will prepare Change Orders and Construction Change Directives, and may order minor changes in the Work as provided in Section 7.4. The Architect will investigate and make determinations and recommendations regarding concealed and unknown conditions as provided in Section 3.7.4.

§ 4.2.9 The Architect will conduct inspections to determine the date or dates of Substantial Completion and the date of final completion; issue Certificates of Substantial Completion pursuant to Section 9.8; receive and forward to the Owner, for the Owner's review and records, written warranties and related documents required by the Contract and assembled by the Contractor pursuant to Section 9.10; and issue a final Certificate for Payment pursuant to Section 9.10.

§ 4.2.10 If the Owner and Architect agree, the Architect will provide one or more Project representatives to assist in carrying out the Architect's responsibilities at the site. The Owner shall notify the Contractor of any change in the duties, responsibilities and limitations of authority of the Project representatives.

§ 4.2.11 The Architect will interpret and decide matters concerning performance under, and requirements of, the Contract Documents on written request of either the Owner or Contractor. The Architect's response to such requests will be made in writing within any time limits agreed upon or otherwise with reasonable promptness.

§ 4.2.12 Interpretations and decisions of the Architect will be consistent with the intent of, and reasonably inferable from, the Contract Documents and will be in writing or in the form of drawings. When making such interpretations and decisions, the Architect will endeavor to secure faithful performance by both Owner and Contractor, will not show partiality to either, and will not be liable for results of interpretations or decisions rendered in good faith.

§ 4.2.13 The Architect's decisions on matters relating to aesthetic effect will be final if consistent with the intent expressed in the Contract Documents.

§ 4.2.14 The Architect will review and respond to requests for information about the Contract Documents. The Architect's response to such requests will be made in writing within any time limits agreed upon or otherwise with reasonable promptness. If appropriate, the Architect will prepare and issue supplemental Drawings and Specifications in response to the requests for information.

ARTICLE 5 SUBCONTRACTORS

§ 5.1 Definitions

§ 5.1.1 A Subcontractor is a person or entity who has a direct contract with the Contractor to perform a portion of the Work at the site. The term "Subcontractor" is referred to throughout the Contract Documents as if singular in

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number and means a Subcontractor or an authorized representative of the Subcontractor. The term "Subcontractor" does not include a Separate Contractor or the subcontractors of a Separate Contractor.

§ 5.1.2 A Sub-subcontractor is a person or entity who has a direct or indirect contract with a Subcontractor to perform a portion of the Work at the site. The term "Sub-subcontractor" is referred to throughout the Contract Documents as if singular in number and means a Sub-subcontractor or an authorized representative of the Sub-subcontractor.

§ 5.2 Award of Subcontracts and Other Contracts for Portions of the Work

§ 5.2.1 Unless otherwise stated in the Contract Documents, the Contractor, as soon as practicable after award of the Contract, shall notify the Owner and Architect of the persons or entities proposed for each principal portion of the Work, including those who are to furnish materials or equipment fabricated to a special design. Within 14 days of receipt of the information, the Architect may notify the Contractor whether the Owner or the Architect (1) has reasonable objection to any such proposed person or entity or (2) requires additional time for review. Failure of the Architect to provide notice within the 14-day period shall constitute notice of no reasonable objection.

§ 5.2.2 The Contractor shall not contract with a proposed person or entity to whom the Owner or Architect has made reasonable and timely objection. The Contractor shall not be required to contract with anyone to whom the Contractor has made reasonable objection.

§ 5.2.3 If the Owner or Architect has reasonable objection to a person or entity proposed by the Contractor, the Contractor shall propose another to whom the Owner or Architect has no reasonable objection. If the proposed but rejected Subcontractor was reasonably capable of performing the Work, the Contract Sum and Contract Time shall be increased or decreased by the difference, if any, occasioned by such change, and an appropriate Change Order shall be issued before commencement of the substitute Subcontractor's Work. However, no increase in the Contract Sum or Contract Time shall be allowed for such change unless the Contractor has acted promptly and responsively in submitting names as required.

§ 5.2.4 The Contractor shall not substitute a Subcontractor, person, or entity for one previously selected if the Owner or Architect makes reasonable objection to such substitution.

§ 5.3 Subcontractual Relations

By appropriate written agreement, the Contractor shall require each Subcontractor, to the extent of the Work to be performed by the Subcontractor, to be bound to the Contractor by terms of the Contract Documents, and to assume toward the Contractor all the obligations and responsibilities, including the responsibility for safety of the Subcontractor's Work that the Contractor, by these Contract Documents, assumes toward the Owner and Architect. Each subcontract agreement shall preserve and protect the rights of the Owner and Architect under the Contract Documents with respect to the Work to be performed by the Subcontractor so that subcontracting thereof will not prejudice such rights, and shall allow to the Subcontractor, unless specifically provided otherwise in the subcontract agreement, the benefit of all rights, remedies, and redress against the Contractor that the Contractor, by the Contract Documents, has against the Owner. Where appropriate, the Contractor shall require each Subcontractor to enter into similar agreements with Sub-subcontractors. The Contractor shall make available to each proposed Subcontractor, prior to the execution of the subcontract agreement, copies of the Contract Documents to which the Subcontractor will be bound, and, upon written request of the Subcontractor, identify to the Subcontractor terms and conditions of the proposed subcontract agreement that may be at variance with the Contract Documents. Subcontractors will similarly make copies of applicable portions of such documents available to their respective proposed Sub-subcontractors.

§ 5.4 Contingent Assignment of Subcontracts

§ 5.4.1 Each subcontract agreement for a portion of the Work is assigned by the Contractor to the Owner, provided that

.1 assignment is effective only after termination of the Contract by the Owner for cause pursuant to Section 14.2 and only for those subcontract agreements that the Owner accepts by notifying the Subcontractor and Contractor; and

.2 assignment is subject to the prior rights of the surety, if any, obligated under bond relating to the Contract.

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When the Owner accepts the assignment of a subcontract agreement, the Owner assumes the Contractor's rights and obligations under the subcontract.

§ 5.4.2 Upon such assignment, if the Work has been suspended for more than 30 days, the Subcontractor's compensation shall be equitably adjusted for increases in cost resulting from the suspension.

§ 5.4.3 Upon assignment to the Owner under this Section 5.4, the Owner may further assign the subcontract to a successor contractor or other entity. If the Owner assigns the subcontract to a successor contractor or other entity, the Owner shall nevertheless remain legally responsible for all of the successor contractor's obligations under the subcontract.

ARTICLE 6 CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS

§ 6.1 Owner's Right to Perform Construction and to Award Separate Contracts

§ 6.1.1 The term "Separate Contractor(s)" shall mean other contractors retained by the Owner under separate agreements. The Owner reserves the right to perform construction or operations related to the Project with the Owner's own forces, and with Separate Contractors retained under Conditions of the Contract substantially similar to those of this Contract, including those provisions of the Conditions of the Contract related to insurance and waiver of subrogation.

§ 6.1.2 When separate contracts are awarded for different portions of the Project or other construction or operations on the site, the term "Contractor" in the Contract Documents in each case shall mean the Contractor who executes each separate Owner-Contractor Agreement.

§ 6.1.3 The Owner shall provide for coordination of the activities of the Owner's own forces and of each Separate Contractor with the Work of the Contractor, who shall cooperate with them. The Contractor shall participate with any Separate Contractors and the Owner in reviewing their construction schedules. The Contractor shall make any revisions to its construction schedule deemed necessary after a joint review and mutual agreement. The construction schedules shall then constitute the schedules to be used by the Contractor, Separate Contractors, and the Owner until subsequently revised.

§ 6.1.4 Unless otherwise provided in the Contract Documents, when the Owner performs construction or operations related to the Project with the Owner's own forces or with Separate Contractors, the Owner or its Separate Contractors shall have the same obligations and rights that the Contractor has under the Conditions of the Contract, including, without excluding others, those stated in Article 3, this Article 6, and Articles 10, 11, and 12.

§ 6.2 Mutual Responsibility

§ 6.2.1 The Contractor shall afford the Owner and Separate Contractors reasonable opportunity for introduction and storage of their materials and equipment and performance of their activities, and shall connect and coordinate the Contractor's construction and operations with theirs as required by the Contract Documents.

§ 6.2.2 If part of the Contractor's Work depends for proper execution or results upon construction or operations by the Owner or a Separate Contractor, the Contractor shall, prior to proceeding with that portion of the Work, promptly notify the Architect of apparent discrepancies or defects in the construction or operations by the Owner or Separate Contractor that would render it unsuitable for proper execution and results of the Contractor's Work. Failure of the Contractor to notify the Architect of apparent discrepancies or defects prior to proceeding with the Work shall constitute an acknowledgment that the Owner's or Separate Contractor's completed or partially completed construction is fit and proper to receive the Contractor's Work. The Contractor shall not be responsible for discrepancies or defects in the construction or operations by the Owner or Separate Contractor that are not apparent.

§ 6.2.3 The Contractor shall reimburse the Owner for costs the Owner incurs that are payable to a Separate Contractor because of the Contractor's delays, improperly timed activities or defective construction. The Owner shall be responsible to the Contractor for costs the Contractor incurs because of a Separate Contractor's delays, improperly timed activities, damage to the Work or defective construction.

§ 6.2.4 The Contractor shall promptly remedy damage that the Contractor wrongfully causes to completed or partially completed construction or to property of the Owner or Separate Contractor as provided in Section 10.2.5.

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§ 6.2.5 The Owner and each Separate Contractor shall have the same responsibilities for cutting and patching as are described for the Contractor in Section 3.14.

§ 6.3 Owner's Right to Clean Up

If a dispute arises among the Contractor, Separate Contractors, and the Owner as to the responsibility under their respective contracts for maintaining the premises and surrounding area free from waste materials and rubbish, the Owner may clean up and the Architect will allocate the cost among those responsible.

ARTICLE 7 CHANGES IN THE WORK

§ 7.1 General

§ 7.1.1 Changes in the Work may be accomplished after execution of the Contract, and without invalidating the Contract, by Change Order, Construction Change Directive or order for a minor change in the Work, subject to the limitations stated in this Article 7 and elsewhere in the Contract Documents.

§ 7.1.2 A Change Order shall be based upon agreement among the Owner, Contractor, and Architect. A Construction Change Directive requires agreement by the Owner and Architect and may or may not be agreed to by the Contractor. An order for a minor change in the Work may be issued by the Architect alone.

§ 7.1.3 Changes in the Work shall be performed under applicable provisions of the Contract Documents. The Contractor shall proceed promptly with changes in the Work, unless otherwise provided in the Change Order, Construction Change Directive, or order for a minor change in the Work.

§ 7.2 Change Orders

§ 7.2.1 A Change Order is a written instrument prepared by the Architect and signed by the Owner, Contractor, and Architect stating their agreement upon all of the following:

.1 The change in the Work;
.2 The amount of the adjustment, if any, in the Contract Sum; and
.3 The extent of the adjustment, if any, in the Contract Time.

§ 7.3 Construction Change Directives

§ 7.3.1 A Construction Change Directive is a written order prepared by the Architect and signed by the Owner and Architect, directing a change in the Work prior to agreement on adjustment, if any, in the Contract Sum or Contract Time, or both. The Owner may by Construction Change Directive, without invalidating the Contract, order changes in the Work within the general scope of the Contract consisting of additions, deletions, or other revisions, the Contract Sum and Contract Time being adjusted accordingly.

§ 7.3.2 A Construction Change Directive shall be used in the absence of total agreement on the terms of a Change Order.

§ 7.3.3 If the Construction Change Directive provides for an adjustment to the Contract Sum, the adjustment shall be based on one of the following methods:

.1 Mutual acceptance of a lump sum properly itemized and supported by sufficient substantiating data to permit evaluation;
.2 Unit prices stated in the Contract Documents or subsequently agreed upon;
.3 Cost to be determined in a manner agreed upon by the parties and a mutually acceptable fixed or percentage fee; or
.4 As provided in Section 7.3.4.

§ 7.3.4 If the Contractor does not respond promptly or disagrees with the method for adjustment in the Contract Sum, the Architect shall determine the adjustment on the basis of reasonable expenditures and savings of those performing the Work attributable to the change, including, in case of an increase in the Contract Sum, an amount for overhead and profit as set forth in the Agreement, or if no such amount is set forth in the Agreement, a reasonable amount. In such case, and also under Section 7.3.3.3, the Contractor shall keep and present, in such form as the Architect may prescribe, an itemized accounting together with appropriate supporting data. Unless otherwise provided in the Contract Documents, costs for the purposes of this Section 7.3.4 shall be limited to the following:

.1 Costs of labor, including applicable payroll taxes, fringe benefits required by agreement or custom, workers' compensation insurance, and other employee costs approved by the Architect;

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.2 Costs of materials, supplies, and equipment, including cost of transportation, whether incorporated or consumed;

.3 Rental costs of machinery and equipment, exclusive of hand tools, whether rented from the Contractor or others;

.4 Costs of premiums for all bonds and insurance, permit fees, and sales, use, or similar taxes, directly related to the change; and

.5 Costs of supervision and field office personnel directly attributable to the change.

§ 7.3.5 If the Contractor disagrees with the adjustment in the Contract Time, the Contractor may make a Claim in accordance with applicable provisions of Article 15.

§ 7.3.6 Upon receipt of a Construction Change Directive, the Contractor shall promptly proceed with the change in the Work involved and advise the Architect of the Contractor's agreement or disagreement with the method, if any, provided in the Construction Change Directive for determining the proposed adjustment in the Contract Sum or Contract Time.

§ 7.3.7 A Construction Change Directive signed by the Contractor indicates the Contractor's agreement therewith, including adjustment in Contract Sum and Contract Time or the method for determining them. Such agreement shall be effective immediately and shall be recorded as a Change Order.

§ 7.3.8 The amount of credit to be allowed by the Contractor to the Owner for a deletion or change that results in a net decrease in the Contract Sum shall be actual net cost as confirmed by the Architect. When both additions and credits covering related Work or substitutions are involved in a change, the allowance for overhead and profit shall be figured on the basis of net increase, if any, with respect to that change.

§ 7.3.9 Pending final determination of the total cost of a Construction Change Directive to the Owner, the Contractor may request payment for Work completed under the Construction Change Directive in Applications for Payment. The Architect will make an interim determination for purposes of monthly certification for payment for those costs and certify for payment the amount that the Architect determines, in the Architect's professional judgment, to be reasonably justified. The Architect's interim determination of cost shall adjust the Contract Sum on the same basis as a Change Order, subject to the right of either party to disagree and assert a Claim in accordance with Article 15.

§ 7.3.10 When the Owner and Contractor agree with a determination made by the Architect concerning the adjustments in the Contract Sum and Contract Time, or otherwise reach agreement upon the adjustments, such agreement shall be effective immediately and the Architect will prepare a Change Order. Change Orders may be issued for all or any part of a Construction Change Directive.

§ 7.4 Minor Changes in the Work

The Architect may order minor changes in the Work that are consistent with the intent of the Contract Documents and do not involve an adjustment in the Contract Sum or an extension of the Contract Time. The Architect's order for minor changes shall be in writing. If the Contractor believes that the proposed minor change in the Work will affect the Contract Sum or Contract Time, the Contractor shall notify the Architect and shall not proceed to implement the change in the Work. If the Contractor performs the Work set forth in the Architect's order for a minor change without prior notice to the Architect that such change will affect the Contract Sum or Contract Time, the Contractor waives any adjustment to the Contract Sum or extension of the Contract Time.

ARTICLE 8 TIME

§ 8.1 Definitions

§ 8.1.1 Unless otherwise provided, Contract Time is the period of time, including authorized adjustments, allotted in the Contract Documents for Substantial Completion of the Work.

§ 8.1.2 The date of commencement of the Work is the date established in the Agreement.

§ 8.1.3 The date of Substantial Completion is the date certified by the Architect in accordance with Section 9.8.

§ 8.1.4 The term "day" as used in the Contract Documents shall mean calendar day unless otherwise specifically defined.

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§ 8.2 Progress and Completion

§ 8.2.1 Time limits stated in the Contract Documents are of the essence of the Contract. By executing the Agreement, the Contractor confirms that the Contract Time is a reasonable period for performing the Work.

§ 8.2.2 The Contractor shall not knowingly, except by agreement or instruction of the Owner in writing, commence the Work prior to the effective date of insurance required to be furnished by the Contractor and Owner.

§ 8.2.3 The Contractor shall proceed expeditiously with adequate forces and shall achieve Substantial Completion within the Contract Time.

§ 8.3 Delays and Extensions of Time

§ 8.3.1 If the Contractor is delayed at any time in the commencement or progress of the Work by (1) an act or neglect of the Owner or Architect, of an employee of either, or of a Separate Contractor; (2) by changes ordered in the Work; (3) by labor disputes, fire, unusual delay in deliveries, unavoidable casualties, adverse weather conditions documented in accordance with Section 15.1.6.2, or other causes beyond the Contractor's control; (4) by delay authorized by the Owner pending mediation and binding dispute resolution; or (5) by other causes that the Contractor asserts, and the Architect determines, justify delay, then the Contract Time shall be extended for such reasonable time as the Architect may determine.

§ 8.3.2 Claims relating to time shall be made in accordance with applicable provisions of Article 15.

§ 8.3.3 This Section 8.3 does not preclude recovery of damages for delay by either party under other provisions of the Contract Documents.

ARTICLE 9 PAYMENTS AND COMPLETION

§ 9.1 Contract Sum

§ 9.1.1 The Contract Sum is stated in the Agreement and, including authorized adjustments, is the total amount payable by the Owner to the Contractor for performance of the Work under the Contract Documents.

§ 9.1.2 If unit prices are stated in the Contract Documents or subsequently agreed upon, and if quantities originally contemplated are materially changed so that application of such unit prices to the actual quantities causes substantial inequity to the Owner or Contractor, the applicable unit prices shall be equitably adjusted.

§ 9.2 Schedule of Values

Where the Contract is based on a stipulated sum or Guaranteed Maximum Price, the Contractor shall submit a schedule of values to the Architect before the first Application for Payment, allocating the entire Contract Sum to the various portions of the Work. The schedule of values shall be prepared in the form, and supported by the data to substantiate its accuracy, required by the Architect. This schedule, unless objected to by the Architect, shall be used as a basis for reviewing the Contractor's Applications for Payment. Any changes to the schedule of values shall be submitted to the Architect and supported by such data to substantiate its accuracy as the Architect may require, and unless objected to by the Architect, shall be used as a basis for reviewing the Contractor's subsequent Applications for Payment.

§ 9.3 Applications for Payment

§ 9.3.1 At least ten days before the date established for each progress payment, the Contractor shall submit to the Architect an itemized Application for Payment prepared in accordance with the schedule of values, if required under Section 9.2, for completed portions of the Work. The application shall be notarized, if required, and supported by all data substantiating the Contractor's right to payment that the Owner or Architect require, such as copies of requisitions, and releases and waivers of liens from Subcontractors and suppliers, and shall reflect retainage if provided for in the Contract Documents.

§ 9.3.1.1 As provided in Section 7.3.9, such applications may include requests for payment on account of changes in the Work that have been properly authorized by Construction Change Directives, or by interim determinations of the Architect, but not yet included in Change Orders.

§ 9.3.1.2 Applications for Payment shall not include requests for payment for portions of the Work for which the Contractor does not intend to pay a Subcontractor or supplier, unless such Work has been performed by others whom the Contractor intends to pay.

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§ 9.3.2 Unless otherwise provided in the Contract Documents, payments shall be made on account of materials and equipment delivered and suitably stored at the site for subsequent incorporation in the Work. If approved in advance by the Owner, payment may similarly be made for materials and equipment suitably stored off the site at a location agreed upon in writing. Payment for materials and equipment stored on or off the site shall be conditioned upon compliance by the Contractor with procedures satisfactory to the Owner to establish the Owner's title to such materials and equipment or otherwise protect the Owner's interest, and shall include the costs of applicable insurance, storage, and transportation to the site, for such materials and equipment stored off the site.

§ 9.3.3 The Contractor warrants that title to all Work covered by an Application for Payment will pass to the Owner no later than the time of payment. The Contractor further warrants that upon submittal of an Application for Payment all Work for which Certificates for Payment have been previously issued and payments received from the Owner shall, to the best of the Contractor's knowledge, information, and belief, be free and clear of liens, claims, security interests, or encumbrances, in favor of the Contractor, Subcontractors, suppliers, or other persons or entities that provided labor, materials, and equipment relating to the Work.

§ 9.4 Certificates for Payment

§ 9.4.1 The Architect will, within seven days after receipt of the Contractor's Application for Payment, either (1) issue to the Owner a Certificate for Payment in the full amount of the Application for Payment, with a copy to the Contractor; or (2) issue to the Owner a Certificate for Payment for such amount as the Architect determines is properly due, and notify the Contractor and Owner of the Architect's reasons for withholding certification in part as provided in Section 9.5.1; or (3) withhold certification of the entire Application for Payment, and notify the Contractor and Owner of the Architect's reason for withholding certification in whole as provided in Section 9.5.1.

§ 9.4.2 The issuance of a Certificate for Payment will constitute a representation by the Architect to the Owner, based on the Architect's evaluation of the Work and the data in the Application for Payment, that, to the best of the Architect's knowledge, information, and belief, the Work has progressed to the point indicated, the quality of the Work is in accordance with the Contract Documents, and that the Contractor is entitled to payment in the amount certified. The foregoing representations are subject to an evaluation of the Work for conformance with the Contract Documents upon Substantial Completion, to results of subsequent tests and inspections, to correction of minor deviations from the Contract Documents prior to completion, and to specific qualifications expressed by the Architect. However, the issuance of a Certificate for Payment will not be a representation that the Architect has (1) made exhaustive or continuous on-site inspections to check the quality or quantity of the Work; (2) reviewed construction means, methods, techniques, sequences, or procedures; (3) reviewed copies of requisitions received from Subcontractors and suppliers and other data requested by the Owner to substantiate the Contractor's right to payment; or (4) made examination to ascertain how or for what purpose the Contractor has used money previously paid on account of the Contract Sum.

§ 9.5 Decisions to Withhold Certification

§ 9.5.1 The Architect may withhold a Certificate for Payment in whole or in part, to the extent reasonably necessary to protect the Owner, if in the Architect's opinion the representations to the Owner required by Section 9.4.2 cannot be made. If the Architect is unable to certify payment in the amount of the Application, the Architect will notify the Contractor and Owner as provided in Section 9.4.1. If the Contractor and Architect cannot agree on a revised amount, the Architect will promptly issue a Certificate for Payment for the amount for which the Architect is able to make such representations to the Owner. The Architect may also withhold a Certificate for Payment or, because of subsequently discovered evidence, may nullify the whole or a part of a Certificate for Payment previously issued, to such extent as may be necessary in the Architect's opinion to protect the Owner from loss for which the Contractor is responsible, including loss resulting from acts and omissions described in Section 3.3.2, because of

- **.1** defective Work not remedied;
- **.2** third party claims filed or reasonable evidence indicating probable filing of such claims, unless security acceptable to the Owner is provided by the Contractor;
- **.3** failure of the Contractor to make payments properly to Subcontractors or suppliers for labor, materials or equipment;
- **.4** reasonable evidence that the Work cannot be completed for the unpaid balance of the Contract Sum;
- **.5** damage to the Owner or a Separate Contractor;
- **.6** reasonable evidence that the Work will not be completed within the Contract Time, and that the unpaid balance would not be adequate to cover actual or liquidated damages for the anticipated delay; or

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.7 repeated failure to carry out the Work in accordance with the Contract Documents.

§ 9.5.2 When either party disputes the Architect's decision regarding a Certificate for Payment under Section 9.5.1, in whole or in part, that party may submit a Claim in accordance with Article 15.

§ 9.5.3 When the reasons for withholding certification are removed, certification will be made for amounts previously withheld.

§ 9.5.4 If the Architect withholds certification for payment under Section 9.5.1.3, the Owner may, at its sole option, issue joint checks to the Contractor and to any Subcontractor or supplier to whom the Contractor failed to make payment for Work properly performed or material or equipment suitably delivered. If the Owner makes payments by joint check, the Owner shall notify the Architect and the Contractor shall reflect such payment on its next Application for Payment.

§ 9.6 Progress Payments

§ 9.6.1 After the Architect has issued a Certificate for Payment, the Owner shall make payment in the manner and within the time provided in the Contract Documents, and shall so notify the Architect.

§ 9.6.2 The Contractor shall pay each Subcontractor, no later than seven days after receipt of payment from the Owner, the amount to which the Subcontractor is entitled, reflecting percentages actually retained from payments to the Contractor on account of the Subcontractor's portion of the Work. The Contractor shall, by appropriate agreement with each Subcontractor, require each Subcontractor to make payments to Sub-subcontractors in a similar manner.

§ 9.6.3 The Architect will, on request, furnish to a Subcontractor, if practicable, information regarding percentages of completion or amounts applied for by the Contractor and action taken thereon by the Architect and Owner on account of portions of the Work done by such Subcontractor.

§ 9.6.4 The Owner has the right to request written evidence from the Contractor that the Contractor has properly paid Subcontractors and suppliers amounts paid by the Owner to the Contractor for subcontracted Work. If the Contractor fails to furnish such evidence within seven days, the Owner shall have the right to contact Subcontractors and suppliers to ascertain whether they have been properly paid. Neither the Owner nor Architect shall have an obligation to pay, or to see to the payment of money to, a Subcontractor or supplier, except as may otherwise be required by law.

§ 9.6.5 The Contractor's payments to suppliers shall be treated in a manner similar to that provided in Sections 9.6.2, 9.6.3 and 9.6.4.

§ 9.6.6 A Certificate for Payment, a progress payment, or partial or entire use or occupancy of the Project by the Owner shall not constitute acceptance of Work not in accordance with the Contract Documents.

§ 9.6.7 Unless the Contractor provides the Owner with a payment bond in the full penal sum of the Contract Sum, payments received by the Contractor for Work properly performed by Subcontractors or provided by suppliers shall be held by the Contractor for those Subcontractors or suppliers who performed Work or furnished materials, or both, under contract with the Contractor for which payment was made by the Owner. Nothing contained herein shall require money to be placed in a separate account and not commingled with money of the Contractor, create any fiduciary liability or tort liability on the part of the Contractor for breach of trust, or entitle any person or entity to an award of punitive damages against the Contractor for breach of the requirements of this provision.

§ 9.6.8 Provided the Owner has fulfilled its payment obligations under the Contract Documents, the Contractor shall defend and indemnify the Owner from all loss, liability, damage or expense, including reasonable attorney's fees and litigation expenses, arising out of any lien claim or other claim for payment by any Subcontractor or supplier of any tier. Upon receipt of notice of a lien claim or other claim for payment, the Owner shall notify the Contractor. If approved by the applicable court, when required, the Contractor may substitute a surety bond for the property against which the lien or other claim for payment has been asserted.

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§ 9.7 Failure of Payment

If the Architect does not issue a Certificate for Payment, through no fault of the Contractor, within seven days after receipt of the Contractor's Application for Payment, or if the Owner does not pay the Contractor within seven days after the date established in the Contract Documents, the amount certified by the Architect or awarded by binding dispute resolution, then the Contractor may, upon seven additional days' notice to the Owner and Architect, stop the Work until payment of the amount owing has been received. The Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable costs of shutdown, delay and start-up, plus interest as provided for in the Contract Documents.

§ 9.8 Substantial Completion

§ 9.8.1 Substantial Completion is the stage in the progress of the Work when the Work or designated portion thereof is sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work for its intended use.

§ 9.8.2 When the Contractor considers that the Work, or a portion thereof which the Owner agrees to accept separately, is substantially complete, the Contractor shall prepare and submit to the Architect a comprehensive list of items to be completed or corrected prior to final payment. Failure to include an item on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents.

§ 9.8.3 Upon receipt of the Contractor's list, the Architect will make an inspection to determine whether the Work or designated portion thereof is substantially complete. If the Architect's inspection discloses any item, whether or not included on the Contractor's list, which is not sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work or designated portion thereof for its intended use, the Contractor shall, before issuance of the Certificate of Substantial Completion, complete or correct such item upon notification by the Architect. In such case, the Contractor shall then submit a request for another inspection by the Architect to determine Substantial Completion.

§ 9.8.4 When the Work or designated portion thereof is substantially complete, the Architect will prepare a Certificate of Substantial Completion that shall establish the date of Substantial Completion; establish responsibilities of the Owner and Contractor for security, maintenance, heat, utilities, damage to the Work and insurance; and fix the time within which the Contractor shall finish all items on the list accompanying the Certificate. Warranties required by the Contract Documents shall commence on the date of Substantial Completion of the Work or designated portion thereof unless otherwise provided in the Certificate of Substantial Completion.

§ 9.8.5 The Certificate of Substantial Completion shall be submitted to the Owner and Contractor for their written acceptance of responsibilities assigned to them in the Certificate. Upon such acceptance, and consent of surety if any, the Owner shall make payment of retainage applying to the Work or designated portion thereof. Such payment shall be adjusted for Work that is incomplete or not in accordance with the requirements of the Contract Documents.

§ 9.9 Partial Occupancy or Use

§ 9.9.1 The Owner may occupy or use any completed or partially completed portion of the Work at any stage when such portion is designated by separate agreement with the Contractor, provided such occupancy or use is consented to by the insurer and authorized by public authorities having jurisdiction over the Project. Such partial occupancy or use may commence whether or not the portion is substantially complete, provided the Owner and Contractor have accepted in writing the responsibilities assigned to each of them for payments, retainage, if any, security, maintenance, heat, utilities, damage to the Work and insurance, and have agreed in writing concerning the period for correction of the Work and commencement of warranties required by the Contract Documents. When the Contractor considers a portion substantially complete, the Contractor shall prepare and submit a list to the Architect as provided under Section 9.8.2. Consent of the Contractor to partial occupancy or use shall not be unreasonably withheld. The stage of the progress of the Work shall be determined by written agreement between the Owner and Contractor or, if no agreement is reached, by decision of the Architect.

§ 9.9.2 Immediately prior to such partial occupancy or use, the Owner, Contractor, and Architect shall jointly inspect the area to be occupied or portion of the Work to be used in order to determine and record the condition of the Work.

§ 9.9.3 Unless otherwise agreed upon, partial occupancy or use of a portion or portions of the Work shall not constitute acceptance of Work not complying with the requirements of the Contract Documents.

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§ 9.10 Final Completion and Final Payment

§ 9.10.1 Upon receipt of the Contractor's notice that the Work is ready for final inspection and acceptance and upon receipt of a final Application for Payment, the Architect will promptly make such inspection. When the Architect finds the Work acceptable under the Contract Documents and the Contract fully performed, the Architect will promptly issue a final Certificate for Payment stating that to the best of the Architect's knowledge, information and belief, and on the basis of the Architect's on-site visits and inspections, the Work has been completed in accordance with the Contract Documents and that the entire balance found to be due the Contractor and noted in the final Certificate is due and payable. The Architect's final Certificate for Payment will constitute a further representation that conditions listed in Section 9.10.2 as precedent to the Contractor's being entitled to final payment have been fulfilled.

§ 9.10.2 Neither final payment nor any remaining retained percentage shall become due until the Contractor submits to the Architect (1) an affidavit that payrolls, bills for materials and equipment, and other indebtedness connected with the Work for which the Owner or the Owner's property might be responsible or encumbered (less amounts withheld by Owner) have been paid or otherwise satisfied, (2) a certificate evidencing that insurance required by the Contract Documents to remain in force after final payment is currently in effect, (3) a written statement that the Contractor knows of no reason that the insurance will not be renewable to cover the period required by the Contract Documents, (4) consent of surety, if any, to final payment, (5) documentation of any special warranties, such as manufacturers' warranties or specific Subcontractor warranties, and (6) if required by the Owner, other data establishing payment or satisfaction of obligations, such as receipts and releases and waivers of liens, claims, security interests, or encumbrances arising out of the Contract, to the extent and in such form as may be designated by the Owner. If a Subcontractor refuses to furnish a release or waiver required by the Owner, the Contractor may furnish a bond satisfactory to the Owner to indemnify the Owner against such lien, claim, security interest, or encumbrance. If a lien, claim, security interest, or encumbrance remains unsatisfied after payments are made, the Contractor shall refund to the Owner all money that the Owner may be compelled to pay in discharging the lien, claim, security interest, or encumbrance, including all costs and reasonable attorneys' fees.

§ 9.10.3 If, after Substantial Completion of the Work, final completion thereof is materially delayed through no fault of the Contractor or by issuance of Change Orders affecting final completion, and the Architect so confirms, the Owner shall, upon application by the Contractor and certification by the Architect, and without terminating the Contract, make payment of the balance due for that portion of the Work fully completed, corrected, and accepted. If the remaining balance for Work not fully completed or corrected is less than retainage stipulated in the Contract Documents, and if bonds have been furnished, the written consent of the surety to payment of the balance due for that portion of the Work fully completed and accepted shall be submitted by the Contractor to the Architect prior to certification of such payment. Such payment shall be made under terms and conditions governing final payment, except that it shall not constitute a waiver of Claims.

§ 9.10.4 The making of final payment shall constitute a waiver of Claims by the Owner except those arising from

- **.1** liens, Claims, security interests, or encumbrances arising out of the Contract and unsettled;
- **.2** failure of the Work to comply with the requirements of the Contract Documents;
- **.3** terms of special warranties required by the Contract Documents; or
- **.4** audits performed by the Owner, if permitted by the Contract Documents, after final payment.

§ 9.10.5 Acceptance of final payment by the Contractor, a Subcontractor, or a supplier, shall constitute a waiver of claims by that payee except those previously made in writing and identified by that payee as unsettled at the time of final Application for Payment.

ARTICLE 10 PROTECTION OF PERSONS AND PROPERTY

§ 10.1 Safety Precautions and Programs

The Contractor shall be responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with the performance of the Contract.

§ 10.2 Safety of Persons and Property

§ 10.2.1 The Contractor shall take reasonable precautions for safety of, and shall provide reasonable protection to prevent damage, injury, or loss to

- **.1** employees on the Work and other persons who may be affected thereby;

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.2 the Work and materials and equipment to be incorporated therein, whether in storage on or off the site, under care, custody, or control of the Contractor, a Subcontractor, or a Sub-subcontractor; and

.3 other property at the site or adjacent thereto, such as trees, shrubs, lawns, walks, pavements, roadways, structures, and utilities not designated for removal, relocation, or replacement in the course of construction.

§ 10.2.2 The Contractor shall comply with, and give notices required by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities, bearing on safety of persons or property or their protection from damage, injury, or loss.

§ 10.2.3 The Contractor shall implement, erect, and maintain, as required by existing conditions and performance of the Contract, reasonable safeguards for safety and protection, including posting danger signs and other warnings against hazards; promulgating safety regulations; and notifying the owners and users of adjacent sites and utilities of the safeguards.

§ 10.2.4 When use or storage of explosives or other hazardous materials or equipment, or unusual methods are necessary for execution of the Work, the Contractor shall exercise utmost care and carry on such activities under supervision of properly qualified personnel.

§ 10.2.5 The Contractor shall promptly remedy damage and loss (other than damage or loss insured under property insurance required by the Contract Documents) to property referred to in Sections 10.2.1.2 and 10.2.1.3 caused in whole or in part by the Contractor, a Subcontractor, a Sub-subcontractor, or anyone directly or indirectly employed by any of them, or by anyone for whose acts they may be liable and for which the Contractor is responsible under Sections 10.2.1.2 and 10.2.1.3. The Contractor may make a Claim for the cost to remedy the damage or loss to the extent such damage or loss is attributable to acts or omissions of the Owner or Architect or anyone directly or indirectly employed by either of them, or by anyone for whose acts either of them may be liable, and not attributable to the fault or negligence of the Contractor. The foregoing obligations of the Contractor are in addition to the Contractor's obligations under Section 3.18.

§ 10.2.6 The Contractor shall designate a responsible member of the Contractor's organization at the site whose duty shall be the prevention of accidents. This person shall be the Contractor's superintendent unless otherwise designated by the Contractor in writing to the Owner and Architect.

§ 10.2.7 The Contractor shall not permit any part of the construction or site to be loaded so as to cause damage or create an unsafe condition.

§ 10.2.8 Injury or Damage to Person or Property

If either party suffers injury or damage to person or property because of an act or omission of the other party, or of others for whose acts such party is legally responsible, notice of the injury or damage, whether or not insured, shall be given to the other party within a reasonable time not exceeding 21 days after discovery. The notice shall provide sufficient detail to enable the other party to investigate the matter.

§ 10.3 Hazardous Materials and Substances

§ 10.3.1 The Contractor is responsible for compliance with any requirements included in the Contract Documents regarding hazardous materials or substances. If the Contractor encounters a hazardous material or substance not addressed in the Contract Documents and if reasonable precautions will be inadequate to prevent foreseeable bodily injury or death to persons resulting from a material or substance, including but not limited to asbestos or polychlorinated biphenyl (PCB), encountered on the site by the Contractor, the Contractor shall, upon recognizing the condition, immediately stop Work in the affected area and notify the Owner and Architect of the condition.

§ 10.3.2 Upon receipt of the Contractor's notice, the Owner shall obtain the services of a licensed laboratory to verify the presence or absence of the material or substance reported by the Contractor and, in the event such material or substance is found to be present, to cause it to be rendered harmless. Unless otherwise required by the Contract Documents, the Owner shall furnish in writing to the Contractor and Architect the names and qualifications of persons or entities who are to perform tests verifying the presence or absence of the material or substance or who are to perform the task of removal or safe containment of the material or substance. The Contractor and the Architect will promptly reply to the Owner in writing stating whether or not either has reasonable objection to the persons or entities proposed by the Owner. If either the Contractor or Architect has an objection to a person or entity proposed

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by the Owner, the Owner shall propose another to whom the Contractor and the Architect have no reasonable objection. When the material or substance has been rendered harmless, Work in the affected area shall resume upon written agreement of the Owner and Contractor. By Change Order, the Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable additional costs of shutdown, delay, and start-up.

§ 10.3.3 To the fullest extent permitted by law, the Owner shall indemnify and hold harmless the Contractor, Subcontractors, Architect, Architect's consultants, and agents and employees of any of them from and against claims, damages, losses, and expenses, including but not limited to attorneys' fees, arising out of or resulting from performance of the Work in the affected area if in fact the material or substance presents the risk of bodily injury or death as described in Section 10.3.1 and has not been rendered harmless, provided that such claim, damage, loss, or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself), except to the extent that such damage, loss, or expense is due to the fault or negligence of the party seeking indemnity.

§ 10.3.4 The Owner shall not be responsible under this Section 10.3 for hazardous materials or substances the Contractor brings to the site unless such materials or substances are required by the Contract Documents. The Owner shall be responsible for hazardous materials or substances required by the Contract Documents, except to the extent of the Contractor's fault or negligence in the use and handling of such materials or substances.

§ 10.3.5 The Contractor shall reimburse the Owner for the cost and expense the Owner incurs (1) for remediation of hazardous materials or substances the Contractor brings to the site and negligently handles, or (2) where the Contractor fails to perform its obligations under Section 10.3.1, except to the extent that the cost and expense are due to the Owner's fault or negligence.

§ 10.3.6 If, without negligence on the part of the Contractor, the Contractor is held liable by a government agency for the cost of remediation of a hazardous material or substance solely by reason of performing Work as required by the Contract Documents, the Owner shall reimburse the Contractor for all cost and expense thereby incurred.

§ 10.4 Emergencies

In an emergency affecting safety of persons or property, the Contractor shall act, at the Contractor's discretion, to prevent threatened damage, injury, or loss. Additional compensation or extension of time claimed by the Contractor on account of an emergency shall be determined as provided in Article 15 and Article 7.

ARTICLE 11 INSURANCE AND BONDS

§ 11.1 Contractor's Insurance and Bonds

§ 11.1.1 The Contractor shall purchase and maintain insurance of the types and limits of liability, containing the endorsements, and subject to the terms and conditions, as described in the Agreement or elsewhere in the Contract Documents. The Contractor shall purchase and maintain the required insurance from an insurance company or insurance companies lawfully authorized to issue insurance in the jurisdiction where the Project is located. The Owner, Architect, and Architect's consultants shall be named as additional insureds under the Contractor's commercial general liability policy or as otherwise described in the Contract Documents.

§ 11.1.2 The Contractor shall provide surety bonds of the types, for such penal sums, and subject to such terms and conditions as required by the Contract Documents. The Contractor shall purchase and maintain the required bonds from a company or companies lawfully authorized to issue surety bonds in the jurisdiction where the Project is located.

§ 11.1.3 Upon the request of any person or entity appearing to be a potential beneficiary of bonds covering payment of obligations arising under the Contract, the Contractor shall promptly furnish a copy of the bonds or shall authorize a copy to be furnished.

§ 11.1.4 Notice of Cancellation or Expiration of Contractor's Required Insurance. Within three (3) business days of the date the Contractor becomes aware of an impending or actual cancellation or expiration of any insurance required by the Contract Documents, the Contractor shall provide notice to the Owner of such impending or actual cancellation or expiration. Upon receipt of notice from the Contractor, the Owner shall, unless the lapse in coverage arises from an act or omission of the Owner, have the right to stop the Work until the lapse in coverage has been cured by the

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procurement of replacement coverage by the Contractor. The furnishing of notice by the Contractor shall not relieve the Contractor of any contractual obligation to provide any required coverage.

§ 11.2 Owner's Insurance

§ 11.2.1 The Owner shall purchase and maintain insurance of the types and limits of liability, containing the endorsements, and subject to the terms and conditions, as described in the Agreement or elsewhere in the Contract Documents. The Owner shall purchase and maintain the required insurance from an insurance company or insurance companies lawfully authorized to issue insurance in the jurisdiction where the Project is located.

§ 11.2.2 Failure to Purchase Required Property Insurance. If the Owner fails to purchase and maintain the required property insurance, with all of the coverages and in the amounts described in the Agreement or elsewhere in the Contract Documents, the Owner shall inform the Contractor in writing prior to commencement of the Work. Upon receipt of notice from the Owner, the Contractor may delay commencement of the Work and may obtain insurance that will protect the interests of the Contractor, Subcontractors, and Sub-Subcontractors in the Work. When the failure to provide coverage has been cured or resolved, the Contract Sum and Contract Time shall be equitably adjusted. In the event the Owner fails to procure coverage, the Owner waives all rights against the Contractor, Subcontractors, and Sub-subcontractors to the extent the loss to the Owner would have been covered by the insurance to have been procured by the Owner. The cost of the insurance shall be charged to the Owner by a Change Order. If the Owner does not provide written notice, and the Contractor is damaged by the failure or neglect of the Owner to purchase or maintain the required insurance, the Owner shall reimburse the Contractor for all reasonable costs and damages attributable thereto.

§ 11.2.3 Notice of Cancellation or Expiration of Owner's Required Property Insurance. Within three (3) business days of the date the Owner becomes aware of an impending or actual cancellation or expiration of any property insurance required by the Contract Documents, the Owner shall provide notice to the Contractor of such impending or actual cancellation or expiration. Unless the lapse in coverage arises from an act or omission of the Contractor: (1) the Contractor, upon receipt of notice from the Owner, shall have the right to stop the Work until the lapse in coverage has been cured by the procurement of replacement coverage by either the Owner or the Contractor; (2) the Contract Time and Contract Sum shall be equitably adjusted; and (3) the Owner waives all rights against the Contractor, Subcontractors, and Sub-subcontractors to the extent any loss to the Owner would have been covered by the insurance had it not expired or been cancelled. If the Contractor purchases replacement coverage, the cost of the insurance shall be charged to the Owner by an appropriate Change Order. The furnishing of notice by the Owner shall not relieve the Owner of any contractual obligation to provide required insurance.

§ 11.3 Waivers of Subrogation

§ 11.3.1 The Owner and Contractor waive all rights against (1) each other and any of their subcontractors, sub-subcontractors, agents, and employees, each of the other; (2) the Architect and Architect's consultants; and (3) Separate Contractors, if any, and any of their subcontractors, sub-subcontractors, agents, and employees, for damages caused by fire, or other causes of loss, to the extent those losses are covered by property insurance required by the Agreement or other property insurance applicable to the Project, except such rights as they have to proceeds of such insurance. The Owner or Contractor, as appropriate, shall require similar written waivers in favor of the individuals and entities identified above from the Architect, Architect's consultants, Separate Contractors, subcontractors, and sub-subcontractors. The policies of insurance purchased and maintained by each person or entity agreeing to waive claims pursuant to this section 11.3.1 shall not prohibit this waiver of subrogation. This waiver of subrogation shall be effective as to a person or entity (1) even though that person or entity would otherwise have a duty of indemnification, contractual or otherwise, (2) even though that person or entity did not pay the insurance premium directly or indirectly, or (3) whether or not the person or entity had an insurable interest in the damaged property.

§ 11.3.2 If during the Project construction period the Owner insures properties, real or personal or both, at or adjacent to the site by property insurance under policies separate from those insuring the Project, or if after final payment property insurance is to be provided on the completed Project through a policy or policies other than those insuring the Project during the construction period, to the extent permissible by such policies, the Owner waives all rights in accordance with the terms of Section 11.3.1 for damages caused by fire or other causes of loss covered by this separate property insurance.

§ 11.4 Loss of Use, Business Interruption, and Delay in Completion Insurance

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The Owner, at the Owner's option, may purchase and maintain insurance that will protect the Owner against loss of use of the Owner's property, or the inability to conduct normal operations, due to fire or other causes of loss. The Owner waives all rights of action against the Contractor and Architect for loss of use of the Owner's property, due to fire or other hazards however caused.

§11.5 Adjustment and Settlement of Insured Loss

§ 11.5.1 A loss insured under the property insurance required by the Agreement shall be adjusted by the Owner as fiduciary and made payable to the Owner as fiduciary for the insureds, as their interests may appear, subject to requirements of any applicable mortgagee clause and of Section 11.5.2. The Owner shall pay the Architect and Contractor their just shares of insurance proceeds received by the Owner, and by appropriate agreements the Architect and Contractor shall make payments to their consultants and Subcontractors in similar manner.

§ 11.5.2 Prior to settlement of an insured loss, the Owner shall notify the Contractor of the terms of the proposed settlement as well as the proposed allocation of the insurance proceeds. The Contractor shall have 14 days from receipt of notice to object to the proposed settlement or allocation of the proceeds. If the Contractor does not object, the Owner shall settle the loss and the Contractor shall be bound by the settlement and allocation. Upon receipt, the Owner shall deposit the insurance proceeds in a separate account and make the appropriate distributions. Thereafter, if no other agreement is made or the Owner does not terminate the Contract for convenience, the Owner and Contractor shall execute a Change Order for reconstruction of the damaged or destroyed Work in the amount allocated for that purpose. If the Contractor timely objects to either the terms of the proposed settlement or the allocation of the proceeds, the Owner may proceed to settle the insured loss, and any dispute between the Owner and Contractor arising out of the settlement or allocation of the proceeds shall be resolved pursuant to Article 15. Pending resolution of any dispute, the Owner may issue a Construction Change Directive for the reconstruction of the damaged or destroyed Work.

ARTICLE 12 UNCOVERING AND CORRECTION OF WORK

§ 12.1 Uncovering of Work

§ 12.1.1 If a portion of the Work is covered contrary to the Architect's request or to requirements specifically expressed in the Contract Documents, it must, if requested in writing by the Architect, be uncovered for the Architect's examination and be replaced at the Contractor's expense without change in the Contract Time.

§ 12.1.2 If a portion of the Work has been covered that the Architect has not specifically requested to examine prior to its being covered, the Architect may request to see such Work and it shall be uncovered by the Contractor. If such Work is in accordance with the Contract Documents, the Contractor shall be entitled to an equitable adjustment to the Contract Sum and Contract Time as may be appropriate. If such Work is not in accordance with the Contract Documents, the costs of uncovering the Work, and the cost of correction, shall be at the Contractor's expense.

§ 12.2 Correction of Work

§ 12.2.1 Before Substantial Completion

The Contractor shall promptly correct Work rejected by the Architect or failing to conform to the requirements of the Contract Documents, discovered before Substantial Completion and whether or not fabricated, installed or completed. Costs of correcting such rejected Work, including additional testing and inspections, the cost of uncovering and replacement, and compensation for the Architect's services and expenses made necessary thereby, shall be at the Contractor's expense.

§ 12.2.2 After Substantial Completion

§ 12.2.2.1 In addition to the Contractor's obligations under Section 3.5, if, within one year after the date of Substantial Completion of the Work or designated portion thereof or after the date for commencement of warranties established under Section 9.9.1, or by terms of any applicable special warranty required by the Contract Documents, any of the Work is found to be not in accordance with the requirements of the Contract Documents, the Contractor shall correct it promptly after receipt of notice from the Owner to do so, unless the Owner has previously given the Contractor a written acceptance of such condition. The Owner shall give such notice promptly after discovery of the condition. During the one-year period for correction of Work, if the Owner fails to notify the Contractor and give the Contractor an opportunity to make the correction, the Owner waives the rights to require correction by the Contractor and to make a claim for breach of warranty. If the Contractor fails to correct nonconforming Work within a reasonable time during that period after receipt of notice from the Owner or Architect, the Owner may correct it in accordance with Section 2.5.

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§ 12.2.2.2 The one-year period for correction of Work shall be extended with respect to portions of Work first performed after Substantial Completion by the period of time between Substantial Completion and the actual completion of that portion of the Work.

§ 12.2.2.3 The one-year period for correction of Work shall not be extended by corrective Work performed by the Contractor pursuant to this Section 12.2.

§ 12.2.3 The Contractor shall remove from the site portions of the Work that are not in accordance with the requirements of the Contract Documents and are neither corrected by the Contractor nor accepted by the Owner.

§ 12.2.4 The Contractor shall bear the cost of correcting destroyed or damaged construction of the Owner or Separate Contractors, whether completed or partially completed, caused by the Contractor's correction or removal of Work that is not in accordance with the requirements of the Contract Documents.

§ 12.2.5 Nothing contained in this Section 12.2 shall be construed to establish a period of limitation with respect to other obligations the Contractor has under the Contract Documents. Establishment of the one-year period for correction of Work as described in Section 12.2.2 relates only to the specific obligation of the Contractor to correct the Work, and has no relationship to the time within which the obligation to comply with the Contract Documents may be sought to be enforced, nor to the time within which proceedings may be commenced to establish the Contractor's liability with respect to the Contractor's obligations other than specifically to correct the Work.

§ 12.3 Acceptance of Nonconforming Work

If the Owner prefers to accept Work that is not in accordance with the requirements of the Contract Documents, the Owner may do so instead of requiring its removal and correction, in which case the Contract Sum will be reduced as appropriate and equitable. Such adjustment shall be effected whether or not final payment has been made.

ARTICLE 13 MISCELLANEOUS PROVISIONS

§ 13.1 Governing Law

The Contract shall be governed by the law of the place where the Project is located, excluding that jurisdiction's choice of law rules. If the parties have selected arbitration as the method of binding dispute resolution, the Federal Arbitration Act shall govern Section 15.4.

§ 13.2 Successors and Assigns

§ 13.2.1 The Owner and Contractor respectively bind themselves, their partners, successors, assigns, and legal representatives to covenants, agreements, and obligations contained in the Contract Documents. Except as provided in Section 13.2.2, neither party to the Contract shall assign the Contract as a whole without written consent of the other. If either party attempts to make an assignment without such consent, that party shall nevertheless remain legally responsible for all obligations under the Contract.

§ 13.2.2 The Owner may, without consent of the Contractor, assign the Contract to a lender providing construction financing for the Project, if the lender assumes the Owner's rights and obligations under the Contract Documents. The Contractor shall execute all consents reasonably required to facilitate the assignment.

§ 13.3 Rights and Remedies

§ 13.3.1 Duties and obligations imposed by the Contract Documents and rights and remedies available thereunder shall be in addition to and not a limitation of duties, obligations, rights, and remedies otherwise imposed or available by law.

§ 13.3.2 No action or failure to act by the Owner, Architect, or Contractor shall constitute a waiver of a right or duty afforded them under the Contract, nor shall such action or failure to act constitute approval of or acquiescence in a breach thereunder, except as may be specifically agreed upon in writing.

§ 13.4 Tests and Inspections

§ 13.4.1 Tests, inspections, and approvals of portions of the Work shall be made as required by the Contract Documents and by applicable laws, statutes, ordinances, codes, rules, and regulations or lawful orders of public authorities. Unless otherwise provided, the Contractor shall make arrangements for such tests, inspections, and approvals with an independent testing laboratory or entity acceptable to the Owner, or with the appropriate public authority, and shall bear all related costs of tests, inspections, and approvals. The Contractor shall give the Architect

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timely notice of when and where tests and inspections are to be made so that the Architect may be present for such procedures. The Owner shall bear costs of tests, inspections, or approvals that do not become requirements until after bids are received or negotiations concluded. The Owner shall directly arrange and pay for tests, inspections, or approvals where building codes or applicable laws or regulations so require.

§ 13.4.2 If the Architect, Owner, or public authorities having jurisdiction determine that portions of the Work require additional testing, inspection, or approval not included under Section 13.4.1, the Architect will, upon written authorization from the Owner, instruct the Contractor to make arrangements for such additional testing, inspection, or approval, by an entity acceptable to the Owner, and the Contractor shall give timely notice to the Architect of when and where tests and inspections are to be made so that the Architect may be present for such procedures. Such costs, except as provided in Section 13.4.3, shall be at the Owner's expense.

§ 13.4.3 If procedures for testing, inspection, or approval under Sections 13.4.1 and 13.4.2 reveal failure of the portions of the Work to comply with requirements established by the Contract Documents, all costs made necessary by such failure, including those of repeated procedures and compensation for the Architect's services and expenses, shall be at the Contractor's expense.

§ 13.4.4 Required certificates of testing, inspection, or approval shall, unless otherwise required by the Contract Documents, be secured by the Contractor and promptly delivered to the Architect.

§ 13.4.5 If the Architect is to observe tests, inspections, or approvals required by the Contract Documents, the Architect will do so promptly and, where practicable, at the normal place of testing.

§ 13.4.6 Tests or inspections conducted pursuant to the Contract Documents shall be made promptly to avoid unreasonable delay in the Work.

§ 13.5 Interest

Payments due and unpaid under the Contract Documents shall bear interest from the date payment is due at the rate the parties agree upon in writing or, in the absence thereof, at the legal rate prevailing from time to time at the place where the Project is located.

ARTICLE 14 TERMINATION OR SUSPENSION OF THE CONTRACT

§ 14.1 Termination by the Contractor

§ 14.1.1 The Contractor may terminate the Contract if the Work is stopped for a period of 30 consecutive days through no act or fault of the Contractor, a Subcontractor, a Sub-subcontractor, their agents or employees, or any other persons or entities performing portions of the Work, for any of the following reasons:

- **.1** Issuance of an order of a court or other public authority having jurisdiction that requires all Work to be stopped;
- **.2** An act of government, such as a declaration of national emergency, that requires all Work to be stopped;
- **.3** Because the Architect has not issued a Certificate for Payment and has not notified the Contractor of the reason for withholding certification as provided in Section 9.4.1, or because the Owner has not made payment on a Certificate for Payment within the time stated in the Contract Documents; or
- **.4** The Owner has failed to furnish to the Contractor reasonable evidence as required by Section 2.2.

§ 14.1.2 The Contractor may terminate the Contract if, through no act or fault of the Contractor, a Subcontractor, a Sub-subcontractor, their agents or employees, or any other persons or entities performing portions of the Work, repeated suspensions, delays, or interruptions of the entire Work by the Owner as described in Section 14.3, constitute in the aggregate more than 100 percent of the total number of days scheduled for completion, or 120 days in any 365-day period, whichever is less.

§ 14.1.3 If one of the reasons described in Section 14.1.1 or 14.1.2 exists, the Contractor may, upon seven days' notice to the Owner and Architect, terminate the Contract and recover from the Owner payment for Work executed, as well as reasonable overhead and profit on Work not executed, and costs incurred by reason of such termination.

§ 14.1.4 If the Work is stopped for a period of 60 consecutive days through no act or fault of the Contractor, a Subcontractor, a Sub-subcontractor, or their agents or employees or any other persons or entities performing portions of the Work because the Owner has repeatedly failed to fulfill the Owner's obligations under the Contract

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Documents with respect to matters important to the progress of the Work, the Contractor may, upon seven additional days' notice to the Owner and the Architect, terminate the Contract and recover from the Owner as provided in Section 14.1.3.

§ 14.2 Termination by the Owner for Cause

§ 14.2.1 The Owner may terminate the Contract if the Contractor

- **.1** repeatedly refuses or fails to supply enough properly skilled workers or proper materials;
- **.2** fails to make payment to Subcontractors or suppliers in accordance with the respective agreements between the Contractor and the Subcontractors or suppliers;
- **.3** repeatedly disregards applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of a public authority; or
- **.4** otherwise is guilty of substantial breach of a provision of the Contract Documents.

§ 14.2.2 When any of the reasons described in Section 14.2.1 exist, and upon certification by the Architect that sufficient cause exists to justify such action, the Owner may, without prejudice to any other rights or remedies of the Owner and after giving the Contractor and the Contractor's surety, if any, seven days' notice, terminate employment of the Contractor and may, subject to any prior rights of the surety:

- **.1** Exclude the Contractor from the site and take possession of all materials, equipment, tools, and construction equipment and machinery thereon owned by the Contractor;
- **.2** Accept assignment of subcontracts pursuant to Section 5.4; and
- **.3** Finish the Work by whatever reasonable method the Owner may deem expedient. Upon written request of the Contractor, the Owner shall furnish to the Contractor a detailed accounting of the costs incurred by the Owner in finishing the Work.

§ 14.2.3 When the Owner terminates the Contract for one of the reasons stated in Section 14.2.1, the Contractor shall not be entitled to receive further payment until the Work is finished.

§ 14.2.4 If the unpaid balance of the Contract Sum exceeds costs of finishing the Work, including compensation for the Architect's services and expenses made necessary thereby, and other damages incurred by the Owner and not expressly waived, such excess shall be paid to the Contractor. If such costs and damages exceed the unpaid balance, the Contractor shall pay the difference to the Owner. The amount to be paid to the Contractor or Owner, as the case may be, shall be certified by the Initial Decision Maker, upon application, and this obligation for payment shall survive termination of the Contract.

§ 14.3 Suspension by the Owner for Convenience

§ 14.3.1 The Owner may, without cause, order the Contractor in writing to suspend, delay or interrupt the Work, in whole or in part for such period of time as the Owner may determine.

§ 14.3.2 The Contract Sum and Contract Time shall be adjusted for increases in the cost and time caused by suspension, delay, or interruption under Section 14.3.1. Adjustment of the Contract Sum shall include profit. No adjustment shall be made to the extent

- **.1** that performance is, was, or would have been, so suspended, delayed, or interrupted, by another cause for which the Contractor is responsible; or
- **.2** that an equitable adjustment is made or denied under another provision of the Contract.

§ 14.4 Termination by the Owner for Convenience

§ 14.4.1 The Owner may, at any time, terminate the Contract for the Owner's convenience and without cause.

§ 14.4.2 Upon receipt of notice from the Owner of such termination for the Owner's convenience, the Contractor shall

- **.1** cease operations as directed by the Owner in the notice;
- **.2** take actions necessary, or that the Owner may direct, for the protection and preservation of the Work; and
- **.3** except for Work directed to be performed prior to the effective date of termination stated in the notice, terminate all existing subcontracts and purchase orders and enter into no further subcontracts and purchase orders.

§ 14.4.3 In case of such termination for the Owner's convenience, the Owner shall pay the Contractor for Work

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properly executed; costs incurred by reason of the termination, including costs attributable to termination of Subcontracts; and the termination fee, if any, set forth in the Agreement.

ARTICLE 15 CLAIMS AND DISPUTES

§ 15.1 Claims

§ 15.1.1 Definition

A Claim is a demand or assertion by one of the parties seeking, as a matter of right, payment of money, a change in the Contract Time, or other relief with respect to the terms of the Contract. The term "Claim" also includes other disputes and matters in question between the Owner and Contractor arising out of or relating to the Contract. The responsibility to substantiate Claims shall rest with the party making the Claim. This Section 15.1.1 does not require the Owner to file a Claim in order to impose liquidated damages in accordance with the Contract Documents.

§ 15.1.2 Time Limits on Claims

The Owner and Contractor shall commence all Claims and causes of action against the other and arising out of or related to the Contract, whether in contract, tort, breach of warranty or otherwise, in accordance with the requirements of the binding dispute resolution method selected in the Agreement and within the period specified by applicable law, but in any case not more than 10 years after the date of Substantial Completion of the Work. The Owner and Contractor waive all Claims and causes of action not commenced in accordance with this Section 15.1.2.

§ 15.1.3 Notice of Claims

§ 15.1.3.1 Claims by either the Owner or Contractor, where the condition giving rise to the Claim is first discovered prior to expiration of the period for correction of the Work set forth in Section 12.2.2, shall be initiated by notice to the other party and to the Initial Decision Maker with a copy sent to the Architect, if the Architect is not serving as the Initial Decision Maker. Claims by either party under this Section 15.1.3.1 shall be initiated within 21 days after occurrence of the event giving rise to such Claim or within 21 days after the claimant first recognizes the condition giving rise to the Claim, whichever is later.

§ 15.1.3.2 Claims by either the Owner or Contractor, where the condition giving rise to the Claim is first discovered after expiration of the period for correction of the Work set forth in Section 12.2.2, shall be initiated by notice to the other party. In such event, no decision by the Initial Decision Maker is required.

§ 15.1.4 Continuing Contract Performance

§ 15.1.4.1 Pending final resolution of a Claim, except as otherwise agreed in writing or as provided in Section 9.7 and Article 14, the Contractor shall proceed diligently with performance of the Contract and the Owner shall continue to make payments in accordance with the Contract Documents.

§ 15.1.4.2 The Contract Sum and Contract Time shall be adjusted in accordance with the Initial Decision Maker's decision, subject to the right of either party to proceed in accordance with this Article 15. The Architect will issue Certificates for Payment in accordance with the decision of the Initial Decision Maker.

§ 15.1.5 Claims for Additional Cost

If the Contractor wishes to make a Claim for an increase in the Contract Sum, notice as provided in Section 15.1.3 shall be given before proceeding to execute the portion of the Work that is the subject of the Claim. Prior notice is not required for Claims relating to an emergency endangering life or property arising under Section 10.4.

§ 15.1.6 Claims for Additional Time

§ 15.1.6.1 If the Contractor wishes to make a Claim for an increase in the Contract Time, notice as provided in Section 15.1.3 shall be given. The Contractor's Claim shall include an estimate of cost and of probable effect of delay on progress of the Work. In the case of a continuing delay, only one Claim is necessary.

§ 15.1.6.2 If adverse weather conditions are the basis for a Claim for additional time, such Claim shall be documented by data substantiating that weather conditions were abnormal for the period of time, could not have been reasonably anticipated, and had an adverse effect on the scheduled construction.

§ 15.1.7 Waiver of Claims for Consequential Damages

The Contractor and Owner waive Claims against each other for consequential damages arising out of or relating to this Contract. This mutual waiver includes

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.1 damages incurred by the Owner for rental expenses, for losses of use, income, profit, financing, business and reputation, and for loss of management or employee productivity or of the services of such persons; and

.2 damages incurred by the Contractor for principal office expenses including the compensation of personnel stationed there, for losses of financing, business and reputation, and for loss of profit, except anticipated profit arising directly from the Work.

This mutual waiver is applicable, without limitation, to all consequential damages due to either party's termination in accordance with Article 14. Nothing contained in this Section 15.1.7 shall be deemed to preclude assessment of liquidated damages, when applicable, in accordance with the requirements of the Contract Documents.

§ 15.2 Initial Decision

§ 15.2.1 Claims, excluding those where the condition giving rise to the Claim is first discovered after expiration of the period for correction of the Work set forth in Section 12.2.2 or arising under Sections 10.3, 10.4, and 11.5, shall be referred to the Initial Decision Maker for initial decision. The Architect will serve as the Initial Decision Maker, unless otherwise indicated in the Agreement. Except for those Claims excluded by this Section 15.2.1, an initial decision shall be required as a condition precedent to mediation of any Claim. If an initial decision has not been rendered within 30 days after the Claim has been referred to the Initial Decision Maker, the party asserting the Claim may demand mediation and binding dispute resolution without a decision having been rendered. Unless the Initial Decision Maker and all affected parties agree, the Initial Decision Maker will not decide disputes between the Contractor and persons or entities other than the Owner.

§ 15.2.2 The Initial Decision Maker will review Claims and within ten days of the receipt of a Claim take one or more of the following actions: (1) request additional supporting data from the claimant or a response with supporting data from the other party, (2) reject the Claim in whole or in part, (3) approve the Claim, (4) suggest a compromise, or (5) advise the parties that the Initial Decision Maker is unable to resolve the Claim if the Initial Decision Maker lacks sufficient information to evaluate the merits of the Claim or if the Initial Decision Maker concludes that, in the Initial Decision Maker's sole discretion, it would be inappropriate for the Initial Decision Maker to resolve the Claim.

§ 15.2.3 In evaluating Claims, the Initial Decision Maker may, but shall not be obligated to, consult with or seek information from either party or from persons with special knowledge or expertise who may assist the Initial Decision Maker in rendering a decision. The Initial Decision Maker may request the Owner to authorize retention of such persons at the Owner's expense.

§ 15.2.4 If the Initial Decision Maker requests a party to provide a response to a Claim or to furnish additional supporting data, such party shall respond, within ten days after receipt of the request, and shall either (1) provide a response on the requested supporting data, (2) advise the Initial Decision Maker when the response or supporting data will be furnished, or (3) advise the Initial Decision Maker that no supporting data will be furnished. Upon receipt of the response or supporting data, if any, the Initial Decision Maker will either reject or approve the Claim in whole or in part.

§ 15.2.5 The Initial Decision Maker will render an initial decision approving or rejecting the Claim, or indicating that the Initial Decision Maker is unable to resolve the Claim. This initial decision shall (1) be in writing; (2) state the reasons therefor; and (3) notify the parties and the Architect, if the Architect is not serving as the Initial Decision Maker, of any change in the Contract Sum or Contract Time or both. The initial decision shall be final and binding on the parties but subject to mediation and, if the parties fail to resolve their dispute through mediation, to binding dispute resolution.

§ 15.2.6 Either party may file for mediation of an initial decision at any time, subject to the terms of Section 15.2.6.1.

§ 15.2.6.1 Either party may, within 30 days from the date of receipt of an initial decision, demand in writing that the other party file for mediation. If such a demand is made and the party receiving the demand fails to file for mediation within 30 days after receipt thereof, then both parties waive their rights to mediate or pursue binding dispute resolution proceedings with respect to the initial decision.

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§ 15.2.7 In the event of a Claim against the Contractor, the Owner may, but is not obligated to, notify the surety, if any, of the nature and amount of the Claim. If the Claim relates to a possibility of a Contractor's default, the Owner may, but is not obligated to, notify the surety and request the surety's assistance in resolving the controversy.

§ 15.2.8 If a Claim relates to or is the subject of a mechanic's lien, the party asserting such Claim may proceed in accordance with applicable law to comply with the lien notice or filing deadlines.

§ 15.3 Mediation

§ 15.3.1 Claims, disputes, or other matters in controversy arising out of or related to the Contract, except those waived as provided for in Sections 9.10.4, 9.10.5, and 15.1.7, shall be subject to mediation as a condition precedent to binding dispute resolution.

§ 15.3.2 The parties shall endeavor to resolve their Claims by mediation which, unless the parties mutually agree otherwise, shall be administered by the American Arbitration Association in accordance with its Construction Industry Mediation Procedures in effect on the date of the Agreement. A request for mediation shall be made in writing, delivered to the other party to the Contract, and filed with the person or entity administering the mediation. The request may be made concurrently with the filing of binding dispute resolution proceedings but, in such event, mediation shall proceed in advance of binding dispute resolution proceedings, which shall be stayed pending mediation for a period of 60 days from the date of filing, unless stayed for a longer period by agreement of the parties or court order. If an arbitration is stayed pursuant to this Section 15.3.2, the parties may nonetheless proceed to the selection of the arbitrator(s) and agree upon a schedule for later proceedings.

§ 15.3.3 Either party may, within 30 days from the date that mediation has been concluded without resolution of the dispute or 60 days after mediation has been demanded without resolution of the dispute, demand in writing that the other party file for binding dispute resolution. If such a demand is made and the party receiving the demand fails to file for binding dispute resolution within 60 days after receipt thereof, then both parties waive their rights to binding dispute resolution proceedings with respect to the initial decision.

§ 15.3.4 The parties shall share the mediator's fee and any filing fees equally. The mediation shall be held in the place where the Project is located, unless another location is mutually agreed upon. Agreements reached in mediation shall be enforceable as settlement agreements in any court having jurisdiction thereof.

§ 15.4 Arbitration

§ 15.4.1 If the parties have selected arbitration as the method for binding dispute resolution in the Agreement, any Claim subject to, but not resolved by, mediation shall be subject to arbitration which, unless the parties mutually agree otherwise, shall be administered by the American Arbitration Association in accordance with its Construction Industry Arbitration Rules in effect on the date of the Agreement. The Arbitration shall be conducted in the place where the Project is located, unless another location is mutually agreed upon. A demand for arbitration shall be made in writing, delivered to the other party to the Contract, and filed with the person or entity administering the arbitration. The party filing a notice of demand for arbitration must assert in the demand all Claims then known to that party on which arbitration is permitted to be demanded.

§ 15.4.1.1 A demand for arbitration shall be made no earlier than concurrently with the filing of a request for mediation, but in no event shall it be made after the date when the institution of legal or equitable proceedings based on the Claim would be barred by the applicable statute of limitations. For statute of limitations purposes, receipt of a written demand for arbitration by the person or entity administering the arbitration shall constitute the institution of legal or equitable proceedings based on the Claim.

§ 15.4.2 The award rendered by the arbitrator or arbitrators shall be final, and judgment may be entered upon it in accordance with applicable law in any court having jurisdiction thereof.

§ 15.4.3 The foregoing agreement to arbitrate and other agreements to arbitrate with an additional person or entity duly consented to by parties to the Agreement, shall be specifically enforceable under applicable law in any court having jurisdiction thereof.

§ 15.4.4 Consolidation or Joinder

§ 15.4.4.1 Subject to the rules of the American Arbitration Association or other applicable arbitration rules, either party may consolidate an arbitration conducted under this Agreement with any other arbitration to which it is a party

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provided that (1) the arbitration agreement governing the other arbitration permits consolidation, (2) the arbitrations to be consolidated substantially involve common questions of law or fact, and (3) the arbitrations employ materially similar procedural rules and methods for selecting arbitrator(s).

§ 15.4.4.2 Subject to the rules of the American Arbitration Association or other applicable arbitration rules, either party may include by joinder persons or entities substantially involved in a common question of law or fact whose presence is required if complete relief is to be accorded in arbitration, provided that the party sought to be joined consents in writing to such joinder. Consent to arbitration involving an additional person or entity shall not constitute consent to arbitration of any claim, dispute or other matter in question not described in the written consent.

§ 15.4.4.3 The Owner and Contractor grant to any person or entity made a party to an arbitration conducted under this Section 15.4, whether by joinder or consolidation, the same rights of joinder and consolidation as those of the Owner and Contractor under this Agreement.

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SUPPLEMENTAL CONDITIONS TO AIA 201

DOCUMENT 00 73 00 – SUPPLEMENTARY CONDITIONS

The following supplements modify the "General Conditions of the Contract for Construction," AIA Document A201-2017. Where a portion of the General Conditions is modified or deleted by these Supplementary Conditions, the unaltered portions of the General Conditions shall remain in effect.

ARTICLE 1 GENERAL PROVISIONS

§ 1.1 BASIC DEFINITIONS

Delete § 1.1.1 in its entirety and replace with the following new § 1.1.1:

> The Contract Documents are enumerated in the Agreement between the Owner and Contractor (hereinafter the Agreement) and consist of the Agreement, Conditions of the Contract (General, Supplementary and other Conditions), Drawings, Specifications, Addenda issued prior to execution of the Agreement; the Bidding Documents, as listed in Instructions to Bidders (specifically including without limitation the Instructions to Bidders, the Advertisement for Bids, all sample forms including in the Project Manual, and any addenda related to the Bidding Documents);the completed Louisiana Uniform Public Work Bid form; the completed Bid Bond; the completed Performance Bond, AIA Document A312 (2010 Edition), as modified by the Owner; the completed Payment Bond, AIA Document A312 (2010 Edition), as modified by the Owner, all other completed forms submitted by the Contractor as required by the Instructions to Bidders and the terms of the Project Manual;

Delete the second sentence of Subparagraph 1.1.1.

Add the following new Subparagraph .1 after § 1.1.1:

> **1.1.1.1** The Contract Documents executed or identified in accordance with Paragraph 1.5.1 shall prevail in case of an inconsistency with subsequent versions made through manipulable electronic operations involving computers.

§ 1.1.2 THE CONTRACT

Delete § 1.1.2 in its entirety and replace with the following new § 1.1.2:

> **§ 1.1.2 THE CONTRACT**
>
> The Contract Documents form the Contract for Construction. The Contract represents the entire and integrated agreement between the parties hereto and supersedes prior negotiations, representations, or agreements, either written or oral. The Contract may be amended or modified only by a Modification. The Contract Documents shall not be construed to create a contractual relationship of any kind (1) between the Contractor and the Architect or the Architect's consultants, (2) between the Contractor and the Owner's representative; (3) between the Owner and a Subcontractor or a Sub-subcontractor, (4) between the Owner and the Architect or the Architect's consultants or (5) between any persons or entities other than the Owner and the Contractor. The Architect shall, however, be entitled to performance and enforcement of obligations under the Contract to facilitate performance of the Architect's duties.

§ 1.1.5 THE DRAWINGS

Add the following new Subparagraph 1.1.5.1 after § 1.1.5:

> **1.1.5.1** Where only part of the Work is indicated, similar parts are considered repetitive. Where any detail is shown and components thereof are fully described, similar details not fully described are deemed to incorporate similar material and construction.

§ 1.1.6 THE SPECIFICATIONS

Add the following new language to the end of § 1.1.6:

> At various sections of the Specifications, related work is identified. Such listing is to serve solely as a guideline and is not to be construed as the only areas of related work or otherwise limit the duties of the Contractor under the Contract Documents. It shall be the Contractor's responsibility to identify all related work and to properly

coordinate the performance of all Work, provided however, that Owner acknowledges that Contractor is not an architect nor a design professional and is not providing those services unless otherwise expressly provided for herein.

§ 1.1.8 INITIAL DECISION MAKER

Delete § 1.1.8 in its entirety and replace with the following new § 1.1.8:

§ 1.1.8 INITIAL DECISION MAKER

The Initial Decision Maker is the person identified in the Agreement to render initial decisions on Claims in accordance with Section 15.2. Unless explicitly stated otherwise in Section 6.1 of the Agreement, the Architect will serve as the Initial Decision Maker. The Initial Decision Maker shall not show partiality to the Owner or Contractor and shall not be liable for results of interpretations or decisions rendered in good faith.

Add the following new § 1.1.9:

§ 1.1.9 FAILURE TO PERFORM

"Failure to Perform", as used herein, is defined to mean non-performance, defective performance or delay in performance.

Add the following new § 1.1.10:

§ 1.1.10 PROJECT MANUAL

The Project Manual is a volume assembled for the Work which may include the Bidding Documents, the bidding requirements, the Advertisement for Bids, the Instructions to Bidders, sample forms, the Agreement, the Conditions of the Contract and Specifications. The Project Manual may exist in electronic format only, or in paper format or both.

Add the following new § 1.1.11:

§ 1.1.11 DAYS

All references to days in the Contract Documents shall mean calendar days, and not business days.

§ 1.2 CORRELATION AND INTENT OF THE CONTRACT DOCUMENTS

Add the following new language to the end of § 1.2.1:

The Contractor acknowledges and agrees that the Contract Documents illustrate the Project's design intent and are sufficient to provide for the completion of the Work, including Work, whether or not shown or described, which may reasonably be inferred to be required for the completion of the Work in accordance with information given in the Contract Documents; provided however, that Owner acknowledges that Contractor is not an architect nor a design professional and is not providing those services unless otherwise expressly provided for herein.

Delete § 1.2.3 in its entirety and replace with the following new § 1.2.3:

Any references in the Contract Documents to standard specifications, manuals, or codes of any technical society, organization, or association or to the laws, statutes or regulations of any governmental body, whether such reference is specific or by implication, shall mean those in effect on the date and time of the opening of the bids, or, in the absence of bids, those in effect on the date the Agreement is executed.

Add the following new § 1.2.4 and its Subparagraphs:

§ 1.2.4 If there should be a conflict between two or more of the Contract Documents, the following order of interpretation shall apply

.1 Where requirements specifically set forth in the Owner-Contractor Agreement are in conflict with other Contract Documents, the Owner-Contractor Agreement shall govern.

.2 Where there is a conflict between the requirements of the General Conditions of the Contract and the Supplementary Conditions, the requirements of the Supplementary Conditions shall govern, except where the requirements set forth in the Supplementary conditions are contrary to law, in which case the

legal requirements shall govern. The General Conditions of the Contract shall take precedence over the other Contract Documents except for the Owner-Contractor Agreement.

.3 Where there is a conflict between the Drawings and Specifications or a conflict within the Drawings or within the Specifications, the conflict shall be brought to the attention of the Architect for determination and resolution of the conflict and may be resolved by the Architect as provided in the General Conditions, Clause 4.2.11.

.4 In the event of any discrepancy or inconsistency among the Contract Documents, the most recent Contract Document as issued by the Architect shall prevail.

.5 In the event of a discrepancy, in the Contract Documents, the more specific and more detailed descriptive information will take precedence over the general and less detailed description. In case of doubt, Contractor shall assume that Owner intends that the more complete method, system, or process is required.

If there is any inconsistency in the Drawings or between the Drawings and the Specifications or between or within any of the Contract Documents that is not resolved by the order of precedence set forth above, unless otherwise ordered in writing by the Owner, the Contractor shall provide or abide by the better quality of or the greater quantity of Work, product, or services for the benefit of the Owner unless the result would be unreasonably or inequitable to the Contractor.

Add the following new § 1.2.5 :

§ 1.2.5 Any work, labor, materials or equipment that may reasonably be inferred from the Contract Documents as being required to produce a functionally complete and properly constructed Project or part thereof, or reasonably required to produce a functionally complete and properly constructed Project or part thereof shall be furnished by the Contractor at no additional cost, whether or not specifically stated or identified in the Contract Documents.

§ 1.7 DIGITAL DATA USE AND TRANSMISSION

Add the following new § 1.7.1 and § 1.7.2 after § 1.7:

§ 1.7.1 If the Contractor requires information or documentation in digital format, it agrees to execute the Architect's data licensing agreement as required in Division 01 General Requirements.

§ 1.7.2 The Contractor shall not transfer or reuse Instruments of Service in electronic or machine-readable form without the prior written consent of the Architect.

ARTICLE 2 OWNER

Delete § 2.2.1 in its entirety.

§ 2.2.1 INFORMATION AND SERVICES REQUIRED OF THE OWNER

Delete § 2.3.1 in its entirety and replace with the following new § 2.3.1:

§ 2.3.1 Except for permits and fees that are the responsibility of the Contractor under the Contract Documents, including those required under Section 3.7.1, the Owner shall secure and pay for necessary zoning approvals, easements, and assessments.

Add the following new language to the end of § 2.2.2:

Neither the Owner or Architect, nor any consultant engaged by them, guarantee the accuracy of any geotechnical, subsurface, or survey information provided regarding features of the site including, but not limited to, the location or elevation of utilities, cables, pipes, manholes or underground pipes, or the presence or absence of easements, topography or any underground feature or obstruction. The Contractor shall confirm all site information and the location of each utility, and make further investigation of all surface and subsurface conditions including any soil borings of the site of the Project and the conditions of any existing structures. Notwithstanding the foregoing, Owner acknowledges that Contractor is entitled to equitable adjustment in the event of unknown materially different conditions as more fully described in Article 3.7.4.

Delete all of § 2.3.5 except for the first sentence.

Delete § 2.4 in its entirety and replace with the following new § 2.4:

§ 2.3 OWNER'S RIGHT TO STOP THE WORK

If the Contractor fails to correct Work that is not in accordance with the requirements of the Contract Documents as required by Section 12.2, or repeatedly fails to carry out Work in accordance with the Contract Documents, or at any time fails to carry out Work in accordance with the Contract Documents in a manner that causes a material adverse effect to the Project or the Owner, the Owner may issue a written order to the Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, the right of the Owner to stop the Work shall not give rise to a duty on the part of the Owner to exercise this right for the benefit of the Contractor or any other person or entity, except to the extent provided by Section 2.5 and Section 6.1.3.

Delete § 2.4 in its entirety and replace with the following new § 2.5:

§ 2.4 OWNER'S RIGHT TO CARRY OUT THE WORK

If the Owner determines that there has been a failure to perform by the Contractor, or the Owner has determined that the Contractor has neglected to diligently carry out the Work in accordance with the Contract Documents, and the Contractor fails to commence and continue correction of such failure to perform by the Contractor within ten (10) calendar days after receipt of written notice, the Owner may, without prejudice to any other rights or remedies which the Owner may have, stop the Contractor's Work, in whole or in part, and correct such failure to perform. In such case, the Owner may deduct from payments then, or thereafter due the Contractor, the cost of correcting such failure to perform, including but not limited to, any costs, expenses, fees and attorney's fees, as well as compensation for any additional services performed by the Architect and other design professionals made necessary by such failure to perform. If payments then or thereafter due the Contractor are not sufficient to cover such amounts, the Contractor and/or its surety shall pay the difference to the Owner. The right to stop the Work shall not give rise to a duty on the part of the Owner to exercise this right for the benefit of the Contractor or any other person or entity. Contractor stipulates and agrees that in the event such work stoppage arises in any manner due to the Contractor's failure to perform, Contractor shall have no claim for delay or acceleration arising from the stoppage of the Work pursuant to this subsection. If the Contractor disagrees with the actions of the Owner, the Contractor may file a Claim pursuant to Article 15 and the results of that Claim shall be binding upon the Owner and Contractor.

Add the following new § 2.6 and its subparagraphs:

§ 2.6 OWNER'S RIGHT TO AUDIT AND REQUIRE RECORD RETENTION

§ 2.6.1 The Contractor shall keep full and accurate records of all costs incurred and items invoiced in connection with the Work, and shall keep and maintain all records related to this Project, for a period of five (5) years after Final Payment, or five (5) years after Grant close-out, as described further in Section 3.23.2 below, whichever is longer. Such records shall be open to audit by the Owner and/or its authorized representatives, and the Legislative Auditor for the State of Louisiana, during the performance of the Work and during the referenced five (5) year period.

§ 2.6.2 For Projects that are funded in full or in part with Federal or State funds, the Contractor shall maintain all records associated with said Project for five (5) calendar years after the Federal or State Grants associated with said Project have been closed by the respective Grantor agency. Due to the possibility of multiple funding streams for a single Project, the Contract may be subject to multiple Grant close-out periods. The Grantor agency will notify the Owner when close-out is complete. The Owner will then notify the Contractor when close-out is complete and when the five (5) year retention period or periods commence.

ARTICLE 3 CONTRACTOR

§ 3.1 GENERAL

Replace the second sentence of § 3.1.1:

The Contractor shall be licensed and authorized to do business in the State and Parish where the Project is located. The requirements to be licensed and authorized to do business in the State and Parish where the Project is located apply to every General Contractor doing business with the Owner, regardless of the size of the Project/Contract sum.

Delete § 3.1.3 in its entirety and replace with the following new § 3.1.3:

§ 3.1.3 The Contractor shall not be relieved of its obligations to perform the work in accordance with the Contract Documents either by the performance or failure to perform by the Architect or any of its Consultants, or by tests, inspections or approvals required or performed by or on behalf of the Architect or its Consultants, the Owner or its consultants, or any governmental entity. Quality control (i.e. - Ensuring compliance with the Contract Documents) is the sole responsibility of the Contractor. Testing, observations and or inspections performed or provided by the Owner or Architect or its Consultants are solely for information purposes for the exclusive benefit of the Owner to determine compliance with the Contract Documents. Notwithstanding the foregoing, Owner acknowledges that Contractor is entitled to equitable adjustments arising out of acts of Owner or Architect as more fully described in Article 8.3.

§ 3.2 REVIEW OF CONTRACT DOCUMENTS AND FIELD CONDITIONS BY CONTRACTOR

Add the following new Subparagraphs .1 and .2 to § 3.2.1:

.1 The Owner assumes no responsibility or liability for the physical condition or safety of the project site or any improvements located on the site. The Contractor is solely responsible for providing a safe place for the performance of the work.

.2 Contractor shall comply with the provisions of the Louisiana underground utilities and facilities damage prevention law, R.S. 40:1749.11 et al, as amended prior to any portion of the work which may require excavation including, but not limited to pile driving, digging, auguring, boring, backfilling, dredging, compressing, plowing-in, trenching, ditching, tunneling, land leveling, grading and or mechanical probing. Damage to underground utilities by Contractor shall be repaired at Contractor's expense. Such damage must be reported immediately to the Architect and the Owner. The Contractor shall undertake to make such further investigations, including without limitation, all structural, surface and subsurface conditions, including soil borings and otherwise of the project site.

Delete § 3.2.2 in its entirety and replace with the following new § 3.2.2:

§ 3.2.2 The Contractor is solely responsible for providing a safe place for the performance of the Work. Neither the Owner nor the Owner's representatives assume any responsibility or liability for the physical condition or safety of the Project site or for any improvements located on the site. Contractor shall comply with the provisions of the Louisiana Underground Utilities and Facilities Damage Prevention Law, La. RS. § 40:1749.11 et seq., prior to performing any portion of the Work which may require excavation, including but not limited to pile driving, digging, auguring, boring, backfilling, dredging, compressing, plowing-in, trenching, ditching, tunneling, land leveling, grading and or mechanical probing. Damage to underground utilities caused by Contractor or anyone performing work for or on behalf of Contractor shall be repaired at Contractor's sole cost and expense. Such damage must be reported immediately to the Architect and the Owner. These requirements regarding utilities shall apply in all cases, regardless of whether or not utilities are shown in the Contract Documents. Notwithstanding anything provided in Section 3.2.1 or 3.2.2, Contractor shall not be responsible for any damage, claim or loss occasioned by the acts or omissions of Owner, Architect, or any agents, employees, consultants or otherwise associated with either, and Owner further acknowledges that Contractor is entitled to equitable adjustments as more fully described in Article 3.7.4 and 8.3.

Delete § 3.2.4 in its entirety and replace with the following new § 3.2.4:

§ 3.2.4 In order for the Contractor to have any right to assert or make a claim for any additional time or money associated with or arising from any clarification or instruction issued by the Architect, the Contractor shall, prior to commencing any work involving additional time or additional money, make a claim as provided in article 15.

§ 3.3 SUPERVISION AND CONSTRUCTION PROCEDURES

Delete the 3rd and 4th sentences from **§** 3.3.1 in their entirety and replace with the following new language:

If the Contractor determines that such means, methods, techniques, sequences or procedures may not be safe, the Contractor shall give advance written notice to the Owner and Architect, informing the Owner and the Architect of the alternate means, methods, techniques, sequences or procedures the Contractor intends to utilize in the performance of the Work, and, unless the Owner or the Architect takes exception to the proposed means, methods, techniques, sequences or procedures, the Contractor shall proceed with the Work.

Delete § 3.3.3 in its entirety and replace with the following new § 3.3.3:

§ 3.3.3 The Contractor shall be solely responsible for inspection of portions of the work already performed to determine and ensure that such portions are in proper condition to receive subsequent portions of the work.

Add the following new § 3.3.4 and § 3.3.5:

§ 3.3.4 Building materials to be incorporated into the Work shall either be certified, in writing, by the manufacturer to be asbestos free or be inspected and tested by accredited testing laboratories and certified to be free of asbestos content in accordance with the applicable federal standards, including but not limited to the Asbestos Hazard Emergency Response Act (AHEARA) and the Toxic Substance Control Act (TSCA). "Asbestos" includes Asbestiform, Tremolite, and Actinolite. Copies of test reports shall be furnished to the Architect and the Owner. Material discovered to contain asbestos shall be removed immediately at the Contractor' s sole cos t and expense using current standards of the Louisiana Department of Environmental Quality (LDEQ).

§ 3.4 LABOR AND MATERIALS

Delete **§** 3.4.2 in its entirety and replace with the following new § 3.4.2:

§ 3.4.2 After the Contract has been executed, the Architect will consider a formal request for the substitution of comparable products in place of those specified only under the conditions and limitations set forth in Division 01 General Requirements.

Add the following new § 3.4.4:

§ 3.4.4 Prior to commencement of any Work, Contractor shall deliver to the Owner a complete list of all materialmen, laborers and employees who are to furnish any material or perform any labor or any service or who may be under any contract or engagement to furnish any material, or to do or perform any service for Contractor in connection with this Project, with the terms and price thereof. Contractor shall update such list and deliver an updated list with each application for payment identifying all materialmen, laborers and employees who have furnished any material or performed any labor or any service or who are under any contract or engagement to furnish any material, or to do or perform any service for Contractor in connection with this Project, with the terms, amount paid, and balance owed.

§ 3.5 WARRANTY

Delete the second sentence of § 3.5.1 in its entirety.

Add the following new § 3.5.2 through 3.5.8:

§ 3.5.2 The Contractor warrants to the Owner that materials and equipment furnished under the Contract will be of good quality and new unless the Contract Documents require or permit otherwise. The Contractor further warrants that the Work will conform to the requirements of the Contract Documents and will be free from defects, except for those inherent in the quality of the Work the Contract Documents require or permit. Work, materials, or equipment not conforming to these requirements will be considered defective. The Contractor's warranty excludes remedy for damage or defect to the extent caused by abuse, alterations to the Work not executed by the Contractor, improper or insufficient maintenance, improper operation, or normal wear and tear and normal usage. If required by the Owner or Architect, the Contractor shall furnish satisfactory evidence as to the kind and quality of materials and equipment.

§ 3.5.3 All manufacturers and vendors' warranties for products and other Work incorporated into the Project will be assigned and transferred without loss or limitation to Owner. Except as otherwise provided in the Contract Documents, all workmanship and product and other Work shall be warranted for one year following the date of Substantial Completion and its acceptance by the Owner or for the period of time stated in the applicable manufacturer or vendor's warranty, whichever is longer, to be new upon installation (and not of such age as to affect durability), free from faults and defects in material and workmanship that is not inherent in the quality required or permitted in the Contract Documents, except to the extent any deficiency arises from Owner's failure to maintain product and other Work as required hereunder. The warranty shall include all parts and labor and other replacement costs, both on and off site, together with all necessary transportation and shipping charges. This warranty shall be extended insofar as a vendor or manufacturer's standard guarantees exceed those specified.

§ 3.5.4 The Contractor (and vendor or manufacturer for extended guarantees) shall warrant throughout the warranty period described in Section 3.5.3 that the Work shall continue to function in conformance with the

Contract Documents (including the performance standards set forth in the Specifications), provided, however, that Contractor shall assume no responsibility for design services, and the provisions of any applicable user/maintenance manuals. Contractor shall, at its expense (including, without limitation, all in and out costs, etc.) remedy all deficiencies appearing within the warranty period and, at its option, repair or replace all defective Work as required to accomplish this. If a manufacturer or vendor's warranty, which has been assigned to Owner by Contractor, is available, Owner shall first diligently pursue its remedies under such warranty, although Contractor shall reasonably assist Owner in such effort. During such effort the warranty period, with respect to the applicable breach of warranty, shall be tolled. If the Contractor fails to remedy such deficiencies within a reasonable time after written notice from Owner, the Owner may cause such remedies to be performed and charge the expense thereof to the Contractor.

§ 3.5.5 Contractor warrants that the installation of any and all product shall be in strict accordance with manufacturer's requirements, unless the Architect has specified otherwise. If the Architect has specified a different method of installation ("Alternate Installation Method"), Contractor shall notify Owner in writing. No exception, limitation or exclusion from Contactor's or manufacturer's warranty shall be based on the Alternate Installation Method, unless (i) Contractor has notified Owner and Architect, in writing that the Alternate Installation Method shall limit Contractor's or manufacturer's warranty, (ii) Contractor has specified, in detail, the limitations to Contractor's or manufacturer's warranty that will result from the Alternate Installation Method and (iii) Owner has directed Contractor, in writing, to proceed with the Alternate Installation Method. In the event Owner seeks to enforce a claim based upon a manufacturer's warranty and should such manufacturer then fail to honor its warranty due to defective installation by Contractor or other fault of Contractor or its employees, agents or subcontractors, Owner shall be entitled to enforce said warranty against Contractor in accordance with the terms of said warranty, except that a claim of defective installation shall not be a defense to any such warranty claim by Owner against Contractor.

§ 3.5.6 All required maintenance of Work shall be the Contractor's responsibility until Substantial Completion, all material maintenance and user's manuals have been turned over to the Owner, and until the Owner's designated personnel (whom Owner shall cause to attend the meeting specified below) have been instructed in the maintenance and operation of all applicable product, which meeting shall not be unreasonably delayed by Owner. This maintenance shall include a complete turnover procedure at the time of Substantial Completion, including reasonable cleaning, testing and adjustment and at a meeting called by Contractor to explain such procedures and related matter to Owner and its designated representatives.

§ 3.5.7 Owner originated service calls which are demonstrated as not covered by warranty will be compensated at the Contractor's direct costs for materials and labor plus any agreed allowance for overhead and profit, provided they are approved in writing after submission of a detailed not-to-exceed estimate and schedule. The Owner will designate persons authorized to request service and will not compensate the Contractor for unauthorized calls. Contractor will only be responsible for the cost of such service calls that are not covered by warranty if the defect at issue arises out of defective installation by Contractor or the warranty denial is otherwise caused by Contractor or its employees, agents or subcontractors.

§ 3.5.8 The Warranties provided by this Section are not limited by the remedy provisions of Article 12. The Contractor further warrants that the work will conform to the requirements of the Contract Documents, and will be free from defects, both apparent and latent, to the fullest extent and duration of the applicable period for bringing claims against a contractor provided by law unless otherwise provided herein.

§ 3.6 TAXES

Delete § 3.6.1 in its entirety and replace with the following new § 3.6 and subparagraphs:

§ 3.6 TAXES The Contractor shall pay all sales, consumer, use and similar taxes associated with the Contractor's performance of the work.

§ 3.6.1 The Contractor is informed that La. R S. 47:301(8)(c) exempts the State of Louisiana, cities. parishes and other political subdivisions and their agencies, boards and commissions from state and local sales and use taxes. The Contractor is hereby made aware that materials and equipment which are affixed to and made a part of the Project such that they become immovable property and permanently incorporated into the Project or Work may qualify for the exemption. The Contractor shall execute any documentation required to effectuate this exemption. The Contractor is still responsible for payment of all taxes on nonexempt items necessary in the construction of the Project

§ 3.6.2 In accordance with La. R. S. 47:301(8){c), the Contractor shall not pay any State or local sales taxes or State or local use taxes on materials and equipment which are affixed to and made a part of the real estate of the Project or Work {hereinafter referred to as "exempt items").

§ 3.6.3 All purchases of "exempt items" for the Project shall be made by the Contractor on behalf of and for the Owner.

§ 3.6.4 The Contractor and all Subcontractors shall record all purchases of materials and equipment to be permanently installed or permanently incorporated into the Work. Preparing. maintaining and preserving these records shall be in accordance with applicable State laws and local ordinances and resolutions except that the records shall be preserved for not less than three (3) years from date of Final Payment. In addition to making the records available to the Louisiana Department of Revenue and Taxation and/or local taxing authorities, co pies of the records shall also be made available to the Owner upon request.

§ 3.6.5 The Contractor and all Subcontractors shall pay all other taxes which are required to be paid on materials. equipment and services supplied or purchased by the Contractor or Subcontractors for use on the Project.

§ 3.6.6 A separate contract (Sales Tax Exemption Contract, in the form included with the Bidding Documents) shall be executed between the Owner and the Contractor on this Project, which will certify that the Contractor is an Agent of the Owner and therefore not subject to state and local sales or use taxes for the purchase of exempt items for the Project. After the Sales Tax Exemption Contract is executed, the Owner will furnish the Contractor a Louisiana Department of Revenue Form R-1020 entitled "Designation of Construction Contractor as Agent of Governmental Entity and Exemption Certificate" for use by the Contractor, Subcontractors, and Material Suppliers for the Project which is required by the State of Louisiana Department of Revenue and Taxation, Sales Tax Division.

§ 3.7 PERMITS, FEES AND NOTICES

Delete § 3.7.3 in its entirety and replace with the following new § 3.7.3:

§ 3.7.3 If the Contractor performs any portion of the work when the Contractor knows or should have known that it would be contrary to applicable laws, statutes, ordinances, codes, standards referenced in the Contract Documents, rules or regulations, lawful orders of public authorities, or any of the requirements of the Contract Documents, and the Contractor proceeds to perform without the prior express written consent of the Architect after full disclosure to the Architect, the Contractor shall be solely responsible for and shall pay for any and all costs, expenses, fees, damages and attorney's fees incurred by the owner arising from the performance of such portion of work, including, but not limited to, all costs attributable for any corrective work.

Add the following new **§** 3.7.6:

§ 3.7.6 Upon issuance of the Notice to Proceed Letter or upon request by Owner, the Contractor, at its own expense, shall record the Notice of Contract with Bond or Bonds and legal description required with the Clerk of Court or Recorder of Mortgages of the Parish where the work is to be performed. Contractor shall furnish the Architect and Owner with all recordation information, including date, time, book and folio number. Owner shall furnish the legal description of the property which shall be attached to the Notice of Contract.

Change heading of § 3.9 to read, "**SUPERINTENDENT AND PROJECT MANAGER**"

§ 3.9 SUPERINTENDENT AND PROJECT MANAGER

Under § 3.9 and its subsections, wherever the word "superintendent" is found, substitute the language "project manager and superintendent".

Add the following new Subparagraph 3.9.1.1 to § 3.9.1:

§ 3.9.1.1 The Contractor shall maintain the same approved project manager and superintendent from the date of issuance of the Notice to Proceed until the Date of Final Completion, except in cases of separation from company or documented medical reasons. Neither the project manager nor the superintendent shall be reassigned to any other project or assignment within the company without the Owner's written permission. If a change to the project manager or superintendent is authorized, the Contractor shall submit proposed changes in personnel to the Architect in accordance with 3.9.2.

Add the following new § 3.9.4 to § 3.9:

§ 3.9.4 The contractor shall, except for sickness or separation from the company, maintain the same approved project manager and field superintendent from the time of issuance of the notice to proceed until the date of substantial completion. Any change in personnel shall be proposed in accordance with § 3.9.2.

§ 3.10 CONTRACTOR'S CONSTRUCTION AND SUBMITTAL SCHEDULES

Add the following new language to § 3.10.1:

Payments which may otherwise be due the Contractor may, at the Owner's option, be withheld until the Contractor delivers a construction schedule in accordance with Section 01290. The Contractor shall submit a paper, an electronic (PDF) and native version of its schedule, along with a written narrative, with each application for payment demonstrating and explaining work progress and any schedule delays or impacts. The first schedule submitted shall be deemed the "base-line schedule." For projects with a contract sum greater than $1,000,000.00, the Contractor shall include with the schedule, for the Owner's and Architect's information, a network analysis to identify those tasks which are on the critical path, i.e. where any delay in the completion of these tasks will lengthen the project timescale, unless action is taken. A revised schedule shall be submitted with each Application and Certificate for Payment. No payment will be made until this schedule is received.

Delete the last sentence of § 3.10.2 and replace with the following new language:

If the Contractor fails to timely submit to the Architect a submittal schedule in accordance with Section 01330, the Contractor shall not be entitled to any increase in the Contract Sum or extension of time based on the time required for the Architect to review the Contractor's submittals. Payments which may otherwise be due the Contractor may, at the Owner's option, be withheld until the Contractor delivers a submittal schedule in accordance with Section 013330 to the Architect.

Add the following new language to the end of § 3.10.3:

If the work is not on schedule, as determined by the Architect, and the Contractor fails to take action to bring the work on schedule, within a reasonable time considering the circumstances, then the Contractor shall be deemed in default under this Contract and the progress of the work shall be deemed unsatisfactory. Such default may be considered grounds for termination by the Owner for cause in accordance with 14.2.

Add the following new § 3.10.4 and § 3.10.5:

§ 3.10.4 Schedules submitted by the Contractor under § 3.10.1 through § 3.10.3 are not to be considered, nor interpreted to be, Contract Documents. The Contractor stipulates and agrees that the schedules shall not form the basis of any delay claim as the schedules are submitted solely for information purposes. Contractor further stipulates that any construction schedule float shall belong to the Owner. Submittal by the contractor of a schedule or other documentation showing a completion date for his work prior to the completion date stated in the contract shall not impose any obligation or responsibility on the Owner or Architect for the earlier completion date.

§ 3.10.5 In the event the Owner, reasonably and approved by Architect, determines that the performance of the Work, as of a Milestone Date, has not progressed or reached the level of completion required by the Contract Documents, the Owner shall have the right to order the Contractor to take corrective measures necessary to expedite the progress of construction, including, without limitation, (i) working additional shifts or overtime, (ii) supplying additional manpower, equipment, and facilities, and (iii) other similar measures (hereinafter referred to collectively as "Extraordinary Measures"). Such Extraordinary Measures shall continue until the progress of the Work complies with the stage of completion required by the Contract Documents. The Owner's right to require Extraordinary Measures is solely for the purpose of ensuring the Contractor's compliance with the construction schedule.

.1 The Contractor shall not be entitled to an adjustment in the Contract Sum in connection with Extraordinary Measures required by the Owner under or pursuant to this Subparagraph 3.10.5.

.2 The Owner may exercise the rights furnished the Owner under or pursuant to this Subparagraph 3.10.5 as frequently as the Owner deems necessary to ensure that the Contractor's performance of the Work will comply with any Milestone Date or completion date set forth in the Contract Documents.

Notwithstanding anything provided in this Section 3.10, the Contractor shall be entitled to equitable adjustments in Contract Time and Sum as set forth in Article 8.3 and elsewhere herein.

3.11 DOCUMENTS AND SAMPLES AT THE SITE

Add the following new language to the end of § 3.11:

The Contractor shall also maintain at the site for the Owner record sets of approved permit documents as stamped by governmental officials having jurisdiction over the work.

§ 3.12 SHOP DRAWINGS, PRODUCT DATA AND SAMPLES

Add the following new language to the end of § 3.12.8:

Any deviation from the requirements of the Contract Documents shall also be stipulated by the Contractor as deviations in the written correspondence transmitting the shop drawings, product data, samples or similar submittals by the Contractor to the Architect. The Architect shall have no obligation in its review of the Contractor's submittal(s) to identify deviations not identified by the Contractor as deviations and the Architect's review shall not constitute Architect's acceptance of such deviations."

Delete the 1st, 2nd and 3rd sentences of § 3.12.10.1, and replace with the following new language:

If professional design services ("delegated design") or certifications by a design professional related to systems, materials or equipment are specifically required of the Contractor by the Contract Documents, the Owner and the Architect will specify the minimum performance and design criteria that such services must satisfy. The Contractor shall cause such services or certifications to be provided by a properly licensed and insured design professional, whose signature and seal shall appear on all drawings, calculations, specifications, certifications, Shop Drawings and other submittals prepared by such design professional.

Delete the 5th sentence of § 3.12.10.1, and replace with the following new language:

The Owner and the Architect shall be entitled to rely upon the adequacy, accuracy and completeness of the services, certifications and approvals performed or provided by the such design professionals, provided the Owner and Architect have specified to the Contractor the minimum performance and design criteria that such services must satisfy; however, the Contractor and its design professional shall further be responsible for all additional code, regulatory and industry standards that are applicable to such systems, materials or equipment. This section shall also be applicable to any subcontractor or supplier engaged by the Contractor for performance of any portion of the work which requires any professional design services including, but not limited to, structural components, fire protection, and exterior envelope components.

§ 3.15 CLEANING UP

Delete § 3.15.2 in its entirety and replace with the following new § 3.15.2:

§ 3.15.2 If the Contractor fails to clean up as provided in the Contract Documents within five (5) calendar days after receiving written notice from the Owner or the Architect to do so, or such reasonable time considering the circumstances, the Owner may, at its option, perform such cleanup work, and the Contractor shall be liable to pay to the Owner for all such costs, expenses and fees.

§ 3.18 INDEMNIFICATION

Delete § 3.18.1 in its entirety and replace with the following new § 3.18.1:

§ 3.18.1 To the fullest extent permitted by law the Contractor shall indemnify, defend and hold harmless the Owner, Architect, Architect's consultants, and agents and employees of any of them, from and against any and all claims, damages, losses and expenses, including but not limited to the payment of attorneys' fees and expenses incurred by any of them, arising out of or resulting the negligence of the Contractor, from any failure to perform, breach of the Contract by or attributable to Contractor or anyone for whom the Contractor is responsible. Such obligation shall not be construed to negate, abridge, or reduce other rights or obligations of indemnity which would otherwise exist under any other provision of the Contract Documents.

Add the following new § 3.19, § 3.20, § 3.21 including § 3.21.1, and § 3.22:

§ 3.19 LOG OF CHANGES

The Contractor shall maintain a current log of changes and shall upon request of Owner, during the construction of the Project, incorporate into a set of the Contract Documents maintained at the project site all Requests for Information (RFIs), Architect's Supplementary Instructions (ASIs), Contractor's Requests for Change orders (RCOs), Change Orders and Construction Change Directives, and shall allow the Owner and Architect access to the same at any time upon request.

§ 3.20 FAILURE TO PERFORM WORK

Subject to Article 8.3 below, Contractor shall be liable to the Owner and pay for all costs, expenses, fees (including attorney fees and expenses) and/or damages that the Owner incurs arising from or connected with the Contractor's failure to perform the work, or any part thereof, in accordance with Contract Documents. Contractor's failure to perform shall include, but not be limited to, the failure of its subcontractors and/or suppliers of any tier to perform. The Contractor's liability to the Owner shall include, but not be limited to (1) the increase costs of performance, including services of the Architect and other consultants, resulting from the Contractor's failure to comply with the Contract Documents; (2) costs of corrective or warranty work; (3) liability to third parties; (4) re-procurement costs; (5) attorney fees and related costs, including costs incurred in enforcing Owner's rights under the Contract Documents; and (6) liquidated damages.

§ 3.21 LIENS

Subject to Owner's proper payment under this Contract, in the event a claim is asserted or a lien is filed by anyone in relation to the Work asserting that work, labor, materials equipment or supplies have been furnished but not paid for, the Owner shall have the right, but not the obligation to: (1) require the Contractor to furnish to the Owner a release of a lien or claim; (2) require the Contractor to discharge the lien by positing a bond within five (5) calendar days of notice by the Owner to the Contractor; (3) issue payment in the form of a joint check to Contractor and claimant to pay the amount claimed and/or (4) retain out of any payment due or thereafter to become due 150% of the amount of the claim/lien and to apply the same in such manner as Owner deems necessary to satisfy such claim/liens and to compensate Owner for attorneys' fees, expenses and/or administrative costs. In the event such claim/lien is not discharged, the Contractor at its sole cost and expense, including attorneys' fees and expenses, shall hold harmless, indemnify and defend the Owner from any and all claims, lawsuits, causes of actions and demands of any person or entity asserting or claiming any right as a result of any lien or claim recorded or unrecorded, against the Owner, Project, or the Owner's property. The Owner shall have the right to terminate the Contractor for cause or to bond off said lien(s), and Contractor shall be liable for and pay to Owner all costs, expenses and fees including but not limited to, bond premiums and attorneys' fees and expenses incurred as a result thereof. Prior to the receipt of partial or final payment, Contractor shall provide the owner a final release of any liens and claims of all persons furnishing labor and/or materials to the Work with satisfactory evidence that there are no other liens or claims whatsoever outstanding against the Work or Contract.

§ 3.21.1 The term "lien" as used in this Section 3.21 and in Article 9 of these General Conditions, and in Article 5 of the Agreement Between Owner and Contractor, AIA 101 refers to "claims" as provided in La. R.S. 38:2242. which authorizes "claimants" who perform work, labor, or provide materials or suppliers for a public work to file "claims" with the governing authority. The term "lien" is used in the referenced sections instead of the word "claim" solely to avoid confusion with the "Claims" that may be filed by the Contactor and/or Owner pursuant to the Contract Documents, as provided in Article 15 of these General Conditions.

§ 3.22 FEDERAL COMPLIANCE PROVISIONS

Contractor and all Subcontractors shall comply with all of the applicable requirements set forth in the Federal Compliance Provisions for Construction Contracts, which are herby made part of the Contract Documents for this Project, a copy of which is included in the Project Manual.

ARTICLE 4 ARCHITECT

§ 4.1 GENERAL

Add the following new Subparagraph 4.1.1.1 after § 4.1.1:

4.1.1.1 The term "Architect," "Architect/Engineer," "Engineer", Consultant or Architect's Consultant as used in the Contract Documents means the Architect or his authorized representative.

§ 4.2 ADMINISTRATION OF THE CONTRACT

Delete § 4.2.1 in its entirety and replace with the following new § 4.2.1:

§ 4.2.1 The Architect will provide administration of the Contract as described in the Contract Documents, not as the agent for the Owner but as an independent design professional.

Delete the 1st sentence of § 4.2.3 in its entirety.

Add the following new language to the end of § 4.2.10

There will be no restriction on the owner having a Representative.

Delete § 4.2.11 in its entirety and replace with the following new § 4.2.11:

§ 4.2.11 The Architect will interpret and decide all matters concerning performance and/or failure to perform by either the Contractor or Owner under the Contract Documents either on written request of the Owner or the Contractor. The Architect's response to such requests will be made in writing within a time limit agreed upon by the Architect or otherwise with reasonable promptness.

ARTICLE 5 SUBCONTRACTORS

§ 5.2 AWARD OF SUBCONTRACTS AND OTHER CONTRACTS FOR PORTIONS OF THE WORK

Delete the 1st sentence of § 5.2.1 and replace with the following new language:

The Contractor, within fourteen (14) calendar days following the date of issuance of the Notice to Proceed or date of commencement of the Work, whichever occurs first, shall submit to the Owner through the Architect a complete list of the names of persons or entities (including those who are to furnish materials and equipment fabricated to a special design) proposed to fabricate, furnish or perform work on the Project as manufacturers, fabricators, suppliers, subcontractors, and sub-subcontractors. No Contractor payments shall be made until this information is received."

Delete § 5.2.2 and substitute the following:

§ 5.2.2 The Contractor shall be solely responsible for selection and performance of all subcontractors. The Contractor shall not be entitled to claims for additional time and/or an increase in the contract sum due to a problem with performance or nonperformance of a subcontractor.

Delete § 5.2.3 and 5.2.4 and add the following:

§ 5.2.3 The contractor shall notify the owner when a subcontractor is to be changed and substituted with another subcontractor.

§ 5.4 CONTINGENT ASSIGNMENT OF SUBCONTRACTS

Delete § 5.4.1 and § 5.4.2 in their entirety.

ARTICLE 6 CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS

§ 6.2 MUTUAL RESPONSIBILITY

Delete § 6.2.3 in its entirety and replace with the following new § 6.2.3:

§ 6.2.3 If a separate Contractor initiates legal or other proceedings against the Owner on account of damage alleged to have been caused by the Contractor, the Owner shall notify the Contractor, who shall defend such proceedings at its own expense, and if judgment or award against the Owner arises therefrom, the Contractor shall pay or satisfy it and shall reimburse the Owner for attorneys' fees and court or other costs which the Owner has incurred over and above those paid for directly by the Contractor.

In the 1st line of § 6.2.4, delete the word "wrongfully."

ARTICLE 7 CHANGES IN THE WORK

§ 7.1 GENERAL

Add the following new language to the end of § 7.1.1:

Requests for Information (RFIs), responses to an RFI and/or Architect's Supplemental Instructions (ASIs) are not recognized as a modification to the Contract Documents where such documents may be interpreted to have the effect of altering the Contract Sum or the Contract Time. Contractor stipulates and agrees that the Contract Documents may only be changed by a written document properly signed as required herein below. Contractor hereby states its solemn intent that any such asserted reliance is unresolvable.

Add the following new § 7.1.4, § 7.1.5, § 7.1.6 and § 7.1.7:

§ 7.1.5 The overhead and profit included in the total cost to the Owner of any change in the Work shall be based on the following schedule:

Cost of Change in Work	Total Profit and Overhead to be Added
$0-$50,000	15%
$50,000-$100,000	15%
$100,000-$200,000	12%
$200,000-$500,000	10%
$500,000-$1,000,000	10%
$1,000,000-$2,000,000	7%
Over $2,000,000	7%

§ 7.1.6 In order to facilitate checking of quotations for extras or credits, all proposals, except those so minor that their propriety can be seen by inspection as determined solely by the Architect, shall be accompanied by a complete itemization of Contractor's costs including labor, materials, and equipment, and Subcontractors costs including labor, materials and equipment at every level. Labor, materials and equipment shall be itemized in the manner prescribed above and shall be supported by proposals and/or invoices.

§ 7.1.7 As part of the pre-construction conference submittals, the contractor is to submit the following prior to the commencement of work.

.1 Fixed job site overhead cost itemized with documentation to support daily rates.

.2 Bond Premium Rate with supporting information from the General Contractor's carrier.

.3 Labor Burden by trade for both Subcontractors and General Contractor.

.4 Internal Rate Charges for all significant company owned equipment.

§ 7.2 CHANGE ORDERS

Delete **§** 7.2.1 and replace with the following new language:

A Change Order is a written order to the Contractor signed by the Owner and the Architect, issued after execution of the Contract, authorizing a change in the work or an adjustment in the Contract Sum or the Contract Time. The Contract Sum and the Contract Time may be changed only by Change Order. A Change Order signed by the Contractor indicates his agreement therewith, including the adjustment in the Contract Sum or the Contract Time.

Add the following new § 7.2.2, § 7.2.3 § 7.2.4, § 7.2.5, § 7.2.6, § 7.2.7, § 7.2.8, § 7.2.9, and § 7.2.10:

§ 7.2.2 By executing the Change Order, the Contractor acknowledges that the Change Order is for the full and final amount of the Contract Sum and the Contract Time adjustments due the Contractor for all additional or changed Work related to the Change Order. Contractor waives all claims for any additional Contract Time or any additional Contract Sum for whatever reason and of whatever kind, whether direct or indirect costs, profit, overhead or any other expense for the work enumerated in the Change Order. An executed Change Order shall have the full force and effect as a compromise and settlement.

§ 7.2.3 The "Cost of the Work", whether Contractor cost, Subcontractor cost or Supplier cost, for the purpose of Change Orders and Construction Change Directives shall be costs actually required to be incurred in performance of the Work and paid by the Contractor and/or Subcontractors. Such costs shall consist only of the following:

.1 Wages paid for direct labor personnel, delineating a labor burden mark-up to include only:
- .1 Applicable payroll taxes;
- .2 Worker's compensation;
- .3 Unemployment compensation – Federal and State;
- .4 Social Security taxes.

.2 Fringe Benefits for direct labor personnel, to include only Sick leave and Vacation, limited to a maximum of 120 hours per year;

.3 Costs of direct materials and supplies, including the identification of each item, its unit cost and quantity;

.4 Costs of necessary machinery and equipment required by the Change Order, including the identification of each and allocation of its cost, and the bases therefore, to the change in the Work,
- .1 For leased machinery and equipment already being utilized on site, the allocation of its cost shall be at the actual rate leased, supported by lease invoices;
- .2 Incidental use of machinery and equipment already being utilized on site shall not be allocated to the costs of a change;

.5 Cost of premiums for bonds directly related to the change in the Work;

.6 Costs of premiums for insurance directly related to the change in the Work.

§ 7.2.4 The "Cost of the Work", whether General Contractor cost, Subcontractor cost or Supplier cost for the purpose of Change Orders, shall not include the following:

.1 Salaries or other compensation of the Contractor's, Subcontractor's and/or Supplier's personnel at its principal offices and branch offices;

.2 Salaries or other compensation of the Contractor's, Subcontractor's and/or Suppliers project management, administrative or safety personnel, whether or not located on site;

.3 Any part of the Contractor's, Subcontractor's and/or Supplier's capital expenses, including interest on its capital employed for the Work;

.4 Overhead and general expenses of any kind or the cost of any item not specifically included in General Conditions § 7.3.7 Cost of the Work;

.5 Cost of supervision not specifically required by the Change Order or for full- or part-time supervisory personnel already required or intended to be on site supervising ongoing Work;

.6 Costs for clean-up, trash removal, and other similar costs that are incidental to the Work.

§ 7.2.5 The Contractor and Subcontractor shall be due job-site and home office fixed overhead and profits on the Cost of the Work as set forth in Section 7.1.5 above.

The credit to the Owner resulting from a change in the work shall be the sum of those items above, except credit will not be required for overhead and profit. Where a change results in both credits to the Owner and extras to the Contractor for related items, overhead and profit will only be computed on the net extra cost to the Contractor.

§ 7.2.6 The cost to the Owner resulting from a change in the work shall be the sum of "Cost of the Work" (as defined at 7.2.3) plus "Overhead and Profit" (as defined at 7.2.5).

§ 7.2.7 "Before a Change Order is prepared, the Contractor shall provide and deliver to the Architect the following information concerning the Cost of the Work, not subject to waiver, within a reasonable time after being notified to prepare said Change Order:

A detailed itemized list of labor, material and equipment costs for the General Contractor's work including quantities and unit costs for each item of labor, material and equipment.

An itemized list of labor, material and equipment costs for each Subcontractor's and/or Sub Subcontractor's work including quantities and unit costs for each item of labor, material, and equipment.

§ 7.2.8 After a Change Order has been approved, no future requests for extensions of time or additional cost shall be considered for that Change Order.

§ 7.2.9 The Contractor will be due extended fixed job-site overhead for time delays only when complete stoppage of work occurs causing a contract completion extension, and the Contractor is unable to mitigate financial damages through replacement work. The stoppage must be due to acts or omissions solely attributable to the Owner. In all cases the Contractor is to notify the Designer in writing as required by article 4.3.2. Reasonable proof may be required by the architect that alternate work could not be performed. Reasonable proof may be required by the architect that the stoppage affected the Completion Date.

§ 7.2.10 "Cost of the work" whether General Contract cost or Subcontract cost shall not apply to the following:

.1 Salaries or other compensation of the Contractor's personnel at the Contractor's principal office and branch offices.

.2 Any part of the Contractor's capital expenses, including interest on the Contractor's capital employed for the work.

.3 Overhead and general expenses of any kind or the cost of any item not specifically and expressly included above in cost of the work.

.4 Cost of supervision not specifically required by the Change Order.

§ 7.2.11 When applicable as provided by the Contract, the cost to Owner for Change Orders shall be determined by quantities and unit prices. The quantity of any item shall be as submitted by the Contractor and approved by the Architect. Unit prices shall cover cost of Material, Labor, Equipment, Overhead and Profit."

At the end of the first sentence of §7.3.3 add:

but not to exceed a specified amount.

Replace the five cost of work descriptions in § 7.3.4 with the following four:

.1 Wages paid direct labor personnel, with a labor burden markup for applicable payroll taxes, worker's compensation insurance, unemployment compensation, and social security taxes.

.2 Cost of all materials and supplies.

.3 Cost of necessary machinery and equipment.

.4 Other documented direct costs.

Delete the last sentence of § 7.3.8 in its entirety and substitute the following new language:

When both additions and deletions are involved in any one change, the allowance for overhead and profit shall be figured on the basis of net increase, if any.

Add the following sentence to § 7.3.7:

The Architect's determination, as specified in Section 7.3.4, shall not be less than the actual cost of the items set forth in Section 7.3.4.1-4 reasonably expended by the Contractor in performing the changed Work. If the Architect's determination is believed to be less than its actual cost in performing the Work, the Contractor may assert a Claim.

§ 7.4 MINOR CHANGES IN THE WORK

Add the following new § 7.4.1:

§ 7.4.1 The issuance of an Architect's Supplemental Instructions ("ASI") or the Architect's response to any Request for Information ("RFI") shall not be interpreted as authorization for the Contractor to perform Work which increases the Contract Sum or Contract Time. The Contractor hereby stipulates and agrees that the Architect does not have the authority to instruct the Contractor to perform any Work which increases the Contract Sum or Contract Time without the express written approval of the Owner as may be documented in a Change Order or Construction Change Directive.

ARTICLE 8 TIME

§ 8.1 DEFINITIONS

Delete § 8.1.2 in its entirety and replace with the following new § 8.1.2:

§ 8.1.2 The date of commencement of the Work is the effective date established in the Agreement or the date established in the Notice to Proceed given by the Owner.

Add the following new § 8.1.5:

§ 8.1.5 The Contract Time shall not be changed by the submission of a schedule that shows an early completion date unless specifically authorized by change order.

§ 8.2 PROGRESS AND COMPLETION

Delete § 8.2.1 in its entirety and replace with the following new § 8.2.1:

Time is of the essence and completion of the work must be within the Time for Completion stated in the Agreement, subject to such extensions as may be granted under Section 8.3. The Contractor agrees to commence work not later than fourteen (14) days after the transmittal date of Written Notice to Proceed from the Owner and to substantially complete the project within the time stated in the Contract, subject to adjustments as contemplated in the Contract Documents. The Owner will suffer financial loss if the project is not substantially complete in the time set forth in the Contract Documents. The Contractor and the Contractor's Surety shall be liable for and shall pay to the Owner the sum stated in the Contract Documents as fixed, agreed and liquidated damages for each consecutive calendar day (Saturdays, Sundays, and holidays included) of delay until the work is substantially complete. The owner shall be entitled to the sum stated in the Contract Documents. Such Liquidated Damages shall be withheld by the Owner from the amounts due the Contractor for progress payments.

Delete § 8.2.2 in its entirety and replace with the following new § 8.2.2:

§ 8.2.2 The Contractor shall not, except by prior written agreement of the Owner, commence operations of any kind or nature whatsoever on the site or elsewhere prior to the effective date of the insurance required by article 11, and the Contractor has delivered to the Owner documentation reasonably requested by the Owner to prove such insurance. The Owner shall have the right to require the Contractor to provide a complete and certified copy of all insurance policies required under the Contract Documents prior to commencement of the work, and any payment becoming due to the Contractor. The Date of Commencement of the work shall not be changed by the effective date of such insurance.

The Contractor shall not commence any portion of the work until the Contractor has properly, and in compliance with applicable law, recorded a notice of contract together with any bonds required by the contract documents and a description of the property where the work is to be performed, with the recorder of mortgages for the parish where the work is to be performed, and the contractor has delivered a copy of the recorded notice of contract and bond(s) to the owner bearing the recordation stamp of the public official. The Contractor hereby stipulates and agrees that the Contractor shall be liable unto the owner for any and all costs, expenses, fees and attorney's fees incurred by the owner arising from the failure of the contractor to perform this obligation. The date of commencement of the work shall not be changed by the effective date of such recordation.

Add the following new § 8.2.4 LIQUIDATED DAMAGES:

§ 8.2.4 LIQUIDATED DAMAGES

The Contractor acknowledges that delay caused by the Contractor will damage the Owner and that, in lieu of proof of actual damages, Contractor hereby stipulates and agrees to pay as stipulated damages, and not as a

penalty, the sum as stated in the Owner/Contractor Agreement, or if none stated there or elsewhere, of one thousand five hundred and no/100 dollars ($1500.00) for each consecutive calendar day, Saturdays, Sundays and holidays, which the work is not complete beginning with the first day beyond the completion time provided in the Notice to Proceed or Contract Documents and any proper extension thereof granted by the Owner.

§ 8.3 DELAYS AND EXTENSION OF TIME

Delete 8.3.1 in its entirety and replace with the following:

If the Contractor is delayed at any time in the commencement or progress of the Work by (1) an act or neglect of the Owner or Architect, of an employee of either, or of a Separate Contractor; (2) by changes ordered in the Work; (3) by labor disputes, fire, earthquakes, enemy action, act of god or similar catastrophe, concealed conditions, unusual delay in deliveries not the fault of Contractor or other unusual delays not due to the fault of Contractor or anyone else for whom Contractor is responsible, unavoidable casualties, adverse weather conditions documented in accordance with Section 15.1.6.2, government-ordered work condition restrictions, government-ordered shutdowns, or government-ordered travel restrictions related to COVID-19, or other causes beyond the Contractor's control and the control of anyone else for whom Contractor is responsible; (4) by delay authorized by the Owner pending mediation and binding dispute resolution; or (5) by other causes that the Contractor asserts, and the Architect determines, justify delay, then only to the extent the critical path of the schedule was delayed by the foregoing causes as determined by the Architect, the Contract Time and Contract Sum may be reasonably adjusted pursuant to a written Change Order issued pursuant to the terms of Article 7.2. Any and all claims by the Contractor arising from or connected with delay shall be submitted in strict accordance with this article and Article 15 of the General Conditions.

Delete § 8.3.2 in its entirety and replace with the following new § 8.3.2:

§ 8.3.2 If the progress or completion of the Work is delayed by any fault, neglect, act or failure to act on the part of the Contractor or any one acting for or on behalf of the Contractor, then the Contractor shall, if permitted by applicable laws and Owner's grant or loan programs, in addition to all of the other obligations imposed by this contract and by law upon the contractor, and at no cost or expense to the Owner, work such overtime or require the appropriate sub-contractor(s) to work such overtime as may be necessary to make up for all time lost and to avoid delay in the progress and completion of the work. The "premium" cost of all such overtime work shall be paid by the Contractor.

Add the following new § 8.3.4 and its Subparagraphs:

§ 8.3.4 If adverse weather conditions are the basis for a claim for additional Contract Time, the Contractor shall document that weather conditions had an adverse effect on the scheduled critical path construction activities only. Rain days shall be those of at least .1" of rain over a 24-hour period and shall only be considered for rain events that impact the portion of the day normally or scheduled for work to be performed. Wet days will not be considered, unless the site conditions due solely to a weather event preclude the performance of critical path work. An increase in the Contract Time due to weather, unavailability or delay in delivery of material or equipment, or any force majeure event, shall not be cause for an increase in the Contract Sum.

.1 Adverse weather conditions shall not be considered as a basis of claim for additional Contract Time involving interior work and may not be claimed for normally scheduled holidays or for days or times not normally scheduled for work to be performed.

.2 The following are considered reasonably anticipated days of adverse weather on a monthly basis:

January	11	days	May	5	days	September	11	days
February	10	days	June	6	days	October	11	days
March	8	days	July	11	days	November	11	days
April	7	days	August	11	days	December	11	days

.3 Contract Time is on a consecutive calendar day basis.

.4 The Contractor shall submit to the Architect a written request for total adverse weather days with each application for payment. Failure to submit such request, with supporting documentation, with the Contractor's application for payment shall serve as a knowing and voluntary waiver of any claim for weather related delays for the period of time covered by such application for payment. The Contractor's request for extension of Contract Time due to weather related delays shall only be considered for the number of properly documented and accepted days

over the allowable number of adverse weather days stated above for the total of all months encompassed in the Project duration, including any adjustments to the Contract Time by Change Order. The Contractor stipulates and agrees that it shall not be allowed to make a Claim for additional Contract Time due to weather delays until the date established for Substantial Completion. The Contractor stipulates and agrees that delays caused by any adverse weather conditions shall not entitle the Contractor to claims for cost due to extended project general conditions or overhead.

Add the following new § 8.3.5 and its Subparagraphs:

§ 8.3.5 If COVID-19 is the basis for a claim for additional Contract Time, the Contractor shall document that government orders related to COVID-19 had an adverse effect on the scheduled critical path construction activities. COVID-19 delays shall only be allowed to the extent that government orders directly restrict Contractor's ability to perform critical path work by limiting workers' ability to access or perform work on the site. The provisions of 8.3.4.4 shall apply to applications for COVID-19 delays.

Re-number existing § 8.3.2 as § 8.3.5.

Add the following new § 8.4 after § 8.3:

§ 8.4 CONTRACT TIME

§ 8.4.1 The Contractor shall commence the Work and achieve Substantial Completion as set forth in Article 3 of the Agreement, such period of time constituting the Contract Time.

.2 The Contractor shall achieve Final Completion of the Work within thirty-five (35) days of the date of Substantial Completion. Contractor shall pay as stipulated damages the amount of $1,500.00 (one thousand five hundred dollars) for each consecutive calendar day, including Saturdays, Sundays and holidays, for which the Work is not Finally Complete after such date.

ARTICLE 9 PAYMENTS AND COMPLETION

§ 9.2 SCHEDULE OF VALUES

Delete § 9.2 and substitute the following:

§ 9.2 At the Pre Construction Conference, the Contractor shall submit to the Owner and the Architect a Schedule of Values prepared as follows:

.1 The attached Schedule of Values Format shall be used. If applicable, the cost of work for each section listed under each division, shall be given. The cost for each section shall include labor, materials, overhead and profit.

.2 The Total of all items shall equal the Total Contract Sum. This schedule, when approved by the Architect, shall be used only as a basis for the Contractor's Applications for Payment.

§ 9.3 APPLICATIONS FOR PAYMENT

Delete Subparagraph 9.3.1 and clause 9.3.1.1 and 9.3.1.2 and substitute the following:

§ 9.3.1 Monthly, the Contractor shall submit to the Architect an Application & Certificate for Payment on the AIA Document G702-1992, accompanied by AIA Document G703-1992, and supported by any additional data substantiating the Contractor's right to payment as the Owner or the Architect may require. Application for Payment shall be submitted on or about the first of each month for the value of labor and materials incorporated into the work and of materials, suitably stored, at the site as of the twenty-fifth day of the preceding month, less normal retainage as follows, per R.S.38:2248:

The normal retainage shall not be due the Contractor until after substantial completion and expiration of the forty five day lien period and submission to the Architect of a clear lien certificate and invoice for retainage.

Add the following new Subparagraph 9.3.1.3 to § 9.3.1:

§ 9.3.1.3 Retainage in the amount of ten (10) percent of the total amount earned to date shall be held by the Owner as retainage from each progress payment. Per R.S. § 38:2248, Normal retainage for Projects with a Contract Sum of less than $500,000.00 shall be 10% of the total Contract Sum. Per R.S. § 38:2248 Normal Retainage for Projects with a Contract Sum of $500,000.00 or more shall be 5% of the total Contract Sum.

Delete Subparagraph 9.3.2 and substitute the following:

§ 9.3.2 Unless otherwise provided in the Contract Documents, payments shall be made on account of materials and equipment delivered and suitably stored at the site for subsequent incorporation in the Work. Payments for materials or equipment stored on the site shall be conditioned upon submission by the Contractor of bills of sale or such other procedures satisfactory to the Owner to establish the Owner's title to such materials and equipment or otherwise protect the Owner's interest, including applicable insurance."

Add the following new Subparagraphs 9.3.2.1 through 9.3.2.5 to § 9.3.2:

§ 9.3.2.1 In requesting payment for materials stored on or off the site, the Contractor shall submit with his Application for Payment the following:

.1 an itemized list of the stored material prepared in sufficient detail to identify the materials and their value. Include an accounting for new items stored, paid items that continue in storage, and items previously stored and since incorporated in the Work.

.2 evidence such as bills of sale or such other proof as may be requested by the Architect to substantiate that the materials listed have been paid for by the Contractor, or, for materials stored at the site only, a notarized statement from the materials supplier stating that the materials will become the property of the Owner upon payment by the Owner to the Contractor.

§ 9.3.2.2 For material stored off the site, the Contractor shall additionally submit with his Application for Payment the following:

.1 evidence that the materials are stored at the location previously agreed to in writing as provided by Subparagraph 9.3.2 of the General Conditions. No payment will be made for material stored off the site until the storage location has been agreed upon in writing.

.2 evidence that the storage location and the subject materials are secured in a manner satisfactory to the Architect.

.3 evidence that the materials are insured while in storage and while in transit to the site.

.4 evidence that transportation to the site will be provided by the Contractor.

§ 9.3.2.3 Stored materials may be reviewed in their storage location by the Architect.

§ 9.3.2.4 Contractor shall reimburse the Owner for the Architect's cost for inspections of off-site stored materials, to include his Time (travel, site observation, and office-related duties) per the hourly rate established by the fee/rate schedule attachment to Owner-Architect Agreement), the cost for Engineering Consultants if their services are needed, and will also include travel expenses at IRS approved travel expense rate for travel to/from the off-site storage location. In no case will the charges be less than the minimum set at $500.00 per inspection.

Add the following new § 9.3.4:

§ 9.3.4 The Owner reserves the right to require the Contractor, all subcontractors, laborers and material suppliers to provide lien releases at any time. The Owner reserves the right to withhold progress payments until such lien releases are received for all work for which prior progress payments have been made. Upon the Owner's Demand for lien releases (either verbally or written), the Contractor, all subcontractors and material or equipment suppliers shall provide such releases with every payment request until Final Acceptance of the Project.

§ 9.5 DECISIONS TO WITHHOLD CERTIFICATION

Add the following after the 2md sentence in 9.5.1:

To the extent the Architect fails to certify the entire amount of the pay application, the Architect shall provide the Contractor with written notification, within seven (7) days, detailing all reasons why the Architect is not certifying the Contractor's pay application.

Delete Subparagraphs 9.5.1.1 through 9.5.1.7 in their entirety and replace with following Subparagraphs 9.5.1.1 through 9.5.1.9:

.1 defective Work not remedied;
.2 third party claims filed in the amount of 125% of the claim or reasonable evidence indicating probable filing of such claims unless security acceptable to the Owner is provided by the Contractor;
.3 failure of the Contractor to make timely payments properly to Subcontractors or for labor, materials or equipment;
.4 reasonable evidence that the Work cannot be completed for the unpaid balance of the Contract Sum;
.5 damage to the Owner or a separate contractor;
.6 reasonable evidence that the Work will not be completed within the Contract Time, and that the unpaid balance would not be adequate to cover actual or liquidated damages for the anticipated delay;
.7 repeated failure(s) to carry out the Work in accordance with the Contract Documents;
.8 the value of the Punch List; and/or
.9 rejection(s) of any part of the Work by any governmental authority having jurisdiction over the Project.

§ 9.6 PROGRESS PAYMENTS

Delete Subparagraph 9.6.1 and substitute the following:

§ 9.6.1 After the Architect has issued a Certificate for Payment, the Owner shall make payment within twenty days except for projects funded fully or in part by a Federal reimbursement program. For such projects the Owner will make payment in a timely manner consistent with reimbursement.

Add the following new language to the end of **§** 9.6.4:

Pursuant to La. R.S. 38:2242, when the Owner receives any claim of nonpayment arising out of the Contract, the owner shall deduct 125% of such claim from the Contract Sum. The Contractor, or any interested party, may deposit security, in accordance with La. R.S. 38:2242.2, guaranteeing payment of the claim with the re-corder of mortgages of the parish where the Work has been done. When the Owner receives original proof of such guarantee from the recorder of mortgages, the claim deduction will be added back to the Contract Sum.

The Owner shall have the right to issue payments on the Contract Sum in the form of a joint check made payable to the Contractor and other persons or entities performing portions of the Work on behalf of the Contractor.

§ 9.7 FAILURE OF PAYMENT

Delete Paragraph 9.7.

9.8 SUBSTANTIAL COMPLETION

Delete § 9.8.1 through 9.8.5 and substitute the following new sections § 9.8.1 through 9.8.7:

§ 9.8.1 Substantial Completion is the stage in the progress of the Work when the Work is sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work for its intended use. The Architect shall determine if the project is substantially complete in accordance with this Subparagraph.

§ 9.8.2 When the Contractor considers that the Work is Substantially Complete, the Contractor shall prepare and submit to the Architect a comprehensive list of items to be completed or corrected prior to final payment. Failure to include an item on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents.

§ 9.8.3 Upon receipt of the Contractor's list, the Architect will make an inspection to determine whether the Work is substantially complete. A prerequisite to the work being accepted as substantially complete, is the Owner's receipt of the executed Roofing Contractor's and Roofing Manufacturer's guarantees, where roofing work is part of the Contract. Prior to inspection by the Architect, the Contractor shall notify the Architect that the project is ready for inspection by the State Fire Marshal's office or other Authority Having Jurisdiction. If the Architect's inspection discloses any item, whether or not included on the Contractor's list, which is not sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work for its intended use,

the Contractor shall, before acceptance of the work as Substantially Complete, complete or correct such item upon notification by the Architect. In such case, the Contractor shall then submit a request for another inspection by the Architect to determine Substantial Completion.

§ 9.8.4 When the Architect determines that the project is Substantially Complete, he shall prepare a "punch list" of exceptions and the dollar value related thereto. The monetary value assigned to this list will be the sum of the cost estimate for each particular item of work the Architect develops based on the mobilization, labor, material and equipment costs of correcting the item and shall be retained from the monies owed the contractor, above and beyond the standard lien retainage. The cost of these items shall be prepared in the same format as the schedule of values. At the end of the 45 day lien period payment shall be approved for all punch list items completed up to that time. After that payment, none of the remaining funds shall be due the contractor until all punch list items are completed and are accepted by the Architect. If the dollar value of the punch list exceeds the amount of funds, less the retainage amount, in the remaining balance of the Contract, then the Project shall not be accepted as substantially complete. If funds remaining are less that that required to complete the work, the Contractor shall pay the difference.

§ 9.8.5 When the "punch list" is complete the Architect shall prepare a Recommendation of Acceptance" incorporating the punch list and submit it to the Owner. Upon approval of the Recommendation the Recommendation of Acceptance, the Owner may issue a Notice of Acceptance of Building Contract which shall establish the Date of Substantial Completion. The Contractor will record the Notice of Acceptance with the Clerk of Court in the Parish or County in which the work has been performed. If the Notice of Acceptance has not been recorded seven (7) days after issuance, the owner may record the acceptance at the Contractor's expense.

§ 9.8.6 Warranties required by the Contract Documents shall commence on the date of Substantial Completion of the Work unless otherwise agreed to in writing by the Owner and Contractor. Unless otherwise agreed to in writing by the Owner and Contractor, security, maintenance, heat, utilities, damage to the Work not covered by the punch list and insurance shall become the Owner's responsibility on the Date of Substantial Completion.

§ 9.8.7 If all punch list items have not been completed by the end of the forty-five (45) day lien period, through no fault of the Architect or Owner, the Owner may hold the Contractor in default. If the Owner finds the Contractor is in default, the Surety shall be notified. If within forty-five (45) days after notification, the Surety has not completed the punch list, through no fault of the Architect or Owner, the Owner may, at his option, contract to have the balance of the work completed and pay for such work with the unpaid funds remaining in the Contract sum. Finding the Contractor in default shall constitute a reason for disqualification of the Contractor from bidding on future state contracts. If the surety fails to complete the punch list within the stipulated time period, the Owner may not accept bonds submitted, in the future, by the surety.

§ 9.9 PARTIAL OCCUPANCY OR USE

Delete § 9.9.1 in its entirety and replace with the following new § 9.9.1:

§ 9.9.1 The Owner may occupy or use any completed or partially completed portion of the Work at any stage when such portion is designated by the Architect, provided such occupancy or use is authorized by public authorities having jurisdiction over the Work, and the Contractor has been provided ten (10) days prior written notice to enable the Contractor to fully document conditions prior to occupancy or use of the completed or partially completed portion of the Work. Such partial occupancy or use may commence whether or not the portion is substantially complete. Any partial occupancy or use of the Work by the Owner shall not relieve the Contractor of any obligation under the Contract Documents except an obligation to provide property casualty insurance for the specific portion of the Work upon the occupancy or use of that portion of the Work by the Owner. The stage of the progress of the Work for any portion to be occupied or used by the Owner shall be determined by decision of the Architect, but Contractor may assert a Claim if it disagrees.

§ 9.10 FINAL COMPLETION AND FINAL PAYMENT

Add the following new language after the second sentence of § 9.10.1:

If the Architect does not find the work acceptable under the Contract Documents, the Architect shall make two additional inspection; if the work is still not acceptable, the Architect, and each of the Architect's principal consultants, shall be paid $150.00/hour for their time at the project site, for each additional inspection, to be withheld from the unpaid funds remaining in the Contract sum. The payment shall be made by the owner and deducted

from the construction contract funds. Contractor shall not be responsible for additional inspections occasioned by the negligence or omission of any party other than Contractor.

Add the following new Subparagraph 9.10.2.1 to § 9.10.2:

9.10.2.1 Except with the consent of the Owner, the Architect will perform no more than two (2) inspection to determine whether the Work or a designated portion thereof has attained Final Completion in accordance with the Contract Documents. The Owner shall be entitled to deduct from the Contract Sum amount paid to the Architect for all additional inspections, including normally reimbursable expenses, and all other costs, expenses and fees incurred by the Owner. Contractor shall not be responsible for additional inspections occasioned by the negligence or omission of any party other than Contractor.

Add the following new Subparagraph 9.10.3.1 to § 9.10.3:

9.10.3.1 Owner's Option Final Payment: If at the time final completion is scheduled there are remaining uncompleted items, the contract may be closed and contract closeout completed, an amount equal to 200 percent of the value of each items as determined by the Architect shall be withheld for these items, as value to the Owner to provide for the Owner's completion of the work and related costs for Owner's and Architect's additional services.

Add the following new Subparagraphs .4, .5, and .6 to § 9.10.4:

.4 Claims for Indemnification;
.5 Claims about which the Owner has given the Contractor written notice;
.6 Claims arising after final payment.

Add the following to § 9.10.4:

The failure of the Architect to identify any failure to perform by the Contractor in accordance with the Contract Documents, shall not serve as a waiver of any Owner rights nor relieve the Contractor of any responsibility to perform the Work in strict accordance with the Contract Documents, despite the Architect's signature on a Final Application or Certification for Payment, or on any recommendation of final acceptance.

Delete § 9.10.5 in its entirety and replace with the following new § 9.10.5:

§ 9.10.5 Acceptance of Final Payment by the Contractor, a subcontractor or material supplier shall constitute a knowing and voluntary forfeiture of any and all claims by that payee except those claims which are specifically identified in writing by that payee on the Final Application for Payment document.

Add the following new § 9.10.6:

9.10.6 In response to Federal Arbitrage regulations: If such compliance has not been effected within 90 days of the date of acceptance, the contract shall be terminated and no further opportunity will be granted the Contractor and no further payments will be made on this contract.

Add the following new § 9.11:

§ 9.11 COSTS FOR ADDITIONAL INSPECTIONS

The Architect's costs for additional inspections will include his Time (Travel, Site Visitation and Office) at the rate established in the fee/rate schedule attachment to the Owner-Architect Agreement, the cost for Engineering Consultants if their services are needed, including their travel expenses at IRS approved Travel Expense Rate to/from the Project site. In no case will the charges be less than the minimum set at $500.00 per inspection. Contractor shall not be responsible for additional inspections occasioned by the negligence or omission of any party other than Contractor.

ARTICLE 10 PROTECTION OF PERSONS AND PROPERTY

§ 10.2 SAFETY OF PERSONS AND PROPERTY

10.2.2, In the first sentence, between the words "bearing on" and "safety", add the words "the health and".

Add the following new Subparagraph 10.2.2.1 after § 10.2.2:

10.2.2.1 In the event that review, inspection or other action by regulatory agencies or other parties results in the imposition of fines, fees, or other costs due to the failure of the Contractor to comply with said applicable laws, ordinances, rules, regulations and lawful orders, the Contractor shall hold harmless the Owner, the Architect, Architect's consultants and Owner's separate consultants and contractors, if any, from all consequences arising from the Contractor's noncompliance.

10.3 HAZARDOUS MATERIALS

In the first sentence of §10.3.1 add the following:

after "(PCB)" add "or lead"

Delete Subparagraph 10.3.3.

§ 10.4 EMERGENCIES

Delete Subparagraph 10.4 and substitute the following:

10.6.14 In an emergency affecting the safety of persons or property, the Contractor shall notify the Owner and Architect immediately of the emergency, simultaneously acting at his discretion to prevent damage, injury, or loss. Any additional compensation or extension of time claimed by the Contractor on account of emergency work shall be determined as provided in Article 4.3 15 and Article 7.

Add the following language to the end of § 10.4:

Nothing in this paragraph shall be construed as relieving the Contractor from sole responsibility for the costs, effect on the Project schedule and responsibility for emergencies covered hereby, which arise from any matter within the contractual responsibility of the Contractor and its control of the property.

Add the following new § 11.3.3:

§ 11.3.11 STATUTORY EMPLOYER STATUS: Pursuant to the directive of Act 315 of the 1997 Louisiana Regular Session regarding guidelines for determining statutory employer status under La R.S. 23:1061, effective June 17, 1997, and in consideration thereof:

.1 Owner and Contractor jointly agree, stipulate and recognize that Owner shall be the Statutory Employer pursuant to R.S. 23:1061 of any and all of the Contractor's employees and/or employees of any subcontractor hired or retained in any manner by Contractor while Contractor's employees and/or subcontractor's employees are performing any work and all work and/or any services under the contract between Owner and Contractor.

.2 Owner and Contractor further stipulate, agree and recognize that all work performed under the contract between Owner and Contractor shall be considered part of Owner's trade, business or occupation and shall be specifically considered an integral part of and essential to the ability of Owner to generate goods, products or services as a private business entity.

.3 Owner and Contractor further stipulate, agree and recognize that the services or work provided by any subcontractor hired or retained by Contractor for the performance of any work and/or services under this contract shall be contemplated by and included in this contract.

Add the following new § 11.6 and subparagraphs:

§11.4.10 RECORDATION OF CONTRACT AND BOND (LA. R.S. 38:2241A (2))

The Contractor shall record. within thirty (30) days of Commencement of the Work, the Contract Between Owner and Contractor and the Performance and Payment Bonds with the Clerk of Court in the Parish in which the work is to be performed. The Contractor shall provide written evidence of such recordation to the Owner. Should the Contractor fail to do so, the Owner may do so at the Contractor's expense.

§11.4.11 RECORDATION OF CERTAIN CHANGE ORDERS (LA. R.S. 38:22221)

The Contractor SHALL record EACH change order to the Contract Between Owner and Contractor or to a contract for materials and supplies that meets the following criteria. The change order:

(1) adds an amount of ten percent or more of the original contract amount, AND

(2) the additional amount is at least ten thousand dollars.

Additionally. the Contractor SHALL record ALL change orders to the Contract Between Owner and Contractor or to a contract for material and supplies that meet the following criteria. ALL change orders which:

(1) aggregate to an amount of twenty percent or more of the original contract amount, AND
(2) the additional amount is at least ten thousand dollars.

IF NOT PREVIOUSLY RECORDED. THE ORIGINAL CONTRACT BETWEEN OWNER AND CONTRACTOR SHALL BE RECORDED TOGETHER WITH THE CHANGE ORDERS. THE CHANGE ORDER OR ORDERS SHALL BE RECORDED IN THE OFFICE OF THE RECORDER OF MORTGAGES IN THE PARISH WHERE THE WORK IS TO BE DONE OR, IF NOT A PUBLIC WORK, IN THE OFFICE OF THE RECORDER OF MORTGAGES WHERE THE ENTITY IS DOMICILED. THE CHANGE ORDER MUST BE RECORDED NOT LATER THAN THIRTY (30) DAYS AFTER THE DATE OF THE CHANGE ORDER WHICH REQUIRES THAT THE RECORDATION TAKE PLACE.ARTICLE 12 UNCOVERING AND CORRECTION OF WORK

§ 12.2 CORRECTION OF WORK

Delete the language “one-year” from Subparagraph 12.2.2.2.

Delete Subparagraph 12.2.2.3 in its entirety and replace with the following Subparagraph 12.2.2.3:

12.2.2.3 The period for correction of Work shall be extended for any portion of the Work corrected or performed by the Contractor for an additional one (1) year from the date that the corrective Work was completed in accordance with the Contract Documents as determined by the Architect.

Add new Subparagraph 12.2.2.4 to § 12.2.2:

12.2.2.4 Upon request by the Owner and prior to the expiration of one year from the date of Substantial Completion, the Architect will conduct, and the Contractor shall attend a meeting with the Owner to review the facility operations and performance of the Work of the Contractor. Subsequent to the meeting, the Owner shall provide the Contractor, with a copy to the Architect, a list of items found not to be not in accordance with the Contract, including latent defects. The Contractor shall correct all items within thirty (30) consecutive calendar days from the date of receipt of the Owner’s list. If certain corrective work requires additional time to complete, the Contractor shall provide the Owner with a schedule to complete the work within a reasonable duration thereafter.

§ 12.3 ACCEPTANCE OF NONCONFORMING WORK

Add the following new language to the end of § 12.3:

The acceptance of nonconforming Work by the Owner shall be by written Change Order or Construction Change Directive, signed by the Owner's authorized representative. No person has authority to accept nonconforming work except the Owner.

ARTICLE 13 MISCELLANEOUS PROVISIONS

13.2 SUCCESSORS AND ASSIGNS

In the second sentence of Subparagraph 13.2.1, delete "Except as.....13.2.2"

Add the following clause 13.3.3

13.3.3 The Judicial Court in and for the Parish of Orleans, State of Louisiana shall have sole jurisdiction and venue in any action brought under this contract.

13.5 TESTS AND INSPECTIONS

In Subparagraph 13.5.1 delete the second sentence and substitute the following:

The Contractor shall make arrangements for such tests, inspections and approvals with the Testing Laboratory provided by the Owner, and the Owner shall bear all related costs of tests, inspections and approvals."

Delete the last sentence of Subparagraph 13.5.1.

13.6 INTEREST

Delete Paragraph 13.6.

Add the following new § 13.6 through § 13.9:

§ 13.6 PROJECT RECORDS
For a negotiated or cost of the work plus fee contract, upon written request from the Owner, the Contractor shall, within ten (10) calendar days, provide access to the Owner of all of the Contractor's Work related papers including, but not limited to, all financial records reflecting payments made for any labor, materials, equipment or supplies.

§ 13.8 WRITING REQUIRED TO WAIVE RIGHTS
Contractor stipulates and agrees that actions, inactions or conduct alone, which may be deemed or interpreted as inconsistent with rights afforded the Owner, shall not be interpreted as a waiver of such rights absent an express writing signed by the Owner to that effect.

§ 13.89 NO THIRD PARTY BENEFICIARIES
There are no third party beneficiaries to this Contract. The Owner and Contractor stipulate and agree that they, as the contracting parties, do not intend to bestow any benefit, direct or indirect, upon any other person or entity.

ARTICLE 14 TERMINATION OR SUSPENSION OF THE CONTRACT

§ 14.1 TERMINATION BY THE CONTRACTOR

Delete clause 14.1.1.4.

§ 14.2 TERMINATION BY THE OWNER FOR CAUSE

Add the following at the beginning of 14.2.1: "After providing the Contractor a fourteen (14) day written notice and an opportunity to cure, and the in the event the Contractor fails to cure or commence a cure"

In 14.2.2: delete the phrase "seven day's notice" and replace with fourteen (14) days' notice and providing Contractor with an opportunity to cure"

In Subparagraph 14.2.1.3, after the semicolon, delete the word "or", delete subparagraph 14.2.1.4 in its entirety and replace with the following new Subparagraphs 14.2.1.4 and 14.2.1.5:

.4 otherwise is guilty of substantial breach of a provision of the Contract Documents; or

.5 failure to complete the punch list or list of deficiencies as developed by either the Contractor or the Architect in connection with Substantial Completion within thirty days following the date designated by the Architect as the date of Substantial Completion.

In the first sentence of § 14.2.2, delete the language: ", upon certification by the initial decision maker that sufficient cause exists to justify such action,"

Add the following new language to the end of § 14.2.3:

The Contractor shall be liable to, and shall pay, the Owner all costs, expenses, fees and attorney's fees and expenses arising from the Owner's termination of the Contractor for cause upon a final determination through the binding resolution procedure that the Owner was entitled to terminate the Contractor for cause as provided under the Contract Documents.

Add the following new § 14.2.5:

§ 14.2.5 Termination by the Owner for cause will not relieve the Contractor or the Surety of any obligation under any liquidated damages or stipulated damages provision of the Contract Documents.

Delete § 14.4.3 in its entirety and replace with the following new § 14.4.3:

§ 14.4.3 Notwithstanding any other provisions in any of the Contract Documents, in case of such termination for the Owner's convenience, the Contractor shall only be entitled to receive payment for Work executed.

ARTICLE 15 CLAIMS AND DISPUTES

§ 15.1. CLAIMS

Add the following to the end of § 15.1.1:

A "Reservation of Rights" and similar stipulations shall not be recognized under this contract as having any effect. A party must make a claim as defined herein within the time limits provided.

§ 15.1.2.1 NOTICE OF CLAIMS

Add the following new language to the end of § 15.1.2.1:

Contractor stipulates and agrees that any such failure to provide timely notification will prejudice the Owner by depriving the Owner of an opportunity to make adjustments to the project budget or schedule. Failure to provide such notice shall serve as a knowing and voluntary forfeiture of any claim by the Contractor, and the Contractor shall be liable for and pay all costs, damages and attorney's fees incurred by the Owner arising from the Contractor's failure to provide timely notice.

§ 15.1.5 CLAIMS FOR ADDITIONAL TIME

Delete paragraph 15.1.5.2 and replace with the following new paragraph 15.1.5.2

15.1.6.2 Claims for increases in the Contract Time shall set forth in detail the circumstances that form the basis for the Claim, the date upon which each cause of delay began to affect the progress of the Work, the date upon which each cause of delay ceased to affect the progress of the Work, and the number of days' increase in the Contract Time claimed as a consequence of each such cause of delay. The Contractor shall provide such supporting documentation as the Owner may require including, when appropriate or upon request of the Owner or Architect, a revised construction scheduled indicating all the activities affected by the circumstances forming the basis of the Claim.

Add the following new Subparagraphs 15.1.6.3 and 15.1.6.4 after Subparagraph 15.1.6.2:

15.1.6.3 The Contractor shall not be entitled to a separate increase in the Contract Time for each one of the number of causes of delay which may have concurrent or interrelated effects on the progress of the Work, or for concurrent delays due to the fault of the Contractor, or for delays not affecting tasks not identified to be on the critical path affecting the date of completion of the Work on the initial project schedule.

15.1.6.4 The Contractor has the option to purchase such insurance and riders to his insurance (Inland Marine Floater policies to Builders Risk Insurance to cover the following potential losses: Theft, Business Interruption, Extra Expense, Installation, Contractors Equipment) as he deems prudent to cover possible losses due to acts of God (force majeure) including loss of income and financial damages due to loss of income caused by delays in construction from a covered peril. This option shall be the Contractor's sole remedy for damages not a result of Owner, Architect, Contractor or their agents' actions, omissions, or failures to take action.

§ 15.1.6 WAIVER OF CLAIMS FOR CONSEQUENTIAL DAMAGE

Delete § 15.1.6 in its entirety.

§ 15.2 INITIAL DECISION

In section § 15.2.2, in the 1st line, add the word "business" between the words "ten" and "days".

In section § 15.2.4, in the 2nd line, add the word "business" between the words "ten" and "days".

Add § 15.2.9 and its Subparagraphs as follows:

§ 15.2.9 Alternative Dispute Resolution: If a dispute occurs between the Owner and Contractor arising out of or relating to the contract or an alleged breach thereof, the Owner and Contractor agree to attempt to resolve the dispute by engaging in good faith negotiations. If the dispute cannot be resolved by negotiation, the Owner and the Contractor agree as a condition precedent to commencing a lawsuit to submit the dispute to the following methods of alternative dispute resolution:

.1 Mediation: pursuant to Constructions Rules of the American Arbitration Association, prior to pursing arbitration.

.2 Arbitration: pursuant to the Arbitration Rules of the American Arbitration Association.

.3 The award rendered by the arbitrator or arbitrators shall be final unless a party thereto gives written notice of its objection to the final award by arbitration within twenty (20) days from receipt of said decision. Upon giving of said notice the party objecting thereto may file suit concerning the dispute as if no arbitration had ever occurred.

§ 15.3 MEDIATION

Delete § 15.3.1 in its entirety and replace with the following § 15.3.1:

§ 15.3.1 Claims, disputes, or other matters in controversy arising out of, or related to the Contract Documents or the Work, except those previously waived, shall be subject to mediation as a condition precedent to binding dispute resolution.

§ 15.4 ARBITRATION

Delete § 15.4 in its entirety and strike any and all references to arbitration wherever they may appear anywhere in the Contract Documents and replace with the following § 15.4:

Add the following as Article 16:

ARTICLE 16 EQUAL OPPORTUNITY

§ 16.1 The Contractor and all Subcontractors shall not discriminate against any employee or applicant for employment because of race, religion, color, sex or national origin. The Contractor shall take affirmative action to ensure that applicants are employed, and that employees are treated during employment without regard to their race, religion, color, sex, or national origin. Such action shall include, but not be limited to the following: employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. The Contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices setting forth the policies of nondiscrimination.

§ 16.2 The Contractor and all Subcontractors shall, in all solicitations or advertisement for employees placed by them or on their behalf, state that all qualified applicants will receive consideration for employment without regard to race, religion, color, sex or national origin.

Add the following as Article 17:

ARTICLE 17 OTHER COMPLIANCE

§ 17.1 Contractor shall comply with 24 CFR Section 570.603, and the requirements of the Secretary of Labor in accordance with the Davis-Bacon Act (40 U.S.C. §3141 et. seq.) and maintain documentation and records which demonstrate compliance with hour and wage requirements, including contract provisions and payroll records and will further provide a certificate of compliance with the foregoing upon request. Contractor shall comply with the requirements set forth in 24 CFR Section 570.613 regarding eligibility restrictions for certain resident aliens and the Fair Housing Act (42 U.S.C. §§3601-3620) and Executive Order 11063, as amended by Executive Order 12259 (Equal Opportunity in Housing) and implementing regulations in 24 CFR Part 107 and keep all records demonstrating compliance with the foregoing for at least five (5) years. Contractor shall comply with the Historic

Preservation requirements set forth in the National Historic Preservation Act of 1966, as amended (16 U.S.C. §470) and the procedures set forth in 36 CFR Part 800, Advisory Council on Historic Preservation Procedures for Protection of Historic Properties, insofar as they apply to the Project and the Property. Contractor shall comply with the conflict of interest provisions contained in 24 CFR Section 570.611, Section 84.42 and Section 85.36, as applicable. Contractor agrees to comply with all CBDG Program requirements, HUD regulations and the provisions of 24 CFR Part 570 and Chapter 15 of Title 42 of the Louisiana Revised Statutes (R.S. 42:1101 et seq., Code of Governmental Ethics) as well as all federal, state, and local regulations, policies, guidelines and requirements, as they relate to the application, acceptance and use of state and federal funds. Contractor shall comply with the Drug-Free Workplace Act of 1988, as amended and with 24 CFR part 21. Contractor shall insure recognition of the role of the Office of Community Development, the Louisiana Recovery Authority, and the U.S. Department of Housing and Urban Development in providing services through this Agreement and in all publications made possible with federal funds. The Contractor shall provide the Owner and Architect and Owner's lender's representatives with access to the Work in preparation and progress wherever located. Contractor shall execute Exhibit D, Contractor Limited Statement of Assurances.

END OF DOCUMENT 00 73 00

PERFORMANCE AND PAYMENT BOND

This agreement entered into this _____day of _____ , 20____, by _____, hereinafter called the "Contractor", whose business address is _____, and YWCA Greater New Orleans., herein represented by the contracting officer executing this contract, hereinafter called the "Owner".

Witnesseth that the Contractor and the Owner, in consideration of premises and the mutual covenants; consideration and agreement herein contained, agree as follows:

Statement of Work: The contractor shall furnish all labor and materials and perform all of the work required to build, construct and complete in a thorough and workmanlike manner:

in strict accordance with Contract Documents prepared by: Trapolin Peer Architects & _____

It is recognized by the parties herein that said Contract Documents including by way of example and not of limitation, the Drawings and Specifications dated _____ , Addenda number(s) _____, the Instruction to Bidders, Bid Form, General Conditions, Supplementary Conditions, any Addenda thereto, impose duties and obligations upon the parties herein, and said parties thereby agree that they shall be bound by said duties and obligations. For these purposes, all of the provisions contained in the aforementioned Construction Documents are incorporated herein by reference with the same force and effect as though said Construction Documents were herein set out in full.

Time for Completion: The work shall be commenced on a date to be specified in a written order of the Owner and shall be substantially completed by _____.

Liquidated Damages: Contractor shall be assessed Liquidated Damages in the amount of $1,500.00 per day for each consecutive calendar day which work is not complete beginning with the first day beyond the completion time.

Compensation to be paid to the Contractor: The Owner will pay and the Contractor will accept in full consideration for the performance of the contract the sum of _____Dollars, ($ _____) which sum represents the Base Bid.

Performance and Payment Bond: To these presents personally came and intervened _____, herein acting for _____, a corporation organized and existing under the laws of the State of _____, and duly authorized to transact business in the State of Louisiana, as Surety, who declared that having taken cognizance of this contract and of the Construction Documents mentioned herein, he hereby in his capacity as its Attorney in Fact obligates his said company, as Surety for the said Contractor, unto the said Owner, up to the sum of _____. By issuance of this bond, the Surety acknowledges they are in compliance with R.S. 38:2219 and Article 8 of the Instructions to Bidders.

The condition of this performance and payment bond shall be that should the Contractor herein not perform the contract in accordance with the terms and conditions hereof, or should said Contractor not fully indemnify and save harmless the Owner, from all cost and damages which he may suffer by said Contractor's non-performance or should said Contractor not pay all persons who have and fulfill obligations to perform labor and/or furnish materials in the prosecution of the work provided for herein, including by way of example workmen, laborers, mechanics, and furnishers of materials, machinery, equipment and fixtures, then said Surety agrees and is bound to so perform the contract and make said payment(s).

Provided, that any alterations which may be made in the terms of the contract or in the work to be done under it, or the giving by the Owner of any extensions of time for the performance of the contract, or any other forbearance on the part of either the Owner or the Contractor to the other shall not in any way release the Contractor or the Surety from their liability hereunder, notice to the Surety of any such alterations, extensions or other forbearance being hereby waived.

The Contractor agrees to abide by the requirements of the following as applicable: Title VI and VII of the Civil Rights Act of 1964, as amended by the Equal Opportunity Act of 1972, Federal Executive Order 11246, the Federal Rehabilitation Act of 1973, as amended, the Vietnam Era Veteran's Readjustment Assistance Act of 1974, Title IX of the Education Amendments of 1972, the Age Act of 1972, and contractor agrees to abide by the requirements of the Americans with Disabilities Act of [2010?].

Contractor agrees not to discriminate in its employment practices, and will render services under this contract without regard to race, color, religion, sex, national origin, veteran status, political affiliation, disabilities, or in accordance with EWE 92-7 because of an individual's sexual orientation.

Any act of discrimination committed by Contractor, or failure to comply with these statutory obligations when applicable shall be grounds for termination of this contract.

In Witness whereof, the parties hereto on the day and year first above written have executed this agreement in seven (7) counterparts, each of which shall, without proof or accountancy for the other counterparts, be deemed an original thereof.

WITNESSES:

_____

_____

_____

_____

_____

_____

YWCA GREATER NEW ORLEANS.
PRESIDENT
BY: _____
Loyce Pierce Wright

BY: _____
SURETY:

_____

BY: _____
ATTORNEY IN FACT

_____

_____
ADDRESS

_____

STATE OF LOUISIANA
PARISH OF ORLEANS

PROJECT: **YWCA Greater New Orleans**
LOCATION: **(aka601 S. Jefferson Davis Parkway)**
601 Norman C. Francis Parkway
New Orleans, LA 70119

NON-COLLUSION AFFIDAVIT

Before me, the undersigned authority, duly commissioned and qualified within and for the State and Parish aforesaid, personally came and appeared _____ representing _____ who, being by me first duly sworn deposed and said that he has read this affidavit and does hereby agree under oath to comply with all provisions herein as follows:

PART I.

Section 2224 of Part II of Chapter 10 of Title 38 of the Louisiana Revised Statutes, as amended.

(1) That affiant employed no person, corporation, firm, association, or other organization, either directly or indirectly, to secure the public contract under which he received payment, other than persons regularly employed by the affiant whose services in connection with the construction, alteration or demolition of the public building or project or in securing the public contract were in the regular course of their duties for affiant; and

(2) That no part of the Contract price received by affiant was paid or will be paid to any person, corporation, firm, association, or other organization for soliciting the Contract, other than the payment of their normal compensation to persons regularly employed by the affiant whose services in connection with the construction, alteration or demolition of the public building or project were in the regular course of their duties for affiant.

PART II.

Section 2190 of Part I of Chapter 10 of Title 38 of the Louisiana Revised Statutes, as amended.

That affiant, if an architect or engineer, or representative thereof, does not own a substantial financial interest, either directly or indirectly, in any corporation, firm, partnership, or other organization which supplies materials for the construction of a public work when the architect or engineer has performed architectural or engineering services, either directly or indirectly, in connection with the public work for which the materials are being supplied.

For the purposes of this Section, a "substantial financial interest" shall exclude any interest in stock being traded on the American Stock Exchange or the New York Stock Exchange.

That affiant, if subject to the provisions of this section, does hereby agree to be subject to the penalties involved for the violation of this section.

_____
AFFIANT

SWORN TO AND SUBSCRIBED BEFORE ME THIS _____ DAY OF _____, 20____

_____
NOTARY

YWCA Greater New Orleans

STATE OF LOUISIANA
PARISH OF ORLEANS

ATTESTATIONS AFFIDAVIT

Before me, the undersigned notary public, duly commissioned and qualified in and for the parish and state aforesaid, personally came and appeared Affiant, who after being duly sworn, attested as follows:

LA. R.S. 38:2227 PAST CRIMINAL CONVICTIONS OF BIDDERS

A. No sole proprietor or individual partner, incorporator, director, manager, officer, organizer, or member who has a minimum of a ten percent (10%) ownership in the bidding entity named below has been convicted of, or has entered a plea of guilty or nolo contendere to any of the following state crimes or equivalent federal crimes:

(a) Public bribery (R.S. 14:118)
(b) Corrupt influencing (R.S. 14:120)
(c) Extortion (R.S. 14:66)
(d) Money laundering (R.S. 14:23)

B. Within the past five years from the project bid date, no sole proprietor or individual partner, incorporator, director, manager, officer, organizer, or member who has a minimum of a ten percent (10%) ownership in the bidding entity named below has been convicted of, or has entered a plea of guilty or nolo contendere to any of the following state crimes or equivalent federal crimes, during the solicitation or execution of a contract or bid awarded pursuant to the provisions of Chapter 10 of Title 38 of the Louisiana Revised Statutes:

(a) Theft (R.S. 14:67)
(b) Identity Theft (R.S. 14:67.16)
(c) Theft of a business record (R.S.14:67.20)
(d) False accounting (R.S. 14:70)
(e) Issuing worthless checks
(f) Bank fraud (R.S. 14:71.1)
(g) Forgery (R.S. 14:72)
(h) Contractors; misapplication of payments (R.S. 14:202)
(i) Malfeasance in office (R.S. 14:134)

LA. R.S. 38:2212.10 Verification of Employees

A. At the time of bidding, Appearer is registered and participates in a status verification system to verify that all new hires in the state of Louisiana are legal citizens of the United States or are legal aliens.

B. If awarded the contract, Appearer shall continue, during the term of the contract, to utilize a status verification system to verify the legal status of all new employees in the state of Louisiana.

C. If awarded the contract, Appearer shall require all subcontractors to submit to it a sworn affidavit verifying compliance with Paragraphs (A) and (B) of this Subsection.

LA. R.S. 23:1726(B) Certification Regarding Unpaid Workers Compensation Insurance

A. R.S. 23:1726 prohibits any entity against whom an assessment under Part X of Chapter 11 of Title 23 of the Louisiana Revised Statutes of 1950 (Alternative Collection Procedures & Assessments) is in effect, and whose right to appeal that assessment is exhausted, from submitting a bid or proposal for or obtaining any contract pursuant to Chapter 10 of Title 38 of the Louisiana Revised Statutes of 1950 and Chapters 16 and 17 of Title 39 of the Louisiana Revised Statutes of 1950.

B. By signing this bid /proposal, Affiant certifies that no such assessment is in effect against the bidding / proposing entity.

DATE: _____, 2023

NAME OF BIDDER: _____

NAME OF AUTHORIZED SIGNATORY OF BIDDER: _____

TITLE OF AUTHORIZED SIGNATORY OF BIDDER: _____

SIGNATURE OF AUTHORIZED SIGNATORY OF BIDDER/AFFIANT: _____

Sworn to and subscribed before me by Affiant on the _____day of _____, 2023 .

_____
Notary Public

NOTICE OF CONSTRUCTION CONTRACT

THIS NOTICE OF CONSTRUCTION CONTRACT is by and between **YWCA Greater New Orleans** ("Owner"), and _____ _____ ("Contractor").

1. Pursuant to the provisions of La. R.S. § 9:4801 *et. seq.*, including but not limited to La. R.S. § 9:4811, Owner and Contractor hereby execute this Notice of Construction Contract and shall cause it to be filed in the mortgage office of Orleans Parish, Louisiana.

2. Owner and Contractor have entered into a written contract dated as of this _____ day of _____, 20___, for the project known as **YWCA Greater New Orleans** (the "Project"), pursuant to the terms and conditions of which Contractor shall perform the work described therein on the real property with the municipal address of **601-605 Norman C. Francis Parkway** (**aka 601 S. Jefferson Davis Parkway), New Orleans, LA 70119**, and as more fully described in Exhibit "A" attached hereto.

3. The work to be done by Contractor consists generally of providing all of the materials and products and all of the labor and services necessary for the design and construction of the improvements of the Project.

4. The price of the services and work to be performed by Contractor is _____ ($_____).

5. Payment of the price of the work by Owner to Contractor shall be made in progress payments during the term of the contract with final payment to be made upon completion and acceptance of the work.

6. The mailing addresses of Owner and Contractor, respectively, are as follows:

Owner: **YWCA Greater New Orleans**

601-605 Norman C. Francis Parkway
(Aka 601-605 S. Jefferson Davis Parkway)
New Orleans, LA 70119

Contractor: _____
_____
_____

7. Payment and Performance Bonds are attached as Exhibit "B" and made a part hereof.

Executed as of the _____ day of _____, 20___.

OWNER:

_____

BY: _____
(Printed Name of Owner)

TITLE: _____

CONTRACTOR:

_____

BY: _____
(Printed Name of Contractor)

TITLE: _____

❖ **FOR RECORDATION** ❖

STATE OF LOUISIANA
PARISH OF ORLEANS

NOTICE OF TERMINATION OF WORK

BEFORE ME, the undersigned Notary Public, duly commissioned and qualified in the State and Parish aforesaid, this _____ day of _____, 20____ personally came and appeared _____ as Owner of **YWCA Greater New Orleans**
(Authorized Signatory of Owner)
, whose mailing address is aka **601- 605 Norman C. Francis Parkway (aka 601-605 S. Jefferson Davis Parkway), New Orleans, LA 70119**, appearing herein by and through the undersigned duly authorized representative ("Owner"); and

BEFORE ME, the undersigned Notary Public, duly commissioned and qualified in the State and Parish aforesaid, this _____ day of _____, 20____ personally came and appeared _____ as _____ of
(Authorized Signatory of Contractor) *(Title)*
_____, [a Louisiana limited liability company]
(Name of Construction Company)
whose mailing address is_____,
appearing herein by and through the undersigned duly authorized representative ("Contractor"); who, after being duly sworn, did depose and state the following, to-wit:

1. That Owner is the record owner of the immovable property more particularly described on Exhibit "A" attached hereto (the "Property").

2. Owner and Contractor entered into a construction contract dated _____ _____, 20____, for **YWCA Greater New Orleans** on the Property (the "Work").

3. A Notice of Contract was recorded on _____, 20____, in the Notarial Archives at #_____ and MIN #_____ in the mortgage records of the Orleans Parish Clerk of Court, State of Louisiana. Partial Acceptances were recorded periodically throughout the Project.

4. Owner and Contractor do hereby certify in good faith that the Work being performed on the Property is substantially complete; and in accordance with the provisions of La. R.S. 9:4822 Owner and Contractor do hereby execute this Notice of Termination of Work.

5. All work has been completed.

6. This Notice of Termination of Work may be executed in multiple counterparts; each counterpart shall be deemed an original, but all of which together shall constitute one and the same instrument.

[SIGNATURES ON FOLLOWING PAGE(S)]

❖ **FOR RECORDATION** ❖

Thus done and signed by the Owner effective as of the day and date first set forth hereinabove.

OWNER:

By: _____ its _____
(Title of Owner)

_____
(Printed Name of Owner)

Sworn to and subscribed before me on this _____ day of_____, 20____.

_____
NOTARY PUBLIC

_____
(Printed Name of Notary Public)

Bar Number: _____
Commission: _____

Thus done and signed by the Contractor effective as of the day and date first set forth hereinabove.

CONTRACTOR:

By: _____ its _____
(Title of Owner)

_____
(Printed Name of Contractor)

Sworn to and subscribed before me on this _____ day of_____, 20____.

_____
NOTARY PUBLIC

_____
(Printed Name of Notary Public)

Bar Number: _____
Commission: _____

CONTRACTOR'S CONDITIONAL WAIVER OF LIEN FOR CURRENT PROGRESS PAYMENT and UNCONDITIONAL WAIVER OF LIEN FOR PRIOR PROGRESS PAYMENTS

STATE OF LOUISIANA DATE: _____, 20____
PARISH OF ORLEANS

The Undersigned is a General Contractor, Subcontractor, materialman, or other person furnishing labor, services or materials pursuant to that Contract dated **_____, 20____**, between the **YWCA GreatervNew Orleans** (the "Owner") and _____ (the "Contractor"), for Work performed on the **YWCA Greater New Orleans** in Orleans Parish, Louisiana. Said Contract is for the total amount of

_____ Dollars and no/100 ($.)
(Insert Current Contract Amount in words and figures.)

for Work on the following described Property:

601-605 Norman C. Francis Parkway
(aka 601-605 S. Jefferson Davis Parkway),
Orleans Parish, LA

Contractor submits this Conditional Waiver of Lien Upon Current Progress Payment and Unconditional Waiver of Lien Upon Prior Progress Payments in connection with that Application for Payment dated

_____, 20____ for period ending **_____, 20____**
(Insert Application for Payment date.) *(Insert End date of Payment Period.)*

submitted by Contractor to Owner in the amount of

_____ Dollars and no/100 ($.)
(Insert Application for Payment amount in words and figures.)

In consideration of receipt of the sum of the current Application for Payment,

_____ Dollars and no/100 ($.)
(Insert Application for Payment amount in words and figures.)

the Contractor hereby waives, releases, relinquishes and quitclaims, in favor of Owner and its successors and assigns, and all persons or entities with any legal or equitable interest in the above-referenced Property, any and all right that Contractor has or may have to lien and claim a lien for all work performed and all costs or expenses incurred, including all labor, services and materials furnished, on the above-referenced Property, up to and including the date of this Waiver of Lien, except for the payment of retainage. This Conditional Waiver of Lien for Current Progress Payment is conditioned upon the Owner's payment to the Contractor being paid in good and sufficient funds by the Bank upon which it is drawn to the account of the Contractor. Once said Bank has made such payment, this Waiver of Lien for Current Progress Payment shall become Unconditional.

Contractor hereby attests that all amounts on prior Applications for Payment have been received from the Owner, and are deemed paid in full, such payments totaling

_____ Dollars and no/100 ($.)
(Insert Sum Total of Prior Payments in words and figures.)

as of the date of this Waiver of Lien. In consideration of receipt of these sums, the Contractor hereby

unconditionally waives, releases, relinquishes and quitclaims, in favor of Owner and its successors and assigns, and all persons or entities with any legal or equitable interest in the above-referenced Property, any and all right that Contractor has or may have to lien and claim a lien for all work performed and all costs or expenses incurred, including all labor, services and materials furnished, on the above-referenced Property, up to and including the date of this Waiver of Lien, except for the payment of retainage.

Undersigned does hereby attest that he/she is duly authorized to act on behalf of the Contractor, and further does hereby certify that every performance of labor and/or items of material for which the Contractor is requesting payment has been performed in strict accordance with the terms and conditions of the hereinabove referenced Contract, and that all labor and/or materials for which this payment is requested has been performed and/or delivered as of the date hereinabove mentioned. Further, any and all contractors, subcontractors, laborers, suppliers and materialmen that have provided labor, material or services to the undersigned for use or incorporation into the construction of the improvements to the Property have been paid and satisfied in full, including payments made on equipment in use on the Project, including that on rental and lease purchase agreements, excepting only amounts in the current Application for Payment dated

_____**, 20___** for period ending _____**, 20___,**
(Insert Application for Payment date.) *(Insert End Date of Payment Period.)*

and retainage, if any, thereon. Contractor further attests that there are no outstanding claims of any character arising out of, or related to, the Contractor's activities on, or improvements to, the Property.

This Waiver constitutes a representation by the undersigned, for and on behalf of the firm or company listed below, that the payments referenced above, once received, constitute full and complete payment for all work performed, and all costs or expenses incurred (including, but not limited to, costs for supervision, field office overhead, home office overhead, interest on capital, profit, and general conditions costs) relative to the work or improvements at the Property as of the date of this Waiver, except for the payment of retainage. The undersigned hereby specifically waives, quitclaims and releases any Claim, as that term is defined in the Contract Documents, for damages due to delay, hindrance, interference, acceleration, inefficiencies or extra work, or any other claim of any kind it may have against the Owner, or any other person or entity with a legal or equitable interest in the Property, as of the date of this Waiver, except as follows:

_____

(*Insert exceptions, if any*)

This Waiver is specifically made for the benefit of the Owner, and may be relied upon unconditionally by the Owner.

In Witness hereof, the undersigned signatory, acting for and on behalf of the firm or company listed below, and all of its laborers, subcontractors and suppliers, has placed his hand and seal.

CONTRACTOR: _____

(General Contractor, Subcontractor, materialman, or other person furnishing labor, services or materials.)

By (Signature): _____

Print Name: _____

Title: _____

☐ *(For Corporations, check box and attach notarized Resolution authorizing the signatory.)*

Sworn to and subscribed before me, this_____day of_____, 20____.

_____

NOTARY PUBLIC in and for the
PARISH OF ORLEANS
STATE OF LOUISIANA

CONTRACTOR'S UNCONDITIONAL WAIVER OF LIEN UPON FINAL PAYMENT

STATE OF LOUISIANA DATE: _____, 20___
PARISH OF ORLEANS

The Undersigned is a General Contractor, Subcontractor, materialman, or other person furnishing labor, services or materials pursuant to that Contract dated **_____, 20___**, between **YWCA Greater New Orleans** (the "Owner") and _____ (the "Contractor"), for Work performed on the **YWCA Greater New Orleans 601-605 Norman C. Francis (aka 601-605 S. Jefferson Davis Parkway)** in Orleans Parish, Louisiana. Said Contract is for the total amount of

Dollars and no/100 ($.)

(Insert Current Contract Amount in words and figures.)

for Work on the following described Property:

601-605 Norman C. Francis
(aka 601 S. Jefferson Davis Parkway),
Orleans Parish, LA

Contractor submits this Unconditional Waiver of Lien Upon Final Payment and in connection with its Final Application for Payment dated

_____, 20___ for period ending **_____, 20___**

(Insert Application for Payment date.) *(Insert End Date of Payment Period.)*

submitted by Contractor to Owner in the amount of

Dollars and no/100 ($.)

(Insert Application for Payment amount in words and figures.)

In consideration of receipt of the sum of the current Application for Payment,

Dollars and no/100 ($.)

(Insert Application for Payment amount in words and figures.)

the Contractor hereby unconditionally waives, releases, relinquishes and quitclaims, in favor of Owner and its successors and assigns, and all persons or entities with any legal or equitable interest in the above-referenced Property, any and all right that Contractor has or may have to lien and claim a lien for all work performed and all costs or expenses incurred, including all labor, services and materials furnished, on the above-referenced Property, up to and including the date of this Waiver of Lien.

Contractor hereby attests that all amounts on prior Applications for Payment have been received from the Owner, and are deemed paid in full, such payments totaling

Dollars and no/100 ($.)

(Insert Sum Total of Prior Payments in words and figures.)

as of the date of this Unconditional Waiver of Lien Upon Final Payment. In consideration of receipt of these sums, the Contractor hereby unconditionally waives, releases, relinquishes and quitclaims, in favor of Owner and its successors and assigns, and all persons or entities with any legal or equitable interest in the above-referenced Property, any and all right that Contractor has or may have to lien and claim a lien for all work performed and all costs or expenses incurred, including all labor, services and materials furnished, on the above-referenced Property.

Undersigned does hereby attest that he/she is duly authorized to act on behalf of Contractor, and further does hereby certify that every performance of labor and/or items of material for which the Contractor is requesting payment has been performed in strict accordance with the terms and conditions of the hereinabove referenced Contract, and that all labor and/or materials for which this payment is requested has been performed and/or delivered. Further, any and all contractors, subcontractors, laborers, suppliers and materialmen that have provided labor, material or services to the undersigned for use or incorporation into the construction of the improvements to the Property have been paid and satisfied in full, including payments made on equipment in use on the Project, including that on rental and lease purchase agreements. Contractor further attests that there are no outstanding claims of any character arising out of, or related to, the Contractor's activities on, or improvements to, the Property.

This Waiver constitutes a representation by the undersigned, for and on behalf of the firm or company listed below, that the payments referenced above, once received, constitute full and complete payment for all work performed, and all costs or expenses incurred (including, but not limited to, costs for supervision, field office overhead, home office overhead, interest on capital, profit, and general conditions costs) relative to the work or improvements at the Property. The undersigned hereby specifically waives, quitclaims and releases any Claim, as that term is defined in the Contract Documents, for damages due to delay, hindrance, interference, acceleration, inefficiencies or extra work, or any other claim of any kind it may have against the Owner, or any other person or entity with a legal or equitable interest in the Property, relative to the Work or improvements at the Property.

This Waiver is specifically made for the benefit of the Owner, and may be relied upon unconditionally by the Owner.

In Witness hereof, the undersigned signatory, acting for and on behalf of the firm or company listed below, and all of its laborers, subcontractors and suppliers, has placed his hand and seal.

CONTRACTOR: _____

(General Contractor, Subcontractor, materialman, or other person furnishing labor, services or materials.)

By (Signature): _____
Print Name: _____
Title: _____

☐ *(For Corporations, check box and attach notarized Resolution authorizing the signatory.)*

Sworn to and subscribed before me, this_____day of_____, 20____.

_____
NOTARY PUBLIC in and for the
PARISH OF _____
STATE OF LOUISIANA

ROOFING GUARANTEE R-1

OWNER: YWCA Greater New Orleans

ADDRESS: 601-605 Norman C. Francis (aka 601-605 S. Jefferson Davis Pkwy.) New Orleans, LA 70119

WHEREAS _____

Address: _____

Telephone: (_____)_____,

herein called the "Roofing Contractor", has performed roofing and flashing in accordance with the Contract Documents for [NAME OF PROJECT] (hereinafter called the "Work") under a Subcontract with General Contractor on the Following Project:

Name of Project: **YWCA of New Orleans New Daycare, Education and Counseling Building**

User Agency: YWCA Greater New Orleans

Location/Address: 601-605 Norman C. Francis Parkway (aka 601-605 S. Jefferson Davis Pkwy.) New Orleans, LA 70119

Name and Type of Building(s): _____

Type(s) of Roof Deck(s): _____

_____

Total Roof Area: _____ SF; Flashing, Edge: _____ LF; Base: _____ LF

Date of Acceptance: _____, 20____ Guarantee Period: Two (2) Years

Date of Expiration: _____, 20____

AND WHEREAS the Roofing Contractor has contracted (as a Subcontractor) to guarantee said work against water entry from faulty or defective materials and workmanship for the designated Guarantee period;

AND WHEREAS the General Contractor, by its acceptance of the Contract for the above described project, has jointly assumed with the Roofing Contractor the obligations to the Owner of said guarantee against leaks and faulty or defective materials and workmanship;

NOW THEREFORE the Roofing Contractor and the General Contractor jointly and severally guarantee, subject to the terms and conditions herein set forth, that during the Guarantee Period they will at their own cost and expense, make or cause to be made with approved procedures and materials such repairs to or replacements of said work resulting from water entry or faults or defects of said Work as are necessary to correct faulty and defective work and as are necessary to maintain said Work in watertight conditions and further to respond on or within two (2) working days upon written notification of leaks or defects by the Owner/User Agency. Furthermore, they will at their own cost and expense maintain the roof for (2) years after acceptance, in accordance with the current edition of the Roof Maintenance Manual published by the Roofing Industry Educational Institute. The roof shall be inspected a minimum of twice each year, and a report prepared documenting the conditions observed at each inspection. These inspections shall be made once during the months of April or May and once during the months of September and October. Two copies of each report shall be forwarded to the Owner and User Agency.

This Guarantee is made subject to the following terms and conditions:

1. Specifically excluded from this guarantee are damages to the Work, other parts of the building and building contents caused by: A) lightning, and storm (includes hurricanes and tornadoes), hailstorm, earthquakes and other unusual phenomena of the elements; B) fire; and C) structural failures causing excessive roof deck, edgings and related roof components movement. When the Work has been damaged by any of the foregoing causes, the Guarantee will be null and void until such damage has been repaired by the Roofing Contractor, and until the cost and expense thereof has been paid by the Owner or another responsible party so designated.

2. During the Guarantee Period, if the Owner/User Agency allows alteration of the Work by anyone other than a Contractor approved in writing by the Roofing Subcontractor, General Contractor, and Roofing Material Manufacturer prior to the work being performed, including cutting, patching and maintenance in connection with penetrations, attachment of other work, and positioning of anything on the roof, this Guarantee shall become null and void upon the date of said alterations. If the Owner/User Agency engages the Roofing Contractor to perform said alterations, the Guarantee shall not become null and void, unless the Roofing Contractor, prior to proceeding with said work, shall have notified the Owner/User Agency in writing, showing reasonable cause for claim that said alterations would likely damage or deteriorate the Work, thereby reasonably justifying a termination of this Guarantee.

3. During the Guarantee Period, if the original use of the roof is changed and it becomes used for, but for which it was not originally designed or specified, as a promenade, work deck, spray-cooled surface, flooded basin, or other use of service more severe than originally specified, this Guarantee shall become null and void upon the date of said change.

4. During the Guarantee Period, if any building or area of a building is changed to uses creating extremes of interior temperature and/or humidity, but for which it was not originally designed and specified, without provisions and alterations made to the building which effectively contain or control these conditions, this guarantee shall become null and void upon the date of said change.

5. The Owner/User Agency shall promptly notify the Roofing Contractor in writing of observed, known or suspected leaks, defects or deterioration, and shall afford reasonable opportunity for the Roofing Contractor to inspect the Work, and to examine the evidence of such leaks, defects or deterioration.

6. This Guarantee is recognized to be the only guarantee of the General and Roofing Contractor on said work, and shall not operate to restrict or cut off the Owner from other remedies and recourses lawfully available to him in case of roofing failure. Specifically, this Guarantee shall not operate to relieve the Roofing Contractor of his responsibility for performance of the original work, regardless of whether the Contract was a Contract directly with the Owner or a Subcontract with the Owner's General Contractor.

IN WITNESS THEREOF, this instrument has been duly executed this _____ day of _____, 20___.

Roofing Contractor's Signature: _____

Typed Name: _____

Representing: _____

Telephone Number: (_____)_____

And has been countersigned by the General Contractor issuing the Roofing Contractor's Subcontract for said work:

Name of General Contractor: _____

Date: _____, 20____ Authorized Signature: _____

Representing: _____

Typed Name: _____

Telephone Number: (_____)_____

WITNESS: _____

_____

Telephone Number: (_____)_____

Witness: _____

ROOFING GUARANTEE R-2

OWNER: YWCA Greater New Orleans

ADDRESS: 601-603 Norman C. Francis (aka 601-603 S Jefferson Davis Pkway.) New Orleans, LA 70119

WHEREAS _____

Address: _____

Telephone: (_____)_____,

herein called the "Roofing Contractor", has performed roofing and flashing in accordance with the Contract Documents for [*name of project*] (hereinafter called the "Work") under a Contract with the Owner.

Name of Project: **YWCA of New Orleans**

Location/Address: 601-603 Norman C. Francis Parkway (aka 601-603 S Jefferson Davis Parkway), New Orleans, LA 70119

User Agency:

Name and Type of Building(s): **YWCA Greater New Orleans**

Type(s) of Roof Deck(s): _____

_____

Total Roof Area: _____ SF; Flashing, Edge: _____ LF; Base: _____ LF

Date of Acceptance: _____, 20___ Guarantee Period: Two (2) Years

Date of Expiration: _____, 20___

AND WHEREAS the Roofing Contractor has contracted to guarantee said work against water entry from faulty or defective materials and workmanship for the designated Guarantee period;

NOW THEREFORE the Roofing Contractor as the General Contractor guarantees, subject to the terms and conditions herein set forth, that during the Guarantee Period he will at his own cost and expense, make or cause to be made with approved procedures and materials such repairs to or replacements of said work resulting from water entry or faults or defects of said Work as are necessary to correct faulty and defective work and as are necessary to maintain said Work in watertight conditions and further to respond on or within two (2) working days upon written notification of leaks or defects by the Owner/User Agency. Furthermore, he will at his own cost and expense maintain the roof for (2) years after acceptance, in accordance with the current edition of the Roof Maintenance Manual published by the Roofing Industry Educational Institute. The roof shall be inspected a minimum of twice each year, and a report prepared documenting the conditions observed at each inspection. These inspections shall be made once during the months of April or May and once during the months of September and October. Two copies of each report shall be forwarded to the Owner and User Agency.

This Guarantee is made subject to the following terms and conditions:

1. Specifically excluded from this guarantee are damages to the Work, other parts of the building and building contents caused by: A) lightning, windstorm (includes hurricanes and tornados), hailstorm, earthquakes and other unusual phenomena of the elements; B) fire; and C) structural failures causing excessive roof deck, edgings and related roof components movement. When the Work has been damaged

by any of the foregoing causes, the Guarantee will be null and void until such damage has been repaired by the Roofing Contractor, and until the cost and expense thereof has been paid by the Owner or another responsible party so designated.

2. During the Guarantee Period, if the Owner/User Agency allows alteration of the Work by anyone other than a Contractor approved in writing by the Roofing Subcontractor, General Contractor, and Roofing Material Manufacturer prior to the work being performed, including cutting, patching and maintenance in connection with penetrations, attachment of other work, and positioning of anything on the roof, this Guarantee shall become null and void upon the date of said alterations. If the Owner/User Agency engages the Roofing Contractor to perform said alterations, the Guarantee shall not become null and void, unless the Roofing Contractor, prior to proceeding with said work, shall have notified the Owner/User Agency in writing, showing reasonable cause for claim that said alterations would likely damage or deteriorate the Work, thereby reasonably justifying a termination of this Guarantee.

3. During the Guarantee Period, if the original use of the roof is changed and it becomes used for, but for which it was not originally designed or specified, as a promenade, work deck, spray-cooled surface, flooded basin, or other use of service more severe than originally specified, this Guarantee shall become null and void upon the date of said change.

4. During the Guarantee Period, if any building or area of a building is changed to uses creating extremes of interior temperature and/or humidity, but for which it was not originally designed and specified, without provisions and alterations made to the building which effectively contain or control these conditions, this Guarantee shall become null and void upon the date of said change.

5. The Owner/User Agency shall promptly notify the Roofing Contractor in writing of observed, known or suspected leaks, defects or deterioration and shall afford reasonable opportunity for the Roofing Contractor to inspect the Work, and to examine the evidence of such leaks, defects or deterioration.

6. This Guarantee is recognized to be the only guarantee of the General and Roofing Contractor on said work, and shall not operate to restrict or cut off the Owner from other remedies and recourses lawfully available to him in case of roofing failure. Specifically, this Guarantee shall not operate to relieve the Roofing Contractor of his responsibility for performance of the original work, regardless of whether the Contract was a Contract directly with the Owner or a Subcontract with the Owner's General Contractor.

IN WITNESS THEREOF, this instrument has been duly executed this _____ day of _____, 20___.

Roofing Contractor's Signature: _____

Typed Name: _____

Representing: _____

Telephone Number: (_____)_____

WITNESS: _____

_____

Telephone Number: (_____)_____

Witness: _____

ROOFING GUARANTEE R3 (METAL)

OWNER: YWCA Greater New Orleans

ADDRESS: 601-605 Norman C. Francis Parkway (aka 601-605 S Jefferson Davis Pkwy.) New Orleans, LA 70119

WHEREAS _____

Address: _____

Telephone: (_____)_____,

herein called the Contractor, has provided pre-formed, pre-finished metal roofing, flashing, accessories and miscellaneous items required for a complete roof system installation in accordance with the Contract Documents for the PROJECT:

Name of Project: **YWCA of New Orleans New Daycare, Education and Counseling Building**

User Agency: YWCA Greater New Orleans

Location/Address: 601-605 Norman C. Francis Parkway (aka 601 S. Jefferson Davis Pkwy.) New Orleans, LA 70119

Name and Type of Building(s): _____

Type of System: (Standing Seam, SR, Flat Seam, etc. _____

Total Roof Area: _____ SF; Total Length of Ridge _____ LF;

Total Length of Valley: _____ LF; Total Length of gutter/fascia trim: _____

Date of Acceptance: _____, 20____ Guarantee Period: Two (2) Years

Date of Expiration: _____, 20____

AND WHEREAS the Contractor has contracted to guarantee said work against water entry from faulty or defective materials and workmanship for the designated Guarantee period of TWO (2) YEARS from the date of the Final acceptance of the Project;

NOW THEREFORE the Contractor guarantees, subject to the terms and conditions herein set forth, that during the Guarantee Period the Contractor will at his own cost and expense, make or cause to be made with approved procedures and materials such repairs to or replacements of said work (including any wetted thermal insulation) resulting from water entry or faults or defects of said Work as are necessary to maintain said Work in watertight conditions and further, respond on or within TWO (2) working days upon written notification of leaks or defects by the Owner/User Agency.

This Guarantee is made subject the following terms and conditions

1. Specifically excluded from this guarantee are damages to the Work, other parts of the building(s) and building contents caused by: A) lighting; windstorm (including hurricanes and tornadoes), hailstorm, earthquake and other unusual phenomena of the elements; B) fire; and C) structural failures causing excessive roof deck, edges and related roof component movement. When the Work has been damaged by any of the foregoing causes, the Guarantee will be suspended until such time as the damage has been repaired, and until the cost and expense thereof has been assigned or paid by the Owner or the responsible party. The

guarantee shall be reinstated upon Final Acceptance of the damage repair Work by both the Owner & Contractor.

2. During the Guarantee Period, if the Owner/ User Agency allows alteration of the Work by anyone other than a Contractor approved in writing by the original Contractor and/or Roofing Material Supplier prior to the work being performed, including cutting, patching and maintenance in connection with penetrations, attachment of other work, and positioning of anything (i.e. signs) onto the roof, this Guarantee shall become null and void as of the date of said alterations. If the Owner/ User Agency engages the original Contractor for said alterations, the Guarantee shall be maintained in force unless the Contractor presents written notification to the Owner that the intended work will likely damage or cause deterioration of the base work, thereby justifying a termination of the original Guarantee.

3. The Owner/User Agency shall promptly notify the Contractor in writing of observed, known or suspected leaks, defects, or condition deterioration and shall afford a reasonable opportunity for the Contractor to inspect the work and examine evidence of such leaks, defects or deterioration.

4. This Guarantee is recognized to be the only guarantee of the Contractor of said work, and shall not operate to restrict or cut-off the Owner from any other remedies and recourse lawfully available to him in case of roofing failure to any cause or degree. Specifically, this Guarantee shall not operate to relieve the Contractor of his responsibility for the performance of the original work.

IN WITNESS THEREOF, this instrument has been duly executed this _____ day of _____, 20___.

Contractor's Signature: _____

Typed Name: _____

Representing: _____

Telephone Number: (_____)_____

WITNESS: _____

_____

And if applicable, is countersigned by the following Sub Contractor, Installer, or other party (as indicated) who acted as agent or represented the Contractor during the performance of the work:

Countersignee Name: _____
(*Type or Print)*

Date: _____, 20____ Signature: _____

Representing: _____

Address: _____

_____

Telephone Number: (_____)_____

Witness: _____

_____

Construction Contract Change Order
BREAKDOWN

YWCA Greater New Orleans

Breakdown No. _____
Item No. _____
RFI No. (or COR, CPR, etc.) _____
Date: _____

Project Name: _____

Contractor/Subcontractor Name: _____

Direct Cost of Work :

A. Labor	Check here if explained on the Comment Sheet ➘	Hourly Wage Rate	Hours	Total Cost
1 _____	☐			
2 _____	☐			
3 _____	☐			
4 _____	☐			
5 _____	☐			
6 _____	☐			
7 _____	☐			
		Add Labor Burden @	____ %	
		LABOR TOTAL		

B. Material		Unit Price	Unit	Units	Total Cost
1 _____	☐				
2 _____	☐				
3 _____	☐				
4 _____	☐				
5 _____	☐				
6 _____	☐				
7 _____	☐				
(Copies of invoices may be required.)		Add Tax @		____ %	
		MATERIAL TOTAL			

C. Equipment		Unit Rate	Unit	Units	Total Cost
1 _____	☐				
2 _____	☐				
3 _____	☐				
4 _____	☐				
5 _____	☐				
6 _____	☐				
7 _____	☐				
(Copies of invoices may be required.)		Add Tax @		____ %	
		EQUIPMENT TOTAL			

TOTAL DIRECT COST FOR THIS BREAKDOWN:
(Sum A, B & C)

Construction Contract Change Order
BREAKDOWN COMMENT SHEET

YWCA Greater New Orleans

Breakdown No. _____
Item No. _____
RFI No. (or COR, CPR, etc.) _____
Date: _____

Project Name: _____

Contractor/Subcontractor Name: _____

A. Labor

No. (From BREAKDOWN Sheet)

B. Material

C. Equipment

Construction Contract Change Order

UNIT PRICE BREAKDOWN

YWCA Greater New Orleans

Breakdown No. _____
Item No. _____
RFI No. (or COR, CPR, etc.) _____
Date: _____

Project Name: _____

Contractor/Subcontractor Name: _____

Unit Price Tabulation

(Unit prices must be included in the bid or clearly defined in a standard, industry recognized pricing reference. The pricing reference shall be identified herein.)

Unit Price Description	Reference*	Unit Price	Units	Total

* Reference Legend: _____

Unit Price Total:
(Sum Total column)

Instructions for Change Order Back Up Forms

The General Conditions of the Contract for Construction, AIA Document A201, 2017 Edition, and the Supplementary Conditions provide for changes in the contract in the form of change orders. The costs of such changes must be carefully, clearly and accurately documented. Advocates for Academic Excellence in Education, Inc. has prepared a set of forms to be used to provide this documentation in a consistent format that is in accordance with the Contract Documents.

Change orders will typically contain one or more items of work. Each item of work will typically include work by the general contractor and/or one or more subcontractors. The documentation begins with a breakdown of the work of the contractor and each subcontractor. This is prepared using the form entitled "BREAKDOWN." One form for the General Contractor and one for each subcontractor. Each breakdown will be summarized on the form entitled "SUMMARY." Each item of work will, in turn, be summarized on the change order itself. This should be on the face of the change order.

The forms are available as a Microsoft Excel worksheet for ease of preparation, with formulas established for mark-ups and other basic mathematical operations.

These forms are to be used as provided. Any alteration to the forms may cause the change order to be rejected.

GENERAL: (Refer to Article 7 of the Supplementary and General Conditions)

Forms - There are five forms to be used for all Advocates for Academic Excellence in Education, Inc. change orders: CHANGE ORDER form, SUMMARY, BREAKDOWN, BREAKDOWN COMMENT SHEET and UNIT PRICE BREAKDOWN. The CHANGE ORDER form is the highest level and is the official, signed document. A CHANGE ORDER form may include one or more items of work, each of which is backed up by a SUMMARY. Each SUMMARY will be backed up with one or more BREAKDOWNs. Any unusual rates, unit costs or quantities may be explained on the COMMENT SHEET. It's simple. The BREAKDOWN form must be used for the general contractor and any subcontractor, at any level, that is to get OH&P. Use as many as needed.

Unit Pricing - Labor, material and equipment breakdown is the standard method of pricing change orders for Facility Planning and Control. However, unit pricing may be considered in some circumstances if the unit prices are clearly established such as by unit prices that were included in the bid. These prices may also be derived from a construction industry standard reference such as R.S. Means. If unit prices were included in the bid they are acceptable for pricing change order work and, in fact, must be used for any work that is included in the change order for which they were established . The UNIT PRICE BREAKDOWN is provided for this purpose.

CHANGE ORDER:

Project identification information: Complete as required.

Description: This will include a list of each attached SUMMARY that makes up this change order and a brief statement of the work included in each.

New Contract Sum: Calculate the new contract amount using the original contract amount, previous change orders and the new change order. Select the appropriate word for increase, decrease or unchanged, and delete the terms that don't apply.

New Contract Completion Date and Revised Time: Calculate the new contract time using the original Contract Completion Date and Contract Time, previous changes in time and the change in time by this change order. Select the appropriate word for increase, decrease or unchanged and delete the terms that don't apply. Show days in the main column and the date in the blank indicated.

Added Building Area: Show any building area added by this change order. If none, enter "None."

RECOMMENDED: Show the Designer's name and address, sign on the line indicated as "By:" and date on the indicated line.

ACCEPTED: Show the Contractor's name and address, sign on the line indicated as "By:" and date on the indicated line.

APPROVED: For approval by AAEE, Inc.

SUMMARY: (Refer to Article 7 of the Supplementary and General Conditions)

Item No.: Show the Item number as it will appear on the CHANGE ORDER Form. Note: This may be one of several items included in one CHANGE ORDER form.

RFI No.: Show the number of the request for information. This may be known by another name such as COR (Change Order Request,) CPR (Change Proposal Request,) etc.

Project No., Date, Project Name. Complete as appropriate.

Contractor: Name of General Contractor.

Description of Work: Give a brief description of the work included in this **Item**.

General Contractor Direct Costs: Show the total General Contractor Cost from the BREAKDOWN and show the Breakdown No. in the space provided.

General Contractor Total Cost: Show the total General Contractor Cost plus the General Contractor's overhead and profit.

Subcontractor Cost Breakdowns: List each subcontractor, Breakdown No. and Total Direct Cost (in column "A") from the attached BREAKDOWN sheets. Show the subcontractor's overhead and profit percentage in column "B" and show the calculated total of the direct cost plus the percentage of the direct cost in column "C." If the electronic version of the form is being used, column "C" will be automatically calculated. The overhead and profit shall not exceed 8% of the Total Direct Cost.

Subcontractor Direct Costs Total: Sum of column "A." This will be used to calculate the General Contractor's overhead and profit on the subcontractors' work. If the electronic version is being used, this will be an automatic calculation.

Subcontractor Direct Costs + Subcontractor OH&P: Sum of column "C." This represents the total amount that subcontractors will be paid. Automatic calculation.

General Contractor OH&P on Subcontractor Direct Cost at ___%. The contractors overhead and profit on the subcontractors' direct cost (without subcontractor OH&P.) Enter the percentage of the contractor's OH&P on the subcontractors' work and show the calculated total of the subcontractors' direct cost plus the percentage of the direct cost in the space. Automatic calculation.

Total Subcontractor Costs: Total of the last two spaces.

Change Order Subtotal: Total of change order except bond.

Performance and Payment Bond at ____%: Enter bond percentage (from amount provided by the contractor at the Pre-Construction Conference) and calculate the amount for the bond.

Amount will be ¨ increased ¨ decreased ¨ unchanged by: Add bond and calculate total change order amount. Indicate "increase," "decrease" or "unchanged", and delete the terms that don't apply.

Days will be ¨ increased ¨ decreased ¨ unchanged by: Show the number of days to be added or deleted from the contract, if any, due to changes in scope, adverse weather, unusual delays or other factors, **only** if it is proven the critical path is affected. Note that a change in scope does not necessarily indicate a change in time. Indicate "increased," "decreased" or "unchanged", and delete the terms that don't apply.

BREAKDOWN:

Item No. Show the Item number as it will appear on the CHANGE ORDER Form and the SUMMARY. Note: This may be one of several items included in one CHANGE ORDER form.

RFI No.: Show the number of the request for information. This may be known by another name such as COR (Change Order Request,) CPR (Change Proposal Request,) etc.

Project No., Date, Project Name. Complete as appropriate.

Contractor: Name of General Contractor or Subcontractor.

Direct Cost of Work:

Check here if explained on the Comment Sheet: If rates, unit costs or quantities may appear unreasonable compared to standard costs or quantities the reasons may be explained on the attached comment sheet and the box checked to indicate that there is an explanation.

A. Labor: Include the "wages paid" hourly direct labor and/or foreman necessary to perform the required change. "Wages paid" is the amount actually paid the employee, not the fully burdened charge rate used in the bid, etc. Supervisory personnel in district or home office shall not be included. Do not include the project superintendent. Supervisory personnel on the job-site, but with broad supervisory responsibility shall not be included as Direct Labor. Typically there will be only one superintendent on the job and his/her time shall not be included. Typically all other employees are eligible for inclusion. List by job title each person employed on the work, his/her hourly rate, the number hours work and the extended Total Cost. Do not list crews unless the rates for them are readily available in standard cost estimating references such as R. S. Means. Add the labor burden that was provided at the Pre-Construction conference and total the amounts in LABOR TOTAL.

B. Material: Include the acquisition cost of all materials directly required to perform the required change. List each material used in the work, the price per unit, name of the unit, the number of units used and the extended Total Cost. Add the tax rate and tax and total the amounts in MATERIAL TOTAL.

C. Equipment: Include the rental cost of equipment items necessary to perform the change. For company-owned equipment items, include documentation of internal rental rates submitted at the pre-construction conference. Charges for small tools, and craft specific tools are not allowed. List each piece of equipment used in the work, the rate by units of time (hour, day, week, etc.,) number of units of time the piece was in service on the work and the extended total cost. Add the tax rate, calculate the tax and total the amounts in EQUIPMENT TOTAL.

TOTAL DIRECT COST FOR THIS BREAKDOWN: Total of A. Labor, B. Material and C. Equipment. This is the amount that will be carried forward to the SUMMARY Sheet. This amount does **NOT** include Overhead and Profit. This will be added on the SUMMARY Sheet.

COMMENTS SHEET:

The COMMENTS SHEET uses the same heading as the SUMMARY and BREAKDOWN.

The COMMENTS SHEET includes three sections, one each for A. Labor, B. Materials and C. Equipment. These correspond to the sections in the BREAKDOWN. Each comment should be entered in the section to which it corresponds on the BREAKDOWN and numbered to correspond to the appropriate line. Comments are to used only to explain unusual rates, costs or quantities.

UNIT PRICE BREAKDOWN:

The UNIT PRICE BREAKDOWN uses the same heading as the BREAKDOWN.

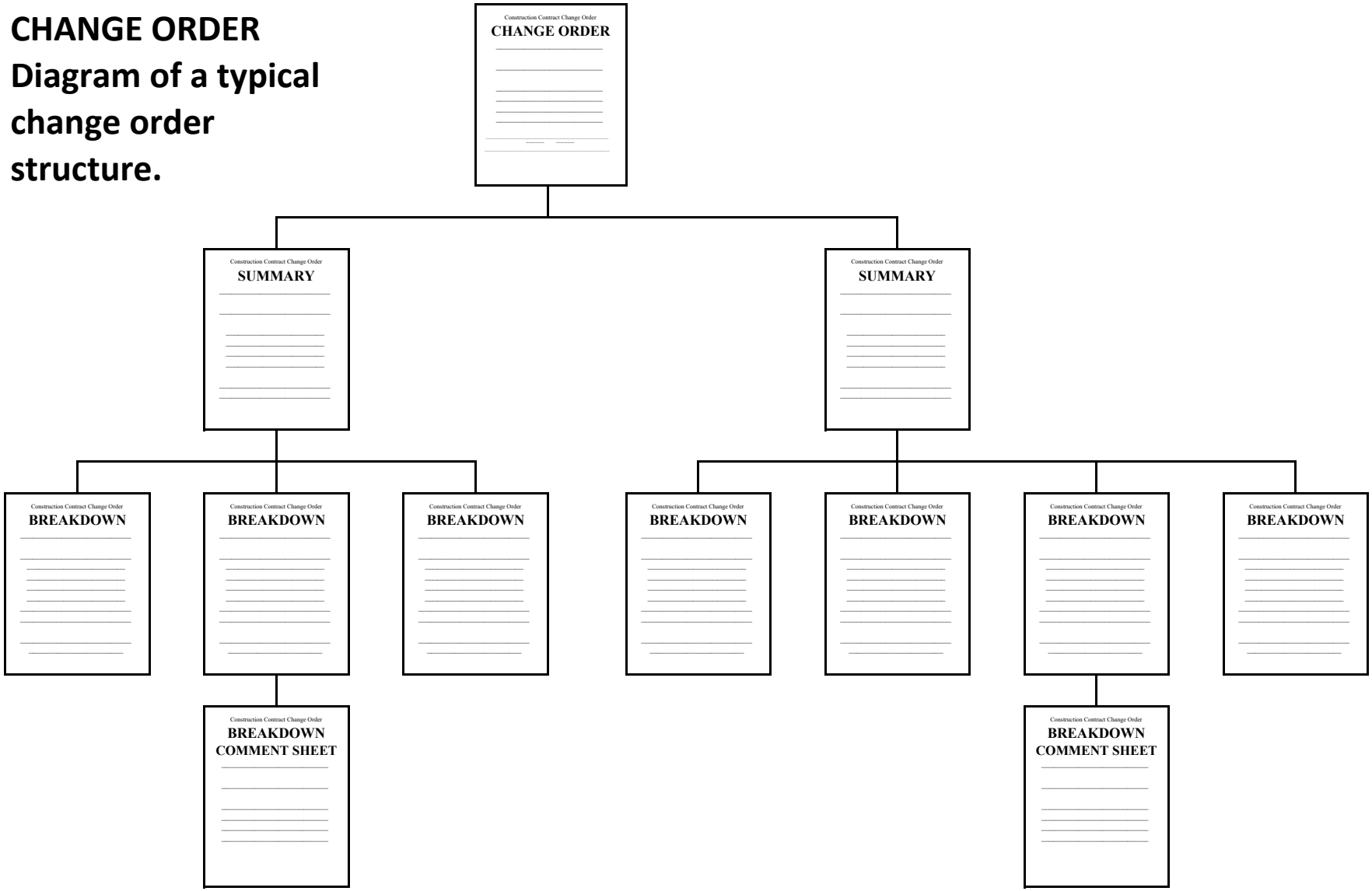
The UNIT PRICE BREAKDOWN is similar to the BREAKDOWN.

Unit Price Tabulation: Each unit price is listed along with its corresponding price and the number of units used in the work. The price and number of units are multiplied to provide the total cost of each unit price item. The pricing reference, such as the bid form for the project or a construction industry standard reference, must be cited for each unit price. This may be more fully described in "Reference Legend,"

Unit Price Total: Sum the unit prices to obtain the total cost for unit prices.

CHANGE ORDER

Diagram of a typical change order structure.



DISADVANTAGED BUSINESS ENTERPRISE (DBE) PROGRAM

ARTICLE 1 - GENERAL

DBE Compliance: The goals of YWCA Greater New Orleans DBE Program apply to this contract. It is the policy of YWCA Greater New Orleans to practice nondiscrimination based on social and economic disadvantage, race, color, sex, gender, disability, or national origin. All firms qualifying under this solicitation are encouraged to submit proposals/bids. Award of this contract shall be conditioned upon satisfying the requirements of the DBE Program. A DBE contract goal of 30 percent has been established for this contract. The offeror/bidder shall agree to use its best efforts, as determined by YWCA Greater New Orleans, to meet the contract goal for DBE participation in the performance of this contract.

ARTICLE 2 – DBE PARTICIPATION

The bidder shall be required to submit the following information on the DBE Participation Summary Sheet:

a. The names and addresses of all DBE firms that will participate in the contract;
b. The dollard amount commitment of the participation of each DBE firm participating in the contract;
c. Written confirmation from the name DBE (s), verifying their participation in the contract as provided in the commitments made under (a) and (b) above; and
d. If the contract goal is not met, evidence of best effort.

5.5.3 Upon receipt of the above-referenced materials, YWCA Greater New Orleans shall then make a determination as to whether the bidder/offeror was responsive as to the DBE contract goal. If it is determined that the bidder/offeror was not responsive to the DBE contract goal, the bid may be rejected as non-responsive.

ARTICLE 3 - DBE CONTRACT PROVISIONS

DBE Program Compliance: Contractor agrees to use its best efforts to fully and completely carry out the applicable requirements of YWCA Greater New Orleans' DBE Program in the award and administration of this Agreement, including, without limitation, all reporting requirements and specific DBE participation goals. Contractor's failure to carry out these requirements, as determined in good faith by YWCA Greater New Orleans, shall be deemed a material breach of this Agreement, which may result in the termination of this Agreement.

DME Compliance Reporting: Contractor agrees to provide quarterly written reports to YWCA Greater New Orleans on all expenditures made to achieve compliance with the DBE

participation goals for this Agreement. The report shall, at a minimum, include the following:

a. The name and business address of each DBE involved in the contract;
b. A description of the work performed and/or the product or service supplied by each DBE;
c. The date and amount of each expenditure made to a DBE; and
d. Such other information as may assist YWCA Greater New Orleans in determining Contractors compliance with the DBE Program and the status of any DBE performing any portion of the Contract.

Access to Books and Records: Contractor agrees to grant YWCA Greater New Orleans reasonable access to its books and records for purposes of verifying compliance with the DBE Program.

FORM DBE-1 **05/04**

DISADVANTAGED BUSINESS ENTERPRISE (DBE) RESPONSIVENESS FORM

This form or a similar form should be provided by the lowest responsible Prime Contractor within ten (10) days of receipt of written notification by YWCA Greater New Orleans

The undersigned bidder/offer or has satisfied the requirements of the bid specification in the following manner (Please check the appropriate space):

_____ The bidder/offerer is committed to a minimum of 30 % DBE utilization on this contract.
_____ The bidder/offerer (if unable to meet the DBE goal of 30 %) is committed to a minimum of
_____ % DBE utilization on this contract and will submit documentation demonstrating best efforts.

Name of bidder/offerer's firm: _____

State Registration No. _____

By _____
(Signature) (Title)

Name of DBE firm: _____

Address: _____

City: _____ State: _____ Zip: _____

Telephone: _____

Description of work to be performed by DBE firm:
_____

_____

_____

The bidder/offerer is committed to utilizing the above-named DBE firm for the work described above. The estimated dollar value of this work is $ _____.

Affirmation
The above-named DBE firm affirms that it will perform the portion of the contract for the estimated dollar value as stated above.

By _____
(Signature) (Title)

If the bidder/offerer does not receive award of the prime contract, any and all representations in this DBE Responsiveness Form and Affirmation shall be null and void.

FORM DBE-2 **05/04**

EVIDENCE OF BEST EFFORTS

This form should be provided by the lowest responsible bidder within ten (10) days of receipt of written notification by YWCA Greater New Orleans if the bidder /offerer is unable to meet the DBE goal. YWCA Greater New Orleans shall be responsible for determining whether the general contractor has made his best efforts to achieve the DBE Program contracting objectives in either bid submission commitments or, upon award of the contract, actual achievement of their stated contractual DBE participation commitment in making this determination, YWCA of New Orleans shall consider the following factors:

Name of bidder/offerer's firm: _____

Address: _____

City: _____ State: _____ Zip: _____

Telephone: _____

_____ PRE-BID MEETINGS: Whether the general contractor or subcontractor attended any pre-bid meetings scheduled by YWCA Greater New Orleans to inform DBEs of contracting and subcontracting opportunities.

_____ SUBCONTRACTORS LISTS: Whether the general contractor or subcontractor requested from the Mayor's Office of Economic Development a list of certified DBEs

_____ SMALL CONTRACTS: Whether the general contractor or subcontractor broke down contracts into dollar or work units to facilitate DBE participation, as consistent with the nature of the work to be performed and its relationship to other aspects of the project.

_____ FOLLOW-UP: Whether the general contractor or subcontractor followed up initial indications of interest by DBEs to determine with certainty if they remained interested in bidding.

_____ ADVERTISEMENT: Whether the general contractor or subcontractor advertised in general circulation and trade association publications concerning subcontracting opportunities, and allowed subcontractors reasonable time to respond.

_____ GOOD FAITH NEGOTIATIONS: Whether the general contractor or subcontractor negotiated in good faith with interested DBEs and did not reject DBEs as unqualified without sound business reasons based on a thorough investigation of their capabilities.

_____ INFORMATION: Whether the general contractor or subcontractor provided interested DBEs with adequate information about the plans, specifications and requirements of the subcontract.

_____ WRITTEN NOTICE: Whether the general contractor or subcontractor took the necessary steps to provide written notice in a manner reasonably calculated to inform DBEs of subcontracting opportunities and allowed sufficient time for them to participate effectively.

_____ COMMUNITY RESOURCES: Whether the general contractor or subcontractor used the services available to DBE community organizations, DBE contractors' groups, local, state and federal disadvantaged business assistance offices, disability rights organizations, and other organizations that provide assistance in the recruitment and placement of DBE firms.

_____ CONTRACT RECORDS: Whether the general contractor or subcontractor has maintained the following records for each DBE that bids on any subcontract:

1. Name, address and telephone number;
2. A description of information provided by the general contractor or subcontractor; and
3. A statement of whether an agreement was reached, and if not, why not, including any reasons for concluding that the bidder was deemed unqualified to perform the job.

Intended DBE Participation Summary Sheet

Contract #, and Name_____ DBE Goal _____

Total Bid/Proposal Amount _____

Name and Address of DBE Participants	Name of Contact Person	Certifying Agency, page number, and date of DBE directory used	Scope of Work to be performed	DBE dollar Amount	Percentage of Dollar Amount of Total Bid/Proposal

Submitted by: _____ Submitted by: _____
(Print Name) (Signature)

Company's Name:_____ Date:_____

On business stationary (of the DBE Applicant), attach verification of agreement to stated terms.

Project Wage Rate Sheet

U.S. Department of Housing and Urban Development
Office of Labor Relations

PROJECT NAME: YWCA Greater New Orleans	**WAGE DECISION NUMBER/MODIFICATION NUMBER:**
PROJECT NUMBER: CN09418	**PROJECT COUNTY:**

WORK CLASSIFICATION	BASIC HOURLY RATE (BHR)	FRINGE BENEFITS	TOTAL HOURLY WAGE RATE	LABORERS FRINGE BENEFITS:		$
				GROUP #	BHR	TOTAL WAGE
Bricklayers			$			
Carpenters			$			$
Cement Masons			$			$
Drywall Hangers			$			$
Electricians			$			$
Iron Workers			$			$
Painters			$	OPERATORS FRINGE BENEFITS:		$
Plumbers			$	GROUP #	BHR	TOTAL WAGE
Roofers			$			$
Sheet Metal Workers			$			$
Soft Floor Layers			$			$
Tapers			$			$
Tile Setters			$	TRUCK DRIVERS FRINGE BENEFITS:		$
OTHER CLASSIFICATIONS				GROUP #	BHR	TOTAL WAGE
			$			$
			$			$
			$			$

ADDITIONAL CLASSIFICATIONS (HUD Form 4230-A)

WORK CLASSIFICATION	BASIC HOURLY RATE	FRINGE BENEFITS	TOTAL HOURLY WAGE RATE	DATE OF HUD SUBMISSION TO DOL	DATE OF DOL APPROVAL
			$		
			$		
			$		
			$		

CSI Form 1.5C

SUBSTITUTION REQUEST
(During the Bid Period)

Project: YWCA Greater New Orleans

601 S. Norman C. Francis Parkway, New Orleans, LA 70119

To: _____

_____

Re: _____

Substitution Request Number: _____

From: _____

Date: _____

A/E Project Number: CN09418

Contract For: _____

Specification Title: _____

Description: _____

Section: _____ Page: _____

Article/Paragraph: _____

Proposed Substitution: _____

Manufacturer: _____ Address: _____ Phone: _____

Trade Name: _____ Model No.: _____

Attached data includes product description, specifications, drawings, photographs, and performance and test data adequate for evaluation of the request; applicable portions of the data are clearly identified.

Attached data also includes a description of changes to the Contract Documents that the proposed substitution will require for its proper installation.

The Undersigned certifies:

- Proposed substitution has been fully investigated and determined to be equal or superior in all respects to specified product.
- Same warranty will be furnished for proposed substitution as for specified product.
- Same maintenance service and source of replacement parts, as applicable, is available.
- Proposed substitution will have no adverse effect on other trades and will not affect or delay progress schedule.
- Proposed substitution does not affect dimensions and functional clearances.
- Payment will be made for changes to building design, including A/E design, detailing, and construction costs caused by the substitution.

Submitted by: _____

Signed by: _____

Firm: _____

Address: _____

_____

Telephone: _____

A/E's REVIEW AND ACTION

☐ Substitution approved - Make submittals in accordance with Specification Section 01 25 00 Substitution Procedures.
☐ Substitution approved as noted - Make submittals in accordance with Specification Section 01 25 00 Substitution Procedures.
☐ Substitution rejected - Use specified materials.
☐ Substitution Request received too late - Use specified materials.

Signed by: Date:

Supporting Data Attached: ☐ Drawings ☐ Product Data ☐ Samples ☐ Tests ☐ Reports ☐ _____

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110 South Union Street, Suite 100, Alexandria, VA 22314

This is not an official CSI Construction Contract Administration (CCA) Form. Please use CSI's official CCA Forms if required by your project needs.

Advancement of Construction Technology

SUBMITTAL TRANSMITTAL

Project: YWCA Greater New Orleans

601 S. Norman C. Francis Parkway, New Orleans, LA 70119

Date:

A/E Project Number: CN09418

TRANSMITTAL A

To (Contractor): _____ Date: _____ Submittal No. _____

From (Subcontractor): _____ By: _____ ☐ Resubmission

Qty.	Reference / Number	Title / Description / Manufacturer	Spec. Section Title and Paragraph / Drawing Detail Reference

☐ Submitted for review and approval
☐ Resubmitted for review and approval
☐ Complies with contract requirements
☐ Will be available to meet construction schedule
☐ A/E review time included in construction schedule
☐ Substitution involved - Substitution request attached
☐ If substitution involved, submission includes point-by-point comparative data or preliminary details
☐ Items included in submission will be ordered immediately upon receipt of approval

Other remarks on above submission:

☐ One copy retained by sender

TRANSMITTAL B

To (A/E): _____ Attn: _____ Date Rec'd by Contractor: _____

From (Contractor): _____ By: _____ Date Trnsmt'd by Contractor: _____

☐ Approved
☐ Approved as noted
☐ Revise / Resubmit
☐ Rejected / Resubmit

Other remarks on above submission:

☐ One copy retained by sender

TRANSMITTAL C

To (Contractor): _____ Attn: _____ Date Rec'd by A/E: _____

From (A/E): _____ ☐ Other By: _____ Date Trnsmt'd by A/E: _____

☐ Approved
☐ Approved as noted
☐ Not subject to review
☐ No action required
☐ Revise / Resubmit
☐ Rejected / Resubmit
☐ Approved as noted / Resubmit
☐ Provide file copy with corrections identified
☐ Sepia copies only returned
☐ Point-by-point comparative data required to complete approval process
☐ Submission Incomplete / Resubmit

Other remarks on above submission:

☐ One copy retained by sender

TRANSMITTAL D

To (Subcontractor): _____ Attn: _____ Date Rec'd by Contractor: _____

From (Contractor): _____ By: _____ Date Trnsmt'd by Contractor: _____

Copies: ☐ Owner ☐ Consultants ☐ _____ ☐ _____ ☐ _____ ☐ One copy retained by sender

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September 1996
CSI Form 12.1A

Advancement of Construction Technology

SUBCONTRACTORS AND MAJOR MATERIAL SUPPLIERS LIST

Project: YWCA Greater New Orleans

601 S. Norman C Francis Parkway, New Orleans, LA 70119

To (A/E): Trapolin-Peer Architects APC

850 Tchoupitoulas Street, New Orleans, LA 70130

From (Contractor): _____

Date: _____

A/E Project Number: CN09418

Contract For: _____

List Subcontractors and Major Material Suppliers proposed for use on this Project as required by the Construction Documents. Attach supplemental sheets if necessary.

Section Number	Section Title	Firm	Address	Phone Number (Fax Number)	Contact

☐ Attachments

Signed by: Date:

Copies: ☐ Owner ☐ Consultants ☐ _____ ☐ _____ ☐ _____ ☐ _____ ☐ _____ ☐ _____ ☐ _____ ☐ File

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601 Madison Street, Alexandria, VA 22314-1791

Advancement of Construction Technology

SUBSTITUTION REQUEST
(After the Bidding Phase)

Project: YWCA Greater New Orleans
601 S. Norman C Francis Parkway, New Orleans, LA 70119

To: Trapolin-Peer Architects APC
850 Tchoupitoulas Street, New Orleans, LA 70130

Re:

Substitution Request Number:

From:

Date:

A/E Project Number: CN09418

Contract For:

Specification Title: Description:

Section: Page: Article/Paragraph:

Proposed Substitution:

Manufacturer: Address: Phone:

Trade Name: Model No.:

Installer: Address: Phone:

History: ☐ New product ☐ 2-5 years old ☐ 5-10 yrs old ☐ More than 10 years old

Differences between proposed substitution and specified product:

☐ Point-by-point comparative data attached - REQUIRED BY A/E

Reason for not providing specified item:

Similar Installation:

Project: Architect:

Address: Owner:

Date Installed:

Proposed substitution affects other parts of Work: ☐ No ☐ Yes; explain

Savings to Owner for accepting substitution: ($).

Proposed substitution changes Contract Time: ☐ No ☐ Yes [Add] [Deduct] days.

Supporting Data Attached: ☐ Drawings ☐ Product Data ☐ Samples ☐ Tests ☐ Reports ☐

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September 1996
CSI Form 13.1A

SUBSTITUTION REQUEST
(Continued)

The Undersigned certifies:

- Proposed substitution has been fully investigated and determined to be equal or superior in all respects to specified product.
- Same warranty will be furnished for proposed substitution as for specified product.
- Same maintenance service and source of replacement parts, as applicable, is available.
- Proposed substitution will have no adverse effect on other trades and will not affect or delay progress schedule.
- Cost data as stated above is complete. Claims for additional costs related to accepted substitution which may subsequently become apparent are to be waived.
- Proposed substitution does not affect dimensions and functional clearances.
- Payment will be made for changes to building design, including A/E design, detailing, and construction costs caused by the substitution.
- Coordination, installation, and changes in the Work as necessary for accepted substitution will be complete in all respects.

Submitted by: _____

Signed by: _____

Firm: _____

Address: _____

_____

Telephone: _____

Attachments: _____

_____

_____

_____

A/E's REVIEW AND ACTION

☐ Substitution approved - Make submittals in accordance with Specification Section 01330.
☐ Substitution approved as noted - Make submittals in accordance with Specification Section 01330.
☐ Substitution rejected - Use specified materials.
☐ Substitution Request received too late - Use specified materials.

Signed by: Date:

Additional Comments: ☐ Contractor ☐ Subcontractor ☐ Supplier ☐ Manufacturer ☐ A/E ☐ _____

_____

_____

_____

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_____

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Advancement of Construction Technology

REQUEST FOR INTERPRETATION

Project: YWCA Greater New Orleans
601 S. Norman C Francis Parkway, New Orleans, LA 70119

To: Trapolin-Peer Architects APC
850 Tchoupitoulas Street, New Orleans, LA 70130

Re:

R.F.I. Number:

From:

Date:

A/E Project Number: CN09418

Contract For:

Specification Section: Paragraph: Drawing Reference: Detail:

Request:

Signed by: Date:

Response:

☐ Attachments

Response From: To: Date Rec'd: Date Ret'd:

Signed by: Date:

Copies: ☐ Owner ☐ Consultants ☐ _____ ☐ _____ ☐ _____ ☐ _____ ☐ File

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Advancement of Construction Technology

PUNCH LIST

Project: YWCA Greater New Orleans

601 S. Norman C Francis Parkway, New Orleans, LA 70119

To (Contractor): _____

_____

From (A/E): Trapolin-Peer Architects APC

Site Visit Date: _____

A/E Project Number: CN09418

Contract For: _____

The following items require the attention of the Contractor for completion or correction. This list may not be all-inclusive, and the failure to include any items on this list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents.

Item Number	Room Number	Location (Area)	Description	Correction/Completion Date	Verification A/E Check

☐ Attachments

Signed by: Date:

Copies: ☐ Owner ☐ Consultants ☐ _____ ☐ _____ ☐ _____ ☐ _____ ☐ _____ ☐ _____ ☐ _____ ☐ File

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❖ NOT FOR RECORDATION PURPOSES ❖

Young Women's Christian Association (YWCA) Greater New Orleans

RECOMMENDATION OF ACCEPTANCE

TO: YWCA Greater New Orleans
601-605 S Norman C. Francis Parkway
(Aka 601-605 S. Jefferson Davis Parkway)
New Orleans, LA 70119

FROM: Trapolin-Peer Architects, APC
850 Tchoupitoulas Street
New Orleans, LA 70112

DATE: _____, 20____

PROJECT NAME: **YWCA of New Orleans**

CONTRACTOR: _____

ORIGINAL CONTRACT AMOUNT: $_____

FINAL CONTRACT AMOUNT: $_____

FINAL BUILDING AREA (SQ. FEET): _____ SF

I certify that, to the best of my knowledge and belief, this project is substantially complete in accordance with the Plans and Specifications to the point where it can be used for the purpose which was intended. It is recommended that it be accepted.

DATE OF ACCEPTANCE: _____, 20____

CONTRACT DATE OF COMPLETION: _____, 20____

NUMBER OF DAYS (OVERRUN) (UNDERRUN) (As of Acceptance Date): _____Days

LIQUIDATED DAMAGES PER DAY STIPULATED IN CONTRACT: $ 1,500.00

VALUE OF PUNCH LIST *(Attach punch list)*: $_____

Was part of project occupied prior to Acceptance?

PORTION OCCUPIED: *(Attach Partial Occupancy Forms)*

_____

ROOF GUAR-MANUFACTURER: _____

START DATE: _____/20____ END DATE: _____/20____

ROOFER: _____

START DATE: _____/20____ END DATE: _____/20____

_____ /20____
Architect Date

FOR USE OF PROJECT MANAGER:

_____ /20____
Owner Date

❖ NOT FOR RECORDATION PURPOSES ❖

CERTIFICATE OF COMPLIANCE

with

Americans with Disabilities Act and Architectural Barriers Act Accessibility Guidelines

TO: **YWCA Greater New Orleans**
601-605 S. Norman C. Francis Parkway (aka 601-605 S. Jefferson Davis Parkway)
New Orleans, LA 70119

FROM: **Trapolin-Peer Architects, APC**
850 Tchoupitoulas Street, New Orleans, LA 70122

PROJECT NAME: **YWCA Greater New Orleans**

DATE OF ACCEPTANCE: _____, 20____

I, _____, certify that, to the best of my knowledge and belief, this project has been constructed in compliance with the Americans with Disabilities Act and Architectural Barriers Act Accessibility Guidelines as reviewed by the Office of State Fire Marshal.

_____ Date: _____, 20____

Architect Signa

SPECIFICATION DIVISONS 01- 32

SECTION 01100 - SUMMARY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Project information.
2. Work covered by Contract Documents.
3. Work by Owner.
4. Work under separate contracts.
5. Owner-furnished products.
6. Contractor-furnished, Owner-installed products.
7. Access to site.
8. Coordination with occupants.
9. Work restrictions.
10. Specification and drawing conventions.

B. Related Requirements:

1. Section 01500 "Temporary Facilities and Controls" for limitations and procedures governing temporary use of Owner's facilities.

1.3 PROJECT INFORMATION

A. Project Identification: YWCA New Orleans

1. Project Location: 601 South Norman C. Francis (aka 601-605 South Jefferson Davis Parkway, New Orleans, LA 70119

B. Owner: YWCA Greater New Orleans; 601-605 South Norman C. Francis (aka 601-605 S Jefferson Davis Parkway, New Orleans, LA 70119

1. Owner's Representative: Keely Thibodeaux/ Project Manager, Landmark Consulting. (504) 524-8880.

C. Architect: Trapolin-Peer Architects; 850 Tchoupitoulas St., New Orleans, LA 70130. (504) 523-2772

D. Architect's Consultants: The Architect has retained the following design professionals who have prepared designated portions of the Contract Documents:

1. Mechanical, Electrical, Plumbing Consultant: IMC. Consulting Engineers; 3120 20th Street, Metairie, LA 70002. (504) 831-919.

2. Structural Consultant: Axis Engineering LLC, 3500 N. Causeway Blvd., Suite 200, Metairie, LA 70002.

3. Civil Consultant: Kyle and Associates, LLC., 638 Village Lane North, Mandeville, LA 70471.

E. Other Owner Consultants: The Owner has retained the following design professionals who have prepared designated portions of the Contract Documents:

1. Hotel & Restaurant Supply: Bill Young, C.F.S.P., (504) 281-5024 or (800) 530-7194.

2. Spackman Mossop Michaels: Emily Bullock, Principal, 1824 Sophie Wright Place, New Orleans, LA. 70130

1.4 WORK COVERED BY CONTRACT DOCUMENTS

A. The Work of Project is defined by the Contract Documents and consists of the following:

1. YWCA is a two story building approximately 17,000 square feet. The construction type is IIB and occupancy type is Educational and Business. The structural system is steel columns, masonry infill, steel beams, load bearing studs and bar joists. The exterior façade is masonry, stucco, and cast stone.

B. Type of Contract:

1. Project will be constructed under a single prime contract.

1.5 WORK BY OWNER

A. General: Cooperate fully with Owner so work may be carried out smoothly, without interfering with or delaying work under this Contract or work by Owner. Coordinate the Work of this Contract with work performed by Owner.

B. Subsequent Work: Owner will perform the following additional work at site after Substantial Completion. Completion of that work will depend on successful completion of preparatory work under this Contract.

1. Installation of playground equipment will be provided by the owner.

1.6 OWNER-FURNISHED PRODUCTS

A. Owner will furnish products indicated. The Work includes receiving, unloading, handling, storing, protecting, and installing Owner-furnished products.

B. Owner-Furnished Products:
   1. Security Cameras and IT equipment
   2. Playground Equipment
   3. Window Coverings

1.7 ACCESS TO SITE

A. Use of Site: Limit use of Project site to areas within the Contract limits indicated. Do not disturb portions of Project site beyond areas in which the Work is indicated.

   1. Limits: Confine construction operations to area defined by the contract documents. Contractor is not to disturb the operations of the existing building.

1.8 WORK RESTRICTIONS

A. Work Restrictions, General: Comply with restrictions on construction operations.

   1. Comply with limitations on use of public streets and with other requirements of authorities having jurisdiction.

B. Existing Utility Interruptions: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after providing temporary utility services according to requirements indicated:

   1. Notify Architect and Owner not less than two days in advance of proposed utility interruptions.
   2. Obtain Owner's written permission before proceeding with utility interruptions.

C. Noise, Vibration, and Odors: Coordinate operations that may result in high levels of noise and vibration, odors, or other disruption to Owner occupancy with Owner.

   1. Notify Architect and Owner not less than two days in advance of proposed disruptive operations.
   2. Obtain Owner's written permission before proceeding with disruptive operations.

D. Nonsmoking Building: Smoking is not permitted within the building or within 25 feet (8 m) of entrances, operable windows, or outdoor-air intakes.

E. Controlled Substances: Use of tobacco products and other controlled substances on Project site is not permitted.

F. Employee Identification: Provide identification tags for Contractor personnel working on Project site. Require personnel to use identification tags at all times.

1.9 SPECIFICATION AND DRAWING CONVENTIONS

A. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:

1. Imperative mood and streamlined language are generally used in the Specifications. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.
2. Specification requirements are to be performed by Contractor unless specifically stated otherwise.

B. Division 01 General Requirements: Requirements of Sections in Division 01 apply to the Work of all Sections in the Specifications.

C. Drawing Coordination: Requirements for materials and products identified on Drawings are described in detail in the Specifications. One or more of the following are used on Drawings to identify materials and products:

1. Terminology: Materials and products are identified by the typical generic terms used in the individual Specifications Sections.
2. Abbreviations: Materials and products are identified by abbreviations published as part of the U.S. National CAD Standard and scheduled on Drawings.
3. Keynoting: Materials and products are identified by reference keynotes referencing Specification Section numbers found in this Project Manual.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01100

SECTION 012100 - ALLOWANCES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements governing allowances.

B. Types of allowances include the following:

1. Lump-sum allowances as determined by Owner
2. Contingency allowances as determined by Owner

C. Related Requirements:
1. Section 012600 "Contract Modification Procedures" for procedures for submitting and handling Change Orders.
2. Section 014000 "Quality Requirements" for procedures governing the use of allowances for field testing by an independent testing agency.

1.3 DEFINITIONS

A. Allowance: A quantity of work or dollar amount included in the Contract, established in lieu of additional requirements, used to defer selection of actual materials and equipment to a later date when direction will be provided to Contractor. If necessary, additional requirements will be issued by Change Order.

1.4 SELECTION AND PURCHASE

A. At the earliest practical date after award of the Contract, advise Architect of the date when final selection, or purchase and delivery, of each product or system described by an allowance must be completed by the Owner to avoid delaying the Work.

B. At Architect's request, obtain proposals for each allowance for use in making final selections. Include recommendations that are relevant to performing the Work.

C. Purchase products and systems selected by Architect from the designated supplier.

1.5 ACTION SUBMITTALS

A. Submit proposals for purchase of products or systems included in allowances in the form specified for Change Orders.

1.6 INFORMATIONAL SUBMITTALS

A. Submit invoices or delivery slips to show actual quantities of materials delivered to the site for use in fulfillment of each allowance.

B. Submit time sheets and other documentation to show labor time and cost for installation of allowance items that include installation as part of the allowance.

C. Coordinate and process submittals for allowance items in same manner as for other portions of the Work.

1.7 LUMP-SUM ALLOWANCES

A. Allowance shall include cost to Contractor of specific products and materials ordered by Owner or selected by Architect under allowance and shall include **taxes,** freight**,** and delivery to Project site.

B. Unless otherwise indicated, Contractor's costs for receiving and handling at Project site, labor, installation, overhead and profit, and similar costs related to products and materials ordered by Owner or selected by Architect under allowance shall be included as part of the of the allowance.

C. Unused Materials: Return unused materials purchased under an allowance to manufacturer or supplier for credit to Owner, after installation has been completed and accepted.

1. If requested by Architect, retain and prepare unused material for storage by Owner. Deliver unused material to Owner's storage space as directed.

1.8 CONTINGENCY ALLOWANCES

A. Use the contingency allowance only as directed by Architect for Owner's purposes and only by Change Orders that indicate amounts to be charged to the allowance.

B. Contractor's overhead, profit, and related costs for products and equipment ordered by Owner under the contingency allowance are included in the allowance and are not part of the Contract Sum. These costs include delivery, installation**, taxes**, insurance, equipment rental, and similar costs.

C. Change Orders authorizing use of funds from the contingency allowance will include Contractor's related costs and reasonable overhead and profit.

D. At Project closeout, credit unused amounts remaining in the contingency allowance to Owner by Change Order.

1.9 ADJUSTMENT OF ALLOWANCES

A. Allowance Adjustment: To adjust allowance amounts, prepare a Change Order proposal based on the difference between purchase amount and the allowance, multiplied by final measurement of work-in-place where applicable. If applicable, include reasonable allowances for cutting losses, tolerances, mixing wastes, normal product imperfections, required maintenance materials, and similar margins.

1. Include installation costs in purchase amount only where indicated as part of the allowance.
2. If requested, prepare explanation and documentation to substantiate distribution of overhead costs and other markups.
3. Submit substantiation of a change in scope of Work, if any, claimed in Change Orders related to unit-cost allowances.
4. Owner reserves the right to establish the quantity of work-in-place by independent quantity survey, measure, or count.

B. Submit claims for increased costs due to a change in the scope or nature of the allowance described in the Contract Documents, whether for the purchase order amount or Contractor's handling, labor, installation, overhead, and profit.

1. Do not include Contractor's or subcontractor's indirect expense in the Change Order cost amount unless it is clearly shown that the nature or extent of Work has changed from what could have been foreseen from information in the Contract Documents.
2. No change to Contractor's indirect expense is permitted for selection of higher- or lower-priced materials or systems of the same scope and nature as originally indicated.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine products covered by an allowance promptly on delivery for damage or defects. Return damaged or defective products to manufacturer for replacement.

3.2 PREPARATION

A. Coordinate materials and their installation for each allowance with related materials and installations to ensure that each allowance item is completely integrated and interfaced with related work.

3.3 SCHEDULE OF ALLOWANCES

A. Allowance No. 1: Lump-Sum Allowance:

1. This allowance includes material, receiving, handling, and installation costs, and Contractor overhead and profit.

B. Allowance No. 2: Quantity Allowance:

C. Allowance No. 3: Contingency Allowance: Include a contingency allowance for use according to Owner's written instructions.

END OF SECTION 012100

SECTION 01230 - ALTERNATES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

B. Related Sections:
   1. Section 01290 “Payment Procedures” for Pay Application requirements for Base Bid and Alternates.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for alternates.

1.3 DEFINITIONS

A. Alternate: An amount proposed by bidders and stated on the Bid Form for certain work defined in the bidding requirements that may be added to or deducted from the base bid amount if Owner decides to accept a corresponding change either in the amount of construction to be completed or in the products, materials, equipment, systems, or installation methods described in the Contract Documents.

   1. Alternates described in this Section are part of the Work only if enumerated in the Agreement.
   2. The cost or credit for each alternate is the net addition to or deduction from the Contract Sum to incorporate alternate into the Work. No other adjustments are made to the Contract Sum.

1.4 PROCEDURES

A. Coordination: Revise or adjust affected adjacent work as necessary to completely integrate work of the alternate into Project.

   1. Include as part of each alternate, miscellaneous devices, accessory objects, and similar items incidental to or required for a complete installation whether or not indicated as part of alternate.

B. Notification: Immediately following award of the Contract, notify each party involved, in writing, of the status of each alternate. Indicate if alternates have been accepted,

SECTION 01250 - CONTRACT MODIFICATION PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for handling and processing Contract modifications.

B. Related Requirements:

1. Section 01635 "Substitution Procedures" for administrative procedures for handling requests for substitutions made after the Contract award.

1.3 MINOR CHANGES IN THE WORK

A. Architect will issue supplemental instructions authorizing minor changes in the Work, not involving adjustment to the Contract Sum or the Contract Time, on AIA Document G710, "Architect's Supplemental Instructions."

1.4 PROPOSAL REQUESTS

A. Owner-Initiated Proposal Requests: Architect will issue a detailed description of proposed changes in the Work that may require adjustment to the Contract Sum or the Contract Time. If necessary, the description will include supplemental or revised Drawings and Specifications.

1. Work Change Proposal Requests issued by Architect are not instructions either to stop work in progress or to execute the proposed change.
2. Within 20 days, when not otherwise specified, after receipt of Proposal Request, submit a quotation estimating cost adjustments to the Contract Sum and the Contract Time necessary to execute the change.

    a. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
    b. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
    c. Include costs of labor and supervision directly attributable to the change.
    d. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
    e. Quotation Form: Use forms acceptable to Architect.

B. Contractor-Initiated Proposals: If latent or changed conditions require modifications to the Contract, Contractor may initiate a claim by submitting a request for a change to Architect .

1. Include a statement outlining reasons for the change and the effect of the change on the Work. Provide a complete description of the proposed change. Indicate the effect of the proposed change on the Contract Sum and the Contract Time.
2. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
3. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
4. Include costs of labor and supervision directly attributable to the change.
5. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
6. Comply with requirements in Section 01635 "Substitution Procedures" if the proposed change requires substitution of one product or system for product or system specified.
7. Proposal Request Form: Use form acceptable to Architect.

1.5 CHANGE ORDER PROCEDURES

A. On Owner's approval of a Work Changes Proposal Request, Architect will issue a Change Order for signatures of Owner and Contractor on AIA Document G701 .

1.6 CONSTRUCTION CHANGE DIRECTIVE

A. Construction Change Directive: Architect may issue a Construction Change Directive on AIA Document G714 . Construction Change Directive instructs Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.

1. Construction Change Directive contains a complete description of change in the Work. It also designates method to be followed to determine change in the Contract Sum or the Contract Time.

B. Documentation: Maintain detailed records on a time and material basis of work required by the Construction Change Directive.

1. After completion of change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01250

SECTION 01290 - PAYMENT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements necessary to prepare and process Applications for Payment.

B. Related Requirements:

1. Section 01210 "Allowances" for procedural requirements governing the handling and processing of allowances.
2. Section 01250 "Contract Modification Procedures" for administrative procedures for handling changes to the Contract.
3. Section 01320 "Construction Progress Documentation" for administrative requirements governing the preparation and submittal of Contractor's construction schedule.

1.3 DEFINITIONS

A. Schedule of Values: A statement furnished by Contractor allocating portions of the Contract Sum to various portions of the Work and used as the basis for reviewing Contractor's Applications for Payment.

1.4 SCHEDULE OF VALUES

A. Coordination: Coordinate preparation of the schedule of values with preparation of Contractor's construction schedule.

1. Base Bid and Alternates as described on Sheet A0.06, shall be separated into their own schedule of values. Food Equipment to be itemized within pay application for each type of equipment. Integrated Mockups to be itemized as a separate line item. Each item listed under Alternates shall be itemized a separate line item within the Pay Application

2. The total of all items shall equal the total contract sum This schedule, when approved by the architect, shall be used as the basis for the contractor’s application for payment and it may be used for determining the cost of the work in deductive change orders, when a specific item of work listed on the schedule of values is to be removed. Once the schedule of values is submitted at the pre-construction conference, the schedule shall not be modified without the approval of the Project Manager and Architect.

3. Coordinate line items in the schedule of values with other required administrative forms and schedules, including the following:

a. Application for Payment forms with continuation sheets.
b. Submittal schedule.
c. Items required to be indicated as separate activities in Contractor's construction schedule.

4. Submit the schedule of values to Architect at earliest possible date, but no later than seven days before the date scheduled for submittal of initial Applications for Payment.
5. Subschedules for Separate Elements of Work: Where the Contractor's construction schedule defines separate elements of the Work, provide subschedules showing values coordinated with each element.
6. Subschedules for Separate Design Contracts: Where the Owner has retained design professionals under separate contracts who will each provide certification of payment requests, provide subschedules showing values coordinated with the scope of each design services contract as described in Section 01100 "Summary."

B. Format and Content: Use Project Manual table of contents as a guide to establish line items for the schedule of values. Provide at least one line item for each Specification Section.

1. Identification: Include the following Project identification on the schedule of values:

a. Project name and location.
b. Name of Architect.
c. Architect's project number.
d. Contractor's name and address.
e. Date of submittal.

2. Arrange schedule of values consistent with format of AIA Document G703 .
3. Arrange the schedule of values in tabular form with separate columns to indicate the following for each item listed:

a. Related Specification Section or Division.
b. Description of the Work.
c. Name of subcontractor.
d. Change Orders (numbers) that affect value.
e. Dollar value of the following, as a percentage of the Contract Sum to nearest one-hundredth percent, adjusted to total 100 percent.

4. Provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Coordinate with Project Manual table of contents. Provide multiple line items for principal subcontract amounts in excess of five percent of the Contract Sum.

a. Include separate line items under Contractor and principal subcontracts for Project closeout requirements in an amount totaling five percent of the Contract Sum and subcontract amount.

5. Round amounts to nearest whole dollar; total shall equal the Contract Sum.
6. Provide a separate line item in the schedule of values for each part of the Work where Applications for Payment may include materials or equipment purchased or fabricated and stored, but not yet installed.

a. Differentiate between items stored on-site and items stored off-site. If required, include evidence of insurance.

7. Allowances: Provide a separate line item in the schedule of values for each allowance. Show line-item value of allowances, as a product of the unit cost, multiplied by measured quantity. Use information indicated in the Contract Documents to determine quantities.

8. Provide separate line items in the schedule of values for initial cost of materials, for each subsequent stage of completion, and for total installed value of that part of the Work.
9. Each item in the schedule of values and Applications for Payment shall be complete. Include total cost and proportionate share of general overhead and profit for each item.

    a. Temporary facilities and other major cost items that are not direct cost of actual work-in-place will be shown as separate line items in the schedule of values.

10. Schedule Updating: Update and resubmit the schedule of values before the next Applications for Payment when Change Orders or Construction Change Directives result in a change in the Contract Sum.

11. Closeout Costs. Include separate line items under Contractor and principal subcontractors for Project closeout requirements in an amount totaling five percent of the Contract Sum and subcontract amount.

12. Schedule of Values Revisions: Revise the schedule of values when Change Orders or Construction Change Directives result in a change in the Contract Sum. Include at least one separate line item for each Change Order and Construction Change Order Directive.

1.5 APPLICATIONS FOR PAYMENT

A. Each Application for Payment following the initial Application for Payment shall be consistent with previous applications and payments as certified by Architect and Project Manager and paid for by Owner.

    1. Initial Application for Payment, Application for Payment at time of Substantial Completion, and final Application for Payment involve additional requirements.

B. Base Bid and Alternates, as described in A-0.06 shall be separated into their owner application for payment. Food Equipment to be itemized within pay application for each type of equipment. Integrated Mock ups to be itemized as a separate line item. Each item listed under Alternates shall be itemized a separate line item within the Pay Application.

C. Payment Application Times: The date for each progress payment is indicated in the Agreement between Owner and Contractor. The period of construction work covered by each Application for Payment is the period indicated in the Agreement.

    1. Submit draft copy of Application for Payment seven days prior to due date for review by Architect.

D. Application for Payment Forms: Use AIA Document G702 and AIA Document G703 as form for Applications for Payment.

E. Application for Payment Forms: Use forms acceptable to Architect and Owner for Applications for Payment. Submit forms for approval with initial submittal of schedule of values.

F. Application Preparation: Complete every entry on form. Notarize and execute by a person authorized to sign legal documents on behalf of Contractor. Architect will return incomplete applications without action.

1. Entries shall match data on the schedule of values and Contractor's construction schedule. Use updated schedules if revisions were made.
2. Include amounts for work completed following previous Application for Payment, whether or not payment has been received. Include only amounts for work completed at time of Application for Payment.
3. Include amounts of Change Orders and Construction Change Directives issued before last day of construction period covered by application.
4. Indicate separate amounts for work being carried out under Owner-requested project acceleration.

G. Stored Materials: Include in Application for Payment amounts applied for materials or equipment purchased or fabricated and stored, but not yet installed. Differentiate between items stored on-site and items stored off-site.

1. Provide certificate of insurance, evidence of transfer of title to Owner, and consent of surety to payment, for stored materials.
2. Provide supporting documentation that verifies amount requested, such as paid invoices. Match amount requested with amounts indicated on documentation; do not include overhead and profit on stored materials.
3. Provide summary documentation for stored materials indicating the following:

    a. Value of materials previously stored and remaining stored as of date of previous Applications for Payment.
    b. Value of previously stored materials put in place after date of previous Application for Payment and on or before date of current Application for Payment.
    c. Value of materials stored since date of previous Application for Payment and remaining stored as of date of current Application for Payment.

H. Transmittal: Submit three signed and notarized original copies of each Application for Payment to Architect by a method ensuring receipt within 24 hours. One copy shall include waivers of lien and similar attachments if required.

1. Transmit each copy with a transmittal form listing attachments and recording appropriate information about application.

I. Waivers of Mechanic's Lien: With each Application for Payment, submit waivers of mechanic's lien from entities lawfully entitled to file a mechanic's lien arising out of the Contract and related to the Work covered by the payment.

1. Submit partial waivers on each item for amount requested in previous application, after deduction for retainage, on each item.
2. When an application shows completion of an item, submit conditional final or full waivers.
3. Owner reserves the right to designate which entities involved in the Work must submit waivers.
4. Waiver Forms: Submit executed waivers of lien on forms acceptable to Owner.

J. Waivers of Mechanic's Lien: With each Application for Payment, submit waivers of mechanic's liens from subcontractors, sub-subcontractors, and suppliers for construction period covered by the previous application.

1. Submit partial waivers on each item for amount requested in previous application, after deduction for retainage, on each item.
2. When an application shows completion of an item, submit conditional final or full waivers.
3. Owner reserves the right to designate which entities involved in the Work must submit waivers.
4. Submit final Application for Payment with or preceded by conditional final waivers from every entity involved with performance of the Work covered by the application who is lawfully entitled to a lien.
5. Waiver Forms: Submit executed waivers of lien on forms, acceptable to Owner.

K. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of first Application for Payment include the following:

1. Overhead and Profit enumerated separately from Construction Costs

2. List of subcontractors. Identify DBE subcontractors.
3. Schedule of values.
4. Contractor's construction schedule (preliminary if not final).
5. Products list (preliminary if not final).
6. Submittal schedule (preliminary if not final).
7. List of Contractor's staff assignments.
8. List of Contractor's principal consultants.
9. Copies of building permits.
10. Copies of authorizations and licenses from authorities having jurisdiction for performance of the Work.
11. Initial progress report.
12. Report of preconstruction conference.
13. Certificates of insurance and insurance policies.
14. Performance and payment bonds.
15. Data needed to acquire Owner's insurance.

L. Application for Payment at Substantial Completion: After Architect issues the Certificate of Substantial Completion, submit an Application for Payment showing 100 percent completion for portion of the Work claimed as substantially complete.

1. Include documentation supporting claim that the Work is substantially complete and a statement showing an accounting of changes to the Contract Sum.
2. This application shall reflect Certificate(s) of Substantial Completion issued previously for Owner occupancy of designated portions of the Work.

M. Final Payment Application: After completing Project closeout requirements, submit final Application for Payment with releases and supporting documentation not previously submitted and accepted, including, but not limited, to the following:

1. Evidence of completion of Project closeout requirements.
2. Insurance certificates for products and completed operations where required and proof that taxes, fees, and similar obligations were paid.
3. Updated final statement, accounting for final changes to the Contract Sum.
4. AIA Document G706, "Contractor's Affidavit of Payment of Debts and Claims."
5. AIA Document G706A, "Contractor's Affidavit of Release of Liens."
6. AIA Document G707, "Consent of Surety to Final Payment."
7. Evidence that claims have been settled.

8. Final meter readings for utilities, a measured record of stored fuel, and similar data as of date of Substantial Completion or when Owner took possession of and assumed responsibility for corresponding elements of the Work.
9. Final liquidated damages settlement statement.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01290

SECTION 01310 - PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:

1. General coordination procedures.
2. Coordination drawings.
3. Requests for Information (RFIs).
4. Project meetings.

B. Related Requirements:
1. Section 01320 "Construction Progress Documentation" for preparing and submitting Contractor's construction schedule.
2. Section 01700 "Execution Requirements" for procedures for coordinating general installation and field-engineering services, including establishment of benchmarks and control points.
3. Section 01770 "Closeout Procedures" for coordinating closeout of the Contract.

1.3 DEFINITIONS

A. RFI: Request from Owner,Architect, or Contractor seeking information required by or clarifications of the Contract Documents.

1.4 INFORMATIONAL SUBMITTALS

A. Subcontract List: Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Use CSI Form 1.5A. Include the following information in tabular form:

1. Name, address, and telephone number of entity performing subcontract or supplying products.
2. Number and title of related Specification Section(s) covered by subcontract.
3. Drawing number and detail references, as appropriate, covered by subcontract.

B. Key Personnel Names: Within 15 days of starting construction operations, submit a list of key personnel assignments, including superintendent and other personnel in attendance at Project site. Identify individuals and their duties and responsibilities; list addresses and telephone numbers, including home, office, and cellular telephone numbers and e-mail addresses. Provide names, addresses, and telephone numbers of individuals assigned as alternates in the absence of individuals assigned to Project.

1. Post copies of list in project meeting room, in temporary field office, and by each temporary telephone. Keep list current at all times.

1.5 GENERAL COORDINATION PROCEDURES

A. Coordination: Coordinate construction operations included in different Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations, included in different Sections, that depend on each other for proper installation, connection, and operation.

1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
2. Coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair.
3. Make adequate provisions to accommodate items scheduled for later installation.

B. Prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.

1. Prepare similar memoranda for Owner and separate contractors if coordination of their Work is required.

C. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:

1. Preparation of Contractor's construction schedule.
2. Preparation of the schedule of values.
3. Installation and removal of temporary facilities and controls.
4. Delivery and processing of submittals.
5. Progress meetings.
6. Preinstallation conferences.
7. Project closeout activities.
8. Startup and adjustment of systems.

D. Conservation: Coordinate construction activities to ensure that operations are carried out with consideration given to conservation of energy, water, and materials. Coordinate use of temporary utilities to minimize waste.

1. Salvage materials and equipment involved in performance of, but not actually incorporated into, the Work. See other Sections for disposition of salvaged materials that are designated as Owner's property.

1.6 COORDINATION DRAWINGS

A. Coordination Drawings, General: Prepare coordination drawings according to requirements in individual Sections, and additionally where installation is not completely shown on Shop Drawings, where limited space availability necessitates coordination, or if coordination is required to facilitate integration of products and materials fabricated or installed by more than one entity.

1. Content: Project-specific information, drawn accurately to a scale large enough to indicate and resolve conflicts. Do not base coordination drawings on standard printed data. Include the following information, as applicable:

    a. Use applicable Drawings as a basis for preparation of coordination drawings. Prepare sections, elevations, and details as needed to describe relationship of various systems and components.
    b. Indicate functional and spatial relationships of components of architectural, structural, civil, mechanical, and electrical systems.
    c. Indicate space requirements for routine maintenance and for anticipated replacement of components during the life of the installation.
    d. Show location and size of access doors required for access to concealed dampers, valves, and other controls.
    e. Indicate required installation sequences.
    f. Indicate dimensions shown on the Drawings. Specifically note dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements. Provide alternate sketches to Architect indicating proposed resolution of such conflicts. Minor dimension changes and difficult installations will not be considered changes to the Contract.

B. Coordination Drawing Organization: Organize coordination drawings as follows:

1. Floor Plans and Reflected Ceiling Plans: Show architectural and structural elements, and mechanical, plumbing, fire-protection, fire-alarm, and electrical Work. Show locations of visible ceiling-mounted devices relative to acoustical ceiling grid. Supplement plan drawings with section drawings where required to adequately represent the Work.
2. Plenum Space: Indicate subframing for support of ceiling and wall systems, mechanical and electrical equipment, and related Work. Locate components within ceiling plenum to accommodate layout of light fixtures indicated on Drawings. Indicate areas of conflict between light fixtures and other components.
3. Mechanical Rooms: Provide coordination drawings for mechanical rooms showing plans and elevations of mechanical, plumbing, fire-protection, fire-alarm, and electrical equipment.
4. Structural Penetrations: Indicate penetrations and openings required for all disciplines.
5. Slab Edge and Embedded Items: Indicate slab edge locations and sizes and locations of embedded items for metal fabrications, sleeves, anchor bolts, bearing plates, angles, door floor closers, slab depressions for floor finishes, curbs and housekeeping pads, and similar items.
6. Mechanical and Plumbing Work: Show the following:

    a. Sizes and bottom elevations of ductwork, piping, and conduit runs, including insulation, bracing, flanges, and support systems.
    b. Dimensions of major components, such as dampers, valves, diffusers, access doors, cleanouts and electrical distribution equipment.
    c. Fire-rated enclosures around ductwork.

7. Electrical Work: Show the following:

    a. Runs of vertical and horizontal conduit 1-1/4 inches (32 mm) in diameter and larger.
    b. Light fixture, exit light, emergency battery pack, smoke detector, and other fire-alarm locations.
    c. Panel board, switch board, switchgear, transformer, busway, generator, and motor control center locations.
    d. Location of pull boxes and junction boxes, dimensioned from column center lines.

8. Fire-Protection System: Show the following:

    a. Locations of standpipes, mains piping, branch lines, pipe drops, and sprinkler heads.

9. Review: Architect will review coordination drawings to confirm that the Work is being coordinated, but not for the details of the coordination, which are Contractor's responsibility. If Architect determines that coordination drawings are not being prepared in sufficient scope or detail, or are otherwise deficient, Architect will so inform Contractor, who shall make changes as directed and resubmit.
10. Coordination Drawing Prints: Prepare coordination drawing prints according to requirements in Section 01330 "Submittal Procedures."

1.7 REQUESTS FOR INFORMATION (RFIs)

A. General: Immediately on discovery of the need for additional information or interpretation of the Contract Documents, Contractor shall prepare and submit an RFI in the form specified.

1. Architect will return RFIs submitted to Architect by other entities controlled by Contractor with no response.
2. Coordinate and submit RFIs in a prompt manner so as to avoid delays in Contractor's work or work of subcontractors.

B. Content of the RFI: Include a detailed, legible description of item needing information or interpretation and the following:

1. Project name.
2. Project number.
3. Date.
4. Name of Contractor.
5. Name of Architect.
6. RFI number, numbered sequentially.
7. RFI subject.
8. Specification Section number and title and related paragraphs, as appropriate.
9. Drawing number and detail references, as appropriate.
10. Field dimensions and conditions, as appropriate.
11. Contractor's suggested resolution. If Contractor's suggested resolution impacts the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
12. Contractor's signature.
13. Attachments: Include sketches, descriptions, measurements, photos, Product Data, Shop Drawings, coordination drawings, and other information necessary to fully describe items needing interpretation.

    a. Include dimensions, thicknesses, structural grid references, and details of affected materials, assemblies, and attachments on attached sketches.

C. RFI Forms: AIA Document G716 .

1. Attachments shall be electronic files in Adobe Acrobat PDF format.

D. Architect's Action: Architect will review each RFI, determine action required, and respond. Allow seven working days for Architect's response for each RFI. RFIs received by Architectafter 1:00 p.m. will be considered as received the following working day.

1. The following Contractor-generated RFIs will be returned without action:

    a. Requests for approval of submittals.
    b. Requests for approval of substitutions.
    c. Requests for approval of Contractor's means and methods.
    d. Requests for coordination information already indicated in the Contract Documents.
    e. Requests for adjustments in the Contract Time or the Contract Sum.
    f. Requests for interpretation of Architect's actions on submittals.
    g. Incomplete RFIs or inaccurately prepared RFIs.

2. Architect's action may include a request for additional information, in which case Architect's time for response will date from time of receipt of additional information.
3. Architect's action on RFIs that may result in a change to the Contract Time or the Contract Sum may be eligible for Contractor to submit Change Proposal according to Section 01250 "Contract Modification Procedures."

    a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Architect in writing within 10 days of receipt of the RFI response.

E. RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by the RFI number. Submit log weekly . Use CSI Log Form 13.2B.

1. Project name.
2. Name and address of Contractor.
3. Name and address of Architect.
4. RFI number including RFIs that were returned without action or withdrawn.
5. RFI description.
6. Date the RFI was submitted.
7. Date Architect's response was received.

F. On receipt of Architect's action, update the RFI log and immediately distribute the RFI response to affected parties. Review response and notify Architectwithin seven days if Contractor disagrees with response.

1. Identification of related Minor Change in the Work, Construction Change Directive, and Proposal Request, as appropriate.

1.8 PROJECT MEETINGS

A. General: Schedule and conduct meetings and conferences at Project site unless otherwise indicated.

1. Attendees: Inform participants and others involved, and individuals whose presence is required, of date and time of each meeting. Notify Owner and Architect of scheduled meeting dates and times.
2. Agenda: Prepare the meeting agenda. Distribute the agenda to all invited attendees.
3. Minutes: Entity responsible for conducting meeting will record significant discussions and agreements achieved. Distribute the meeting minutes to everyone concerned, including Owner and Architect, within three days of the meeting.

B. Preconstruction Conference: Architect will schedule and conduct a preconstruction conference before starting construction, at a time convenient to Owner and Architect, but no later than 15 days after execution of the Agreement.

1. Conduct the conference to review responsibilities and personnel assignments.
2. Attendees: Authorized representatives of Owner Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the conference. Participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
3. Agenda: Discuss items of significance that could affect progress, including the following:

    a. Tentative construction schedule.
    b. Phasing.
    c. Critical work sequencing and long-lead items.
    d. Designation of key personnel and their duties.
    e. Lines of communications.
    f. Procedures for processing field decisions and Change Orders.
    g. Procedures for RFIs.
    h. Procedures for testing and inspecting.
    i. Procedures for processing Applications for Payment.
    j. Distribution of the Contract Documents.
    k. Submittal procedures.
    l. Preparation of record documents.
    m. Use of the premises and existing building.
    n. Work restrictions.
    o. Working hours.
    p. Owner's occupancy requirements.
    q. Responsibility for temporary facilities and controls.
    r. Procedures for moisture and mold control.
    s. Procedures for disruptions and shutdowns.
    t. Construction waste management and recycling.
    u. Parking availability.
    v. Office, work, and storage areas.
    w. Equipment deliveries and priorities.
    x. First aid.
    y. Security.
    z. Progress cleaning.

4. Minutes: Entity responsible for conducting meeting will record and distribute meeting minutes.

C. Preinstallation Conferences: Conduct a preinstallation conference at Project site before each construction activity that requires coordination with other construction.

1. Attendees: Installer and representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Advise Architect of scheduled meeting dates.
2. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration, including requirements for the following:

    a. Contract Documents.
    b. Options.
    c. Related RFIs.
    d. Related Change Orders.

e. Purchases.
f. Deliveries.
g. Submittals.
h. Review of mockups.
i. Possible conflicts.
j. Compatibility requirements.
k. Time schedules.
l. Weather limitations.
m. Manufacturer's written instructions.
n. Warranty requirements.
o. Compatibility of materials.
p. Acceptability of substrates.
q. Temporary facilities and controls.
r. Space and access limitations.
s. Regulations of authorities having jurisdiction.
t. Testing and inspecting requirements.
u. Installation procedures.
v. Coordination with other work.
w. Required performance results.
x. Protection of adjacent work.
y. Protection of construction and personnel.

3. Record significant conference discussions, agreements, and disagreements, including required corrective measures and actions.
4. Reporting: Distribute minutes of the meeting to each party present and to other parties requiring information.
5. Do not proceed with installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of the Work and reconvene the conference at earliest feasible date.

D. Project Closeout Conference: Schedule and conduct a project closeout conference, at a time convenient to Owner and Architect, but no later than 90 days prior to the scheduled date of Substantial Completion.

1. Conduct the conference to review requirements and responsibilities related to Project closeout.
2. Attendees: Authorized representatives of Owner, Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the meeting. Participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
3. Agenda: Discuss items of significance that could affect or delay Project closeout, including the following:

a. Preparation of record documents.
b. Procedures required prior to inspection for Substantial Completion and for final inspection for acceptance.
c. Submittal of written warranties.
d. Requirements for preparing operations and maintenance data.
e. Requirements for delivery of material samples, attic stock, and spare parts.
f. Requirements for demonstration and training.
g. Preparation of Contractor's punch list.
h. Procedures for processing Applications for Payment at Substantial Completion and for final payment.
i. Submittal procedures.
j. Owner's partial occupancy requirements.
k. Installation of Owner's furniture, fixtures, and equipment.

l. Responsibility for removing temporary facilities and controls.

4. Minutes: Entity conducting meeting will record and distribute meeting minutes.

E. Progress Meetings: Conduct progress meetings at regular intervals.

1. Coordinate dates of meetings with preparation of payment requests.
2. Attendees: In addition to representatives of Owner and Architect, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
3. Agenda: Review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.

    a. Contractor's Construction Schedule: Review progress since the last meeting. Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor's construction schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.

        1) Review schedule for next period.

    b. Review present and future needs of each entity present, including the following:

        1) Interface requirements.
        2) Sequence of operations.
        3) Status of submittals.
        4) Deliveries.
        5) Off-site fabrication.
        6) Access.
        7) Site utilization.
        8) Temporary facilities and controls.
        9) Progress cleaning.
        10) Quality and work standards.
        11) Status of correction of deficient items.
        12) Field observations.
        13) Status of RFIs.
        14) Status of proposal requests.
        15) Pending changes.
        16) Status of Change Orders.
        17) Pending claims and disputes.
        18) Documentation of information for payment requests.

4. Minutes: Entity responsible for conducting the meeting will record and distribute the meeting minutes to each party present and to parties requiring information.

    a. Schedule Updating: Revise Contractor's construction schedule after each progress meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with the report of each meeting.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01310

SECTION 01320 - CONSTRUCTION PROGRESS DOCUMENTATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for documenting the progress of construction during performance of the Work, including the following:

1. Startup construction schedule.
2. Contractor's construction schedule.
3. Construction schedule updating reports.
4. Weekly construction reports.
5. Material location reports.
6. Site condition reports.
7. Special reports.

B. Related Requirements:
1. Section 01330 "Submittal Procedures" for submitting schedules and reports.
2. Section 01400 "Quality Requirements" for submitting a schedule of tests and inspections.

1.3 DEFINITIONS

A. Activity: A discrete part of a project that can be identified for planning, scheduling, monitoring, and controlling the construction project. Activities included in a construction schedule consume time and resources.

1. Critical Activity: An activity on the critical path that must start and finish on the planned early start and finish times.
2. Predecessor Activity: An activity that precedes another activity in the network.
3. Successor Activity: An activity that follows another activity in the network.

B. Cost Loading: The allocation of the schedule of values for the completion of an activity as scheduled. The sum of costs for all activities must equal the total Contract Sum unless otherwise approved by Architect.

C. CPM: Critical path method, which is a method of planning and scheduling a construction project where activities are arranged based on activity relationships. Network calculations determine when activities can be performed and the critical path of Project.

D. Critical Path: The longest connected chain of interdependent activities through the network schedule that establishes the minimum overall Project duration and contains no float.

E. Event: The starting or ending point of an activity.

F. Float: The measure of leeway in starting and completing an activity.

1. Float time is not for the exclusive use or benefit of either Owner or Contractor, but is a jointly owned, expiring Project resource available to both parties as needed to meet schedule milestones and Contract completion date.
2. Free float is the amount of time an activity can be delayed without adversely affecting the early start of the successor activity.
3. Total float is the measure of leeway in starting or completing an activity without adversely affecting the planned Project completion date.

G. Resource Loading: The allocation of manpower and equipment necessary for the completion of an activity as scheduled.

1.4 INFORMATIONAL SUBMITTALS

A. Format for Submittals: Submit required submittals in the following format:

1. Working electronic copy of schedule file, where indicated.
2. PDF electronic file.
3. [Two paper copies.

B. Startup construction schedule.

C. Startup Network Diagram: Of size required to display entire network for entire construction period. Show logic ties for activities.

D. Contractor's Construction Schedule: Initial schedule, of size required to display entire schedule for entire construction period.

E. Construction Schedule Updating Reports: Submit with Applications for Payment.

F. Weekly Construction Reports: Submit at monthly intervals with Application for Payment.

G. Material Location Reports: Submit at monthly intervals with Application for Payment.

H. Site Condition Reports: Submit at time of discovery of differing conditions.

I. Special Reports: Submit at time of unusual event.

J. Qualification Data: For scheduling consultant.

1.5 QUALITY ASSURANCE

A. Prescheduling Conference: Conduct conference at Project site to comply with requirements in Section 01310 "Project Management and Coordination." Review methods and procedures related to the preliminary construction schedule and Contractor's construction schedule, including, but not limited to, the following:

1. Review software limitations and content and format for reports.
2. Verify availability of qualified personnel needed to develop and update schedule.
3. Discuss constraints, including phasing work stages area separations interim milestones and partial Owner occupancy.

4. Review delivery dates for Owner-furnished products.
5. Review schedule for work of Owner's separate contracts.
6. Review submittal requirements and procedures.
7. Review time required for review of submittals and resubmittals.
8. Review requirements for tests and inspections by independent testing and inspecting agencies.
9. Review time required for Project closeout and Owner startup procedures.
10. Review and finalize list of construction activities to be included in schedule.
11. Review procedures for updating schedule.

1.6 COORDINATION

A. Coordinate Contractor's construction schedule with the schedule of values, list of subcontracts, submittal schedule, progress reports, payment requests, and other required schedules and reports.

1. Secure time commitments for performing critical elements of the Work from entities involved.
2. Coordinate each construction activity in the network with other activities and schedule them in proper sequence.

PART 2 - PRODUCTS

2.1 CONTRACTOR'S CONSTRUCTION SCHEDULE, GENERAL

A. Time Frame: Extend schedule from date established for commencement of the Work the Notice to Proceed to date of final completion.

1. Contract completion date shall not be changed by submission of a schedule that shows an early completion date, unless specifically authorized by Change Order.

B. Activities: Treat each story or separate area as a separate numbered activity for each main element of the Work. Comply with the following:

1. Activity Duration: Define activities so no activity is longer than 20 days, unless specifically allowed by Architect.
2. Procurement Activities: Include procurement process activities for long lead items and major items, requiring a cycle of more than 60 days, as separate activities in schedule. Procurement cycle activities include, but are not limited to, submittals, approvals, purchasing, fabrication, and delivery.
3. Submittal Review Time: Include review and resubmittal times indicated in Section 01330 "Submittal Procedures" in schedule. Coordinate submittal review times in Contractor's construction schedule with submittal schedule.
4. Startup and Testing Time: Include no fewer than 15 days for startup and testing.
5. Substantial Completion: Indicate completion in advance of date established for Substantial Completion, and allow time for Architect's administrative procedures necessary for certification of Substantial Completion.
6. Punch List and Final Completion: Include not more than 30 days for completion of punch list items and final completion.

C. Constraints: Include constraints and work restrictions indicated in the Contract Documents and as follows in schedule, and show how the sequence of the Work is affected.

1. Phasing: Arrange list of activities on schedule by phase.
2. Products Ordered in Advance: Include a separate activity for each product. Include delivery date indicated in Section 01100 "Summary." Delivery dates indicated stipulate the earliest possible delivery date.
3. Owner-Furnished Products: Include a separate activity for each product. Include delivery date indicated in Section 01100 "Summary." Delivery dates indicated stipulate the earliest possible delivery date.
4. Work Restrictions: Show the effect of the following items on the schedule:

    a. Coordination with existing construction.
    b. Uninterruptible services.
    c. Use of premises restrictions.
    d. Provisions for future construction.
    e. Seasonal variations.
    f. Environmental control.

5. Work Stages: Indicate important stages of construction for each major portion of the Work, including, but not limited to, the following:

    a. Subcontract awards.
    b. Submittals.
    c. Purchases.
    d. Mockups.
    e. Fabrication.
    f. Sample testing.
    g. Deliveries.
    h. Installation.
    i. Tests and inspections.
    j. Adjusting.
    k. Curing.
    l. Startup and placement into final use and operation.

6.

D. Milestones: Include milestones indicated in the Contract Documents in schedule, including, but not limited to, the Notice to Proceed, Substantial Completion, and final completion**[.]**

E. Upcoming Work Summary: Prepare summary report indicating activities scheduled to occur or commence prior to submittal of next schedule update. Summarize the following issues:

1. Unresolved issues.
2. Unanswered Requests for Information.
3. Rejected or unreturned submittals.
4. Notations on returned submittals.
5. Pending modifications affecting the Work and Contract Time.

F. Recovery Schedule: When periodic update indicates the Work is 14 or more calendar days behind the current approved schedule, submit a separate recovery schedule indicating means by which Contractor intends to regain compliance with the schedule. Indicate changes to working hours, working days, crew sizes, and equipment required to achieve compliance, and date by which recovery will be accomplished.

G. Computer Scheduling Software: Prepare schedules using current version of a program that has been developed specifically to manage construction schedules.

2.2 CONTRACTOR'S CONSTRUCTION SCHEDULE (GANTT CHART)

A. Gantt-Chart Schedule: Submit a comprehensive, fully developed, horizontal, Gantt-chart-type, Contractor's construction schedule within 30 days of date established for commencement of the Work . Base schedule on the startup construction schedule and additional information received since the start of Project.

B. Preparation: Indicate each significant construction activity separately. Identify first workday of each week with a continuous vertical line.

1. For construction activities that require three months or longer to complete, indicate an estimated completion percentage in 10 percent increments within time bar.

2.3 REPORTS

A. Weekly Construction Reports: Prepare a daily construction report recording the following information concerning events at Project site:

1. List of subcontractors at Project site.
2. List of separate contractors at Project site.
3. Approximate count of personnel at Project site.
4. Equipment at Project site.
5. Material deliveries.
6. High and low temperatures and general weather conditions, including presence of rain or snow.
7. Accidents.
8. Meetings and significant decisions.
9. Unusual events (see special reports).
10. Stoppages, delays, shortages, and losses.
11. Meter readings and similar recordings.
12. Emergency procedures.
13. Orders and requests of authorities having jurisdiction.
14. Change Orders received and implemented.
15. Construction Change Directives received and implemented.
16. Services connected and disconnected.
17. Equipment or system tests and startups.
18. Partial completions and occupancies.
19. Substantial Completions authorized.

B. Material Location Reports: At monthly intervals, prepare and submit a comprehensive list of materials delivered to and stored at Project site. List shall be cumulative, showing materials previously reported plus items recently delivered. Include with list a statement of progress on and delivery dates for materials or items of equipment fabricated or stored away from Project site. Indicate the following categories for stored materials:

1. Material stored prior to previous report and remaining in storage.
2. Material stored prior to previous report and since removed from storage and installed.
3. Material stored following previous report and remaining in storage.

C. Site Condition Reports: Immediately on discovery of a difference between site conditions and the Contract Documents, prepare and submit a detailed report. Submit with a Request for Information. Include a detailed description of the differing conditions, together with recommendations for changing the Contract Documents.

2.4 SPECIAL REPORTS

A. General: Submit special reports directly to Owner within one day(s) of an occurrence. Distribute copies of report to parties affected by the occurrence.

B. Reporting Unusual Events: When an event of an unusual and significant nature occurs at Project site, whether or not related directly to the Work, prepare and submit a special report. List chain of events, persons participating, response by Contractor's personnel, evaluation of results or effects, and similar pertinent information. Advise Owner in advance when these events are known or predictable.

PART 3 - EXECUTION

3.1 CONTRACTOR'S CONSTRUCTION SCHEDULE

A. Contractor's Construction Schedule Updating: At monthly intervals, update schedule to reflect actual construction progress and activities. Issue schedule one week before each regularly scheduled progress meeting.

1. Revise schedule immediately after each meeting or other activity where revisions have been recognized or made. Issue updated schedule concurrently with the report of each such meeting.
2. Include a report with updated schedule that indicates every change, including, but not limited to, changes in logic, durations, actual starts and finishes, and activity durations.
3. As the Work progresses, indicate final completion percentage for each activity.

B. Distribution: Distribute copies of approved schedule to Architect Owner, separate contractors, testing and inspecting agencies, and other parties identified by Contractor with a need-to-know schedule responsibility.

1. Post copies in Project meeting rooms and temporary field offices.
2. When revisions are made, distribute updated schedules to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in performance of construction activities.

END OF SECTION 01320

SECTION 01330 - SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes requirements for the submittal schedule and administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals.

B. Related Requirements:

1. Section 01290 "Payment Procedures" for submitting Applications for Payment and the schedule of values.
2. Section 01320 "Construction Progress Documentation" for submitting schedules and reports, including Contractor's construction schedule.
3. Section 01781 "Project Record Documents" for submitting record Drawings, record Specifications, and record Product Data.

1.3 DEFINITIONS

A. Action Submittals: Written and graphic information and physical samples that require Architect's responsive action. Action submittals are those submittals indicated in individual Specification Sections as "action submittals."

B. Informational Submittals: Written and graphic information and physical samples that do not require Architect's responsive action. Submittals may be rejected for not complying with requirements. Informational submittals are those submittals indicated in individual Specification Sections as "informational submittals."

C. File Transfer Protocol (FTP): Communications protocol that enables transfer of files to and from another computer over a network and that serves as the basis for standard Internet protocols. An FTP site is a portion of a network located outside of network firewalls within which internal and external users are able to access files.

D. Portable Document Format (PDF): An open standard file format licensed by Adobe Systems used for representing documents in a device-independent and display resolution-independent fixed-layout document format.

1.4 ACTION SUBMITTALS

A. Submittal Schedule: Submit a schedule of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, ordering, manufacturing, fabrication, and delivery when establishing dates. Include additional time required for making

corrections or revisions to submittals noted by Architect and additional time for handling and reviewing submittals required by those corrections.

1. Coordinate submittal schedule with list of subcontracts, the schedule of values, and Contractor's construction schedule.
2. Final Submittal: Submit concurrently with the first complete submittal of Contractor's construction schedule.

    a. Submit revised submittal schedule to reflect changes in current status and timing for submittals.

3. Format: Arrange the following information in a tabular format:

    a. Scheduled date for first submittal.
    b. Specification Section number and title.
    c. Submittal category: Action; informational.
    d. Name of subcontractor.
    e. Description of the Work covered.
    f. Scheduled date for Architect's final release or approval.
    g. Scheduled date of fabrication.
    h. Scheduled dates for purchasing.
    i. Scheduled dates for installation.
    j. Activity or event number.

1.5 SUBMITTAL ADMINISTRATIVE REQUIREMENTS

A. Architect's Digital Data Files: Electronic digital data files of the Contract Drawings will not be provided by Architect for Contractor's use in preparing submittals.

1. Architect will furnish Contractor one set of digital data drawing files of the Contract Drawings for use in preparing Shop Drawings and Project record drawings.
    a. Contractor shall execute a data licensing agreement in the form of AIA Document C106, Digital Data Licensing Agreement or as provided by Architect & their Consultants.

B. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.

1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
2. Submit all submittal items required for each Specification Section concurrently unless partial submittals for portions of the Work are indicated on approved submittal schedule.
3. Submit action submittals and informational submittals required by the same Specification Section as separate packages under separate transmittals.
4. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.

    a. Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.

C. Processing Time: Allow time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Architect's receipt of submittal. No extension of the

Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.

1. Initial Review: Allow 15 days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Architect will advise Contractor when a submittal being processed must be delayed for coordination.
2. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.
3. Resubmittal Review: Allow 15 days for review of each resubmittal.
4. Sequential Review: Where sequential review of submittals by Architect's consultants, Owner, or other parties is indicated, allow 21 days for initial review of each submittal.

    a. Structural

    b. Elevator

    c. HVAC

    d. Plumbing

    e. Electrical

    f. Sprinkler

    g. Kitchen Equipment

D. Paper Submittals: Place a permanent label or title block on each submittal item for identification.

1. Indicate name of firm or entity that prepared each submittal on label or title block.
2. Provide a space approximately 6 by 8 inches on label or beside title block to record Contractor's review and approval markings and action taken by Architect.
3. Include the following information for processing and recording action taken:

    a. Project name.
    b. Date.
    c. Name of Architect.
    d. Name of Construction Manager.
    e. Name of Contractor.
    f. Name of subcontractor.
    g. Name of supplier.
    h. Name of manufacturer.
    i. Submittal number or other unique identifier, including revision identifier.

        1) Submittal number shall use Specification Section number followed by a decimal point and then a sequential number (e.g., 06100.01). Resubmittals shall include an alphabetic suffix after another decimal point (e.g., 06100.01.A).

    j. Number and title of appropriate Specification Section.
    k. Drawing number and detail references, as appropriate.
    l. Location(s) where product is to be installed, as appropriate.
    m. Other necessary identification.

4. Additional Paper Copies: Unless additional copies are required for final submittal, and unless Architect observes noncompliance with provisions in the Contract Documents, initial submittal may serve as final submittal.

    a. Submit one copy of submittal to concurrent reviewer in addition to specified number of copies to Architect.

5. Transmittal for Paper Submittals: Assemble each submittal individually and appropriately for transmittal and handling. Transmit each submittal using a transmittal form. Architect] will return without review submittals received from sources other than Contractor.

    a. Transmittal Form for Paper Submittals: Use AIA Document G810 .
    b. Transmittal Form for Paper Submittals: Provide locations on form for the following information:

        1) Project name.
        2) Date.
        3) Destination (To:).
        4) Source (From:).
        5) Name and address of Architect.
        6) Name of Contractor.
        7) Name of firm or entity that prepared submittal.
        8) Names of subcontractor, manufacturer, and supplier.
        9) Category and type of submittal.
        10) Submittal purpose and description.
        11) Specification Section number and title.
        12) Specification paragraph number or drawing designation and generic name for each of multiple items.
        13) Drawing number and detail references, as appropriate.
        14) Indication of full or partial submittal.
        15) Transmittal number, numbered consecutively.
        16) Submittal and transmittal distribution record.
        17) Remarks.
        18) Signature of transmitter.

E. Options: Identify options requiring selection by Architect.

F. Deviations and Additional Information: On an attached separate sheet, prepared on Contractor's letterhead, record relevant information, requests for data, revisions other than those requested by Architect on previous submittals, and deviations from requirements in the Contract Documents, including minor variations and limitations. Include same identification information as related submittal. Architect will advise Contactor when deviations must be delayed for further review and coordination.

G. Resubmittals: Make resubmittals in same form and number of copies as initial submittal.

1. Note date and content of previous submittal.
2. Note date and content of revision in label or title block and clearly indicate extent of revision.
3. Resubmit submittals until they are marked with approval notation from Architect'saction stamp.

H. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.

I. Use for Construction: Retain complete copies of submittals on Project site. Use only final action submittals that are marked with approval notation from Architect'saction stamp.

PART 2 - PRODUCTS

2.1 SUBMITTAL PROCEDURES

A. General Submittal Procedure Requirements: Prepare and submit submittals required by individual Specification Sections. Types of submittals are indicated in individual Specification Sections.

1. Action Submittals: Submit three paper copies of each submittal unless otherwise indicated. Architect will return two copies.
2. Informational Submittals: Submit two paper copies of each submittal unless otherwise indicated. Architect will not return copies.
3. Certificates and Certifications Submittals: Provide a statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity.
    a. Provide a notarized statement on original paper copy certificates and certifications where indicated.

B. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.

1. If information must be specially prepared for submittal because standard published data are not suitable for use, submit as Shop Drawings, not as Product Data.
2. Mark each copy of each submittal to show which products and options are applicable.
3. Include the following information, as applicable:

    a. Manufacturer's catalog cuts.
    b. Manufacturer's product specifications.
    c. Standard color charts.
    d. Statement of compliance with specified referenced standards.
    e. Testing by recognized testing agency.
    f. Application of testing agency labels and seals.
    g. Notation of coordination requirements.
    h. Availability and delivery time information.

4. For equipment, include the following in addition to the above, as applicable:

    a. Wiring diagrams showing factory-installed wiring.
    b. Printed performance curves.
    c. Operational range diagrams.
    d. Clearances required to other construction, if not indicated on accompanying Shop Drawings.

5. Submit Product Data before or concurrent with Samples.

6. Submit Product Data in the following format:

    a. PDF electronic file.
    b. Three paper copies of Product Data unless otherwise indicated. Architect will return two copies.

C. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data.

1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:

    a. Identification of products.
    b. Schedules.
    c. Compliance with specified standards.
    d. Notation of coordination requirements.
    e. Notation of dimensions established by field measurement.
    f. Relationship and attachment to adjoining construction clearly indicated.
    g. Seal and signature of professional engineer if specified.

2. Sheet Size: Except for templates, patterns, and similar full-size drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches, but no larger than 24 inches by 36 inches.
3. Submit Shop Drawings in the following format:
    a. Three opaque copies of each submittal. Architect will retain one copy; remainder will be returned.

D. Samples: Submit Samples for review of kind, color, pattern, and texture for a check of these characteristics with other elements and for a comparison of these characteristics between submittal and actual component as delivered and installed.

1. Transmit Samples that contain multiple, related components such as accessories together in one submittal package.
2. Identification: Attach label on unexposed side of Samples that includes the following:

    a. Generic description of Sample.
    b. Product name and name of manufacturer.
    c. Sample source.
    d. Number and title of applicable Specification Section.
    e. Specification paragraph number and generic name of each item.
3. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.

    a. Samples that may be incorporated into the Work are indicated in individual Specification Sections. Such Samples must be in an undamaged condition at time of use.
    b. Samples not incorporated into the Work, or otherwise designated as Owner's property, are the property of Contractor.

4. Samples for Initial Selection: Submit manufacturer's color charts consisting of physical units or sections of units showing the full range of colors, textures, and patterns available. If physical units are not provided, architect shall select no more than 3 options from the

range provided. Physical samples shall then be provided of those 3 options. If approved, one of those options shall be considered the accepted sample for verification.

a. Number of Samples: Submit one full set(s) of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Architect will return submittal with options selected.

5. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from same material to be used for the Work, cured and finished in manner specified, and physically identical with material or product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.

a. Number of Samples: Submit three sets of Samples. Architectwill retain two Sample sets; remainder will be returned. Mark up and retain one returned Sample set as a project record sample.

1) Submit a single Sample where assembly details, workmanship, fabrication techniques, connections, operation, and other similar characteristics are to be demonstrated.
2) If variation in color, pattern, texture, or other characteristic is inherent in material or product represented by a Sample, submit at least three sets of paired units that show approximate limits of variations.

E. Product Schedule: As required in individual Specification Sections, prepare a written summary indicating types of products required for the Work and their intended location. Include the following information in tabular form:

1. Type of product. Include unique identifier for each product indicated in the Contract Documents or assigned by Contractor if none is indicated.
2. Manufacturer and product name, and model number if applicable.
3. Number and name of room or space.
4. Location within room or space.
5. Submit product schedule in the following format:

a. PDF electronic file.
b. Three paper copies of product schedule or list unless otherwise indicated. Architect**,** will return two copies.

F. Coordination Drawing Submittals: Comply with requirements specified in Section 01310 "Project Management and Coordination."

G. Contractor's Construction Schedule: Comply with requirements specified in Section 01320 "Construction Progress Documentation."

H. Application for Payment and Schedule of Values: Comply with requirements specified in Section 01290 "Payment Procedures."

I. Test and Inspection Reports and Schedule of Tests and Inspections Submittals: Comply with requirements specified in Section 01400 "Quality Requirements."

J. Closeout Submittals and Maintenance Material Submittals: Comply with requirements specified in Section 01770 "Closeout Procedures."

K. Maintenance Data: Comply with requirements specified in Section 01782 "Operation and Maintenance Data."

L. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, contact information of architects and owners, and other information specified.

M. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of Welding Procedure Specification and Procedure Qualification Record on AWS forms. Include names of firms and personnel certified.

N. Installer Certificates: Submit written statements on manufacturer's letterhead certifying that Installer complies with requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.

O. Manufacturer Certificates: Submit written statements on manufacturer's letterhead certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.

P. Product Certificates: Submit written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.

Q. Material Certificates: Submit written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.

R. Material Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in the Contract Documents.

S. Product Test Reports: Submit written reports indicating that current product produced by manufacturer complies with requirements in the Contract Documents. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.

T. Research Reports: Submit written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for Project. Include the following information:

1. Name of evaluation organization.
2. Date of evaluation.
3. Time period when report is in effect.
4. Product and manufacturers' names.
5. Description of product.
6. Test procedures and results.
7. Limitations of use.

U. Preconstruction Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements in the Contract Documents.

V. Compatibility Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for primers and substrate preparation needed for adhesion.

W. Field Test Reports: Submit written reports indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.

X. Design Data: Prepare and submit written and graphic information, including, but not limited to, performance and design criteria, list of applicable codes and regulations, and calculations. Include list of assumptions and other performance and design criteria and a summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Include page numbers.

PART 3 - EXECUTION

3.1 CONTRACTOR'S REVIEW

A. Action and Informational Submittals: Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Architect.

B. Project Closeout and Maintenance Material Submittals: See requirements in Section 01770 "Closeout Procedures."

C. Approval Stamp: Stamp each submittal with a uniform, approval stamp. Include Project name and location, submittal number, Specification Section title and number, name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.

3.2 ARCHITECT'S ACTION

A. Action Submittals: Architect will review each submittal, make marks to indicate corrections or revisions required, and return it. Architect will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action.

1. “Reviewed or Reviewed as Noted” If submittals and/or shop drawings are marked such this indicates the shop drawing, product data or sample is reviewed for field use. This review does not authorize changes to the contract sum unless agreed to in writing by the owner and unless provided by change order.

   Review is only for conformance with the design concept of the work and with the information given in the contract documents. The contractor is responsible for determining and verifying all materials, field measurements and field construction criteria related thereto for information and fabricating requirements or to the means, methods, techniques, sequences and procedures of construction, and for the coordination of the work of all trades. The Architect’s and/or the Project Manager’s review shall not be construed to approve any deviation of the requirements for errors or omissions in the shop drawings, product data or sample by review thereof.

2. “Revise and Resubmit” or “Rejected”
   If submittals and /or shop drawings are marked as such then this indicates that the shop drawing, product data or sample is not approved for field use. Resubmission is required. Corrections shall be limited to items marked. If revisions other than those requested are made on subsequent submittals, the contractor shall direct specific attention thereto.

B. Informational Submittals: Architect will review each submittal and will not return it, or will return it if it does not comply with requirements. Architect will forward each submittal to appropriate party.

C. Partial submittals prepared for a portion of the Work will be reviewed when use of partial submittals has received prior review from Architect.

D. Incomplete submittals are unacceptable, will be considered nonresponsive, and will be returned for resubmittal without review.

E. Submittals not required by the Contract Documents may be returned by the Architect without action.

END OF SECTION 01330

SECTION 01400 - QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for quality assurance and quality control.

B. Testing and inspecting services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.

1. Specific quality-assurance and -control requirements for individual construction activities are specified in the Sections that specify those activities. Requirements in those Sections may also cover production of standard products.
2. Specified tests, inspections, and related actions do not limit Contractor's other quality-assurance and -control procedures that facilitate compliance with the Contract Document requirements.
3. Requirements for Contractor to provide quality-assurance and -control services required by Architect, Owner, or authorities having jurisdiction are not limited by provisions of this Section.
4. Specific test and inspection requirements are not specified in this Section.

1.3 DEFINITIONS

A. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.

B. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that actual products incorporated into the Work and completed construction comply with requirements. Services do not include contract enforcement activities performed by Architect.

C. Mockups: Full-size physical assemblies that are constructed on-site. Mockups are constructed to verify selections made under Sample submittals; to demonstrate aesthetic effects and, where indicated, qualities of materials and execution; to review coordination, testing, or operation; to show interface between dissimilar materials; and to demonstrate compliance with specified installation tolerances. Mockups are not Samples. Unless otherwise indicated, approved mockups establish the standard by which the Work will be judged.

1. Mockups must be approved by the Architect prior to preceding the work. The Architect has the right to reject an unsatisfactory mockup. In this case the Contractor is required to recreate the mockup for approval according to the Contract Documents.

2. Integrated Exterior Mockups: Mockups of the exterior envelope erected separately from the building but on Project site, consisting of multiple products, assemblies, and subassemblies. Construction of integrated exterior mockup specified in this section will serve to meet mockup requirements of individual listed sections unless otherwise noted.
3. Other Exterior Product Mockups: Mockups of exterior products not listed in this Section are required by individual specification sections, provide separate mockups and size of mockup construction.

D. Preconstruction Testing: Tests and inspections performed specifically for Project before products and materials are incorporated into the Work, to verify performance or compliance with specified criteria.

E. Product Testing: Tests and inspections that are performed by an NRTL, an NVLAP, or a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with specified requirements.

F. Source Quality-Control Testing: Tests and inspections that are performed at the source, e.g., plant, mill, factory, or shop.

G. Field Quality-Control Testing: Tests and inspections that are performed on-site for installation of the Work and for completed Work.

H. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.

I. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform a particular construction operation, including installation, erection, application, and similar operations.

1. Use of trade-specific terminology in referring to a trade or entity does not require that certain construction activities be performed by accredited or unionized individuals, or that requirements specified apply exclusively to specific trade(s).

J. Experienced: When used with an entity or individual, "experienced" means having successfully completed a minimum of five previous projects similar in nature, size, and extent to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.

1.4 CONFLICTING REQUIREMENTS

A. Referenced Standards: If compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer conflicting requirements that are different, but apparently equal, to Architect for a decision before proceeding.

B. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to Architect for a decision before proceeding.

1.5 ACTION SUBMITTALS

A. Shop drawings: For mockups, provide plans, sections, and elevations, indicating materials and size of mockup construction.
   1. Indicate manufacturer and model number of individual components.
   2. Provide axonometric drawings for conditions difficult to illustrate in two dimensions.

B. Coordination Date Information: For integrated exterior mockups provide product list indicating manufacturer and model number of individual components.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Contractor's quality-control personnel.

B. Contractor's Statement of Responsibility: When required by authorities having jurisdiction, submit copy of written statement of responsibility sent to authorities having jurisdiction before starting work on the following systems:
   1. Main wind-force-resisting system or a wind-resisting component listed in the wind-force-resisting system quality-assurance plan prepared by Architect.

C. Testing Agency Qualifications: For testing agencies specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include proof of qualifications in the form of a recent report on the inspection of the testing agency by a recognized authority.

D. Schedule of Tests and Inspections: Prepare in tabular form and include the following:

   1. Specification Section number and title.
   2. Entity responsible for performing tests and inspections.
   3. Description of test and inspection.
   4. Identification of applicable standards.
   5. Identification of test and inspection methods.
   6. Number of tests and inspections required.
   7. Time schedule or time span for tests and inspections.
   8. Requirements for obtaining samples.
   9. Unique characteristics of each quality-control service.

1.7 REPORTS AND DOCUMENTS

A. Test and Inspection Reports: Prepare and submit certified written reports specified in other Sections. Include the following:

   1. Date of issue.
   2. Project title and number.
   3. Name, address, and telephone number of testing agency.
   4. Dates and locations of samples and tests or inspections.
   5. Names of individuals making tests and inspections.
   6. Description of the Work and test and inspection method.
   7. Identification of product and Specification Section.
   8. Complete test or inspection data.
   9. Test and inspection results and an interpretation of test results.
   10. Record of temperature and weather conditions at time of sample taking and testing and inspecting.

11. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
12. Name and signature of laboratory inspector.
13. Recommendations on retesting and reinspecting.

B. Manufacturer's Technical Representative's Field Reports: Prepare written information documenting manufacturer's technical representative's tests and inspections specified in other Sections. Include the following:

1. Name, address, and telephone number of technical representative making report.
2. Statement on condition of substrates and their acceptability for installation of product.
3. Statement that products at Project site comply with requirements.
4. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
5. Results of operational and other tests and a statement of whether observed performance complies with requirements.
6. Statement whether conditions, products, and installation will affect warranty.
7. Other required items indicated in individual Specification Sections.

C. Permits, Licenses, and Certificates: For Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents, established for compliance with standards and regulations bearing on performance of the Work.

1.8 QUALITY ASSURANCE

A. General: Qualifications paragraphs in this article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.

B. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

C. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

D. Installer Qualifications: A firm or individual experienced in installing, erecting, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.

E. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or product that are similar in material, design, and extent to those indicated for this Project.

F. Specialists: Certain Specification Sections require that specific construction activities shall be performed by entities who are recognized experts in those operations. Specialists shall satisfy qualification requirements indicated and shall be engaged for activities indicated.

1. Requirements of authorities having jurisdiction shall supersede requirements for specialists.

G. Testing Agency Qualifications: An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspecting indicated, as documented according to ASTM E 329 ; and with additional qualifications specified in individual Sections; and, where required by authorities having jurisdiction, that is acceptable to authorities.

1. NRTL: A nationally recognized testing laboratory according to 29 CFR 1910.7.
2. NVLAP: A testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program.

H. Manufacturer's Technical Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to observe and inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.

I. Factory-Authorized Service Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.

J. Preconstruction Testing: Where testing agency is indicated to perform preconstruction testing for compliance with specified requirements for performance and test methods, comply with the following:

1. Contractor responsibilities include the following:

a. Provide test specimens representative of proposed and construction.
b. Submit specimens in a timely manner with sufficient time for testing and analyzing results to prevent delaying the Work.
c. Provide sizes and configurations of test assemblies, mockups, and laboratory mockups to adequately demonstrate capability of products to comply with performance requirements.
d. Build site-assembled test assemblies and mockups using installers who will perform same tasks for Project.
e. Build laboratory mockups at testing facility using personal, products, and methods of construction indicated for the completed Work.
f. When testing is complete, remove test specimens, assemblies, and mockups: do not refuse products on Project.

2. Testing Agency Responsibilities: Submit a certified written report of each test, inspection, and similar quality-assurance service to Architect, with copy to Contractor. Interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from the Contract Documents.

K. Mockups: Before installing portions of the Work requiring mockups, build mockups for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work:

1. Build mockups in location and of size indicated or, if not indicated, as directed by Architect.
2. Notify Architect seven days in advance of dates and times when mockups will be constructed.
3. Employ supervisory personnel who will oversee mockup construction. Employ workers that will be employed during the construction at Project.
4. Demonstrate the proposed range of aesthetic effects and workmanship.

5. Obtain Architect's approval of mockups before starting work, fabrication, or construction.

    a. Allow seven days for initial review and each re-review of each mockup.

6. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
7. Preinstallation Conference: Convene at Project site. Review requirements for construction of integrated exterior mockup with installers of all products required to be incorporated in mockup. Review approved mockup requirements in individual specification section. Resolve issues related to coordination and scheduling of work.
8. Integrated Exterior Mockups: Before installing portions of Exterior work requiring mockups, build integrated exterior mockup for each form of construction and finish required to comply with the following requirements, using material indicated for the completed Work:
    a. Build mockups in location and of size indicated or, if not indicated, as directed by Architect but not less than the following overall size and configuration:
        1) Build integrated mockup of adequate size to represent masonry products, stucco product, trim profiles, door and window not less than 12 feet wide by 8 feet high, incorporating wall assembly for each type unless otherwise shown on drawings.
9. Demolish and remove mockups when directed unless otherwise indicated.

1.9 QUALITY CONTROL

A. Owner Responsibilities: Where quality-control services are indicated as Owner's responsibility, Owner will engage a qualified testing agency to perform these services.

1. Owner will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of types of testing and inspecting they are engaged to perform.
2. Payment for these services will be made from testing and inspecting allowances, as authorized by Change Orders.
3. Costs for retesting and reinspecting construction that replaces or is necessitated by work that failed to comply with the Contract Documents will be charged to Contractor.

B. Contractor Responsibilities: Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. Perform additional quality-control activities required to verify that the Work complies with requirements, whether specified or not.

1. Unless otherwise indicated, provide quality-control services specified and those required by authorities having jurisdiction. Perform quality-control services required of Contractor by authorities having jurisdiction, whether specified or not.
2. Where services are indicated as Contractor's responsibility, engage a qualified testing agency to perform these quality-control services.

    a. Contractor shall not employ same entity engaged by Owner, unless agreed to in writing by Owner.

3. Notify testing agencies at least 24 hours in advance of time when Work that requires testing or inspecting will be performed.
4. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.

5. Testing and inspecting requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
6. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.

C. Manufacturer's Field Services: Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing as specified in Section 01330 "Submittal Procedures."

D. Manufacturer's Technical Services: Where indicated, engage a manufacturer's technical representative to observe and inspect the Work. Manufacturer's technical representative's services include participation in preinstallation conferences, examination of substrates and conditions, verification of materials, observation of Installer activities, inspection of completed portions of the Work, and submittal of written reports.

E. Retesting/Reinspecting: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and reinspecting, for construction that replaced Work that failed to comply with the Contract Documents.

F. Testing Agency Responsibilities: Cooperate with Architect and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.

1. Notify Architect and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
2. Determine the location from which test samples will be taken and in which in-situ tests are conducted.
3. Conduct and interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from requirements.
4. Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control service through Contractor.
5. Do not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the Work.
6. Do not perform any duties of Contractor.

G. Associated Services: Cooperate with agencies performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:

1. Access to the Work.
2. Incidental labor and facilities necessary to facilitate tests and inspections.
3. Adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples.
4. Facilities for storage and field curing of test samples.
5. Delivery of samples to testing agencies.
6. Preliminary design mix proposed for use for material mixes that require control by testing agency.
7. Security and protection for samples and for testing and inspecting equipment at Project site.

H. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and -control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.

1. Schedule times for tests, inspections, obtaining samples, and similar activities.

I. Coordination of Integrated Mock-ups: coordinate sequence of mock-up erection to enable assembly to duplicate conditions to be anticipated in the work.

J. Schedule of Tests and Inspections: Prepare a schedule of tests, inspections, and similar quality-control services required by the Contract Documents as a component of Contractor's quality-control plan. Coordinate and submit concurrently with Contractor's construction schedule. Update as the Work progresses.

1. Distribution: Distribute schedule to Owner, Architect, testing agencies, and each party involved in performance of portions of the Work where tests and inspections are required.

1.10 SPECIAL TESTS AND INSPECTIONS

A. Special Tests and Inspections: Conducted by a qualified testing agency as required by authorities having jurisdiction, as indicated in individual Specification Sections, and as follows:

1. Verifying that manufacturer maintains detailed fabrication and quality-control procedures and reviews the completeness and adequacy of those procedures to perform the Work.
2. Notifying Architect and Contractor promptly of irregularities and deficiencies observed in the Work during performance of its services.
3. Submitting a certified written report of each test, inspection, and similar quality-control service to Architect with copy to Contractor and to authorities having jurisdiction.
4. Submitting a final report of special tests and inspections at Substantial Completion, which includes a list of unresolved deficiencies.
5. Interpreting tests and inspections and stating in each report whether tested and inspected work complies with or deviates from the Contract Documents.
6. Retesting and reinspecting corrected work.
7.

PART 2 - PRODUCTS

2.1 INTEGRATED MOCKUP MATERIALS –

A. Materials and Products, General; Use specified products, or products approved by Architect prior to erection of mockup. Incorporate primary and accessory products specified in each section to be incorporated in exterior work where mockups are called for.

B. Exterior Mockup Components: Incorporate products in integrated exterior mockup specified in the following sections
1. 03450 Architectural Precast Concrete: to illustrate concrete copings in masonry walls and as required for support of integrated exterior mockup
2. 04220 Concrete Unit Masonry: to illustrate exposed exterior masonry and wall construction, and as required for support of integrated exterior mockup
3. 04720 Cast Stone: to illustrate exposed exterior masonry and wall construction, and as required for support of integrated exterior mockup
4. 04813 Brick Masonry: to illustrate exposed exterior masonry and wall construction, and as required for support of integrated exterior mockup
5. 05240 Cold Form Metal Studs: to illustrate wall construction, and as requirement support of integrated exterior mockup

6. 06160 Sheathing: Apply to framing where used as substrate for cladding materials incorporated in integrated exterior mockup
7. 07210 Insulation: apply in assemblies incorporated in integrated mockup
8. 07250 Weather Barriers: Apply to portion of each mockup material specified to receive weather barrier
9. 07272 Fluid Applied Membrane Air Barriers: Apply to portion of mockup material specified to receive air barrier
10. 07620 Sheet Metal Flashing and Trim: Include each exposed material and each material incorporated in wall assembly
11. 07920 Joint Sealants: Include sample of each typical exposed joint and each color within each cladding type.
12. 08411 Aluminum-Framed Entrances and Storefronts: Include frame in sample portion of opening as part of the integrated exterior mockup
13. 08520 Aluminum Windows: Include frame in sample portion of opening as part of the integrated exterior mockup
14. 09240 Portland Cement Plastering: to illustrate product in integrated mockup for installation and finish
15. 09220 Portland Cement Plaster: to illustrate product in integrated mockup for installation and finish
16. 09963 Elastomeric Coatings: to illustrate product on plaster surfaces
17. 09981 Cementitious Coatings: to illustrate product on concrete surfaces

PART 3 - EXECUTION

3.1 TEST AND INSPECTION LOG

A. Test and Inspection Log: Prepare a record of tests and inspections. Include the following:

1. Date test or inspection was conducted.
2. Description of the Work tested or inspected.
3. Date test or inspection results were transmitted to Architect.
4. Identification of testing agency or special inspector conducting test or inspection.

B. Maintain log at Project site. Post changes and revisions as they occur. Provide access to test and inspection log for Architect's reference during normal working hours.

3.2 REPAIR AND PROTECTION

A. General: On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.

1. Provide materials and comply with installation requirements specified in other Specification Sections or matching existing substrates and finishes. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible. Comply with the Contract Document requirements for cutting and patching in Section 01700 "Execution Requirements."

B. Assembly of integrated Exterior mockups: in locations indicated on the drawings, or if not indicated, as directed by Architect.
1. Maintain area around mockup free of stored materials and debris

2. Position mockup in location where lighting conditions are comparable to planned construction.
3. Assemble mockup to be self-bracing or provide adequate bracing against lateral forces
4. Masonry: Include masonry connection and insert details, ties, anchors, shelf angles, dowels and other related components.

C. Protect construction exposed by or for quality-control service activities.

D. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

3.3 DESCRIPTION OF LABORATORY SERVICES

A. Concrete;
1. Mix Design: In advance of concrete operations, materials proposed for use in concrete will be sampled and tested to determine their compliance with these Specifications. Mix proportions for each strength and type of concrete required shall be established by the Contractor and submitted to Laboratory. Laboratory shall review the designs for compliance with the specifications and shall submit a report to Engineer for his records.
2. Job Inspections: A representative of the Laboratory at the site will check the mixing of the concrete and conduct all field tests, such as slump determinations, yield, and air content checks, cast test cylinders, and regulate the consistency of the concrete. This representative shall also check and report any substandard concreting operations observed while at the site.
3. Concrete Cylinders: For each day's pour of one hundred (1000 cubic yards of fraction thereof, three(3) test cylinders shall be cast for each different strength of concrete placed. One (1) cylinder shall be tested and reported at seven (7) days and two (2) at twenty-eight (28) days, unless otherwise directed.

B. Reinforcing Steel: check for compliance with Specifications.

C. Piling:
1. Test Piles and Load Test: Laboratory shall inspect and log the placement of all test piles, and oversee the load testing of one (1) test pile as selected by the Engineer and as described in Section 316200 DRIVEN PILES. The load test shall be conducted in compliance with the requirements of the Orleans Parish Building Code as per ASTM 1143 to determine the safe bearing capacity of the piles.
2. Inspections: Perform inspections at source and at project site as specified in the Division 2 section for pilings.
3. Logging of Pile Driving: Log the driving all piling and record the following:
   a. Date driven
   b. Type of Hammer
   c. Pile description including actual tip
   d. Length and butt dimensions measured just prior to driving
   e. Location of Pile
   f. Size and depth of predrill
   g. Number of blows per foot for full length of the pile
   h. Tip and butt elevation
   i. Condition of shell, including depth of water removed (if any)
   j. Rate of concrete placement, volume of concrete placed, and elapsed time from start to finish
4. Concrete and Reinforcing steel quality control as specified herein above.
5. Reporting: Submit records daily.

D. Soil Compaction:
   1. Evaluate soil materials to determine optimum density in accordance with ASTM method specified (standard or modified Proctor).
   2. Test and inspect subgrades and fill layers to determine compliance with the Contract requirements.
   3. Test Methods: Perform field density tests in accordance with ASTM D 1556 (sand cone method) or ASTM D2922 (nuclear method).
   4. Building Slab Subgrade: make a least one field density test of subgrade for every 2000 sq. ft. of building slab, but in no case less than 4 tests.
   5. Paved Areas Subgrade: Make at least one field density test of subgrade for every 1,500 sq. ft. of paved area, but in no case less than 4 tests.

E. Granular Subbase and Soil-Cement Base Course:
   1. Perform in-place density tests as specified in Section 02540.
   2. Make at least one field density test of subbase and base course for every 1,500 sq. ft. of paved area, but not less than 4 tests of each material.

F. Structural Steel and Metal Deck:
   1. The testing laboratory shall visually inspect all connections to determine quality, size and compliance with approved erection drawings. Where the quality of a weld is in question, the Architect and Engineer will be advised. The Contractor may then be required to remove and reweld the connection or if the Contractor desires, may have the weld inspected further by radiography. The cost of this radiography inspection will be borne by the Contractor whether or not the weld is acceptable.
   2. All welders shall be approved by the laboratory in accordance with the American Society of Standards and qualified for the type of welding which they will perform.
   3. The testing laboratory shall inspect the high-strength bold connections in accordance with the requirements set forth in “Specifications for Structural Joints Using ASTM A 325 Bolts”, by the American Institute of Steel Construction.

G. Sprayed on Fireproofing:
   1. Certify that the sprayed-on fireproofing has been applied as required by Underwriter’s Laboratories, Inc. (UL) and that fireproofing has been tested in accordance with Section 07810 for thickness and density, and is undamaged and intact at the time of concealment.

END OF SECTION 01400

SECTION 01410- SPECIAL INSTRUCTIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SELECTION AND PAYMENT:

A. The Owner shall select and shall pay for the services of an independent testing laboratory to perform inspections and tests of materials and constructions as hereinafter specified and/or as specified in other sections of the specifications or as shown on the Drawings.

1.3 RELATED SECTIONS

A. 03300 – Cast-In-Place Concrete
B. 05120 – Structural Steel
C. 05210 – Steel Joist Framing
D. 05400 – Cold-Formed Metal Framing
E. 311000 – Clearing, Grubbing, and Proof-Rolling
F. 312000 – Earthwork
G. 315000 – Structural Excavation and Backfill

1.4 RESPONSIBILITY OF CONTRACTOR

A. Selection of the laboratory by the Owner in no way relieves the Contractor of his responsibility to furnish materials and construction in full compliance with the project plans and specifications. The Contractor accepts all processes, materials and their use which are approved by the testing laboratory unless the Contractor protests in writing prior to the approval by the testing laboratory.

1.5 COOPERATION OF CONTRACTOR

A. The Contractor shall cooperate with the laboratory and make available, without cost, samples of materials to be tested.

B. Furnish such nominal labor and sheltered working space as is necessary to obtain samples at the project.

C. Advise the laboratory of the identity of material sources and instruct the suppliers to allow tests or inspections by the laboratory.

D. Notify the laboratory sufficiently in advance of operations to allow for completion of initial tests and assignment of inspection personnel. Notification shall be not less than 48 hours in advance or as directed by the Architect.

1.6 REJECTION OF MATERIALS

A. The laboratory shall reject any materials which are not in full conformance with specifications, and promptly notify the Architect. The Architect shall notify the Contractor promptly of such rejections. Any materials rejected by the laboratory shall not be incorporated in the work without prior written approval of the Architect.

1.7 TEST METHODS

A. Tests and inspections shall be conducted in accordance with the requirements of these specifications or, if not herein specified, in accordance with latest ASTM, ACI, or other recognized authorities.

1.8 TEST REPORTS

A. The laboratory shall submit written reports of each test and inspection made to the Architect, Engineer and Contractor, suppliers of tested products and to such other parties the Architect may specify.

1.9 ADDITIONAL TESTS

A. The Architect reserves the right to require additional tests to those specified or upon materials not herein specified for testing. If such tests are necessary because of apparently defective materials or workmanship, the cost of these additional tests shall be borne by the Contractor.

1.10 DESCRIPTION OF TESTS AND INSPECTION

A. Concrete: The laboratory shall continuously monitor the delivery and placing of ready-mix concrete for compliance with the Drawings and the Specifications. The laboratory representative shall report any substandard concrete operations as soon as practicable. Laboratory shall comply with the requirements of ACI 301, Chapter 16.

1. Mix Design: In advance of concrete operations, materials proposed for use in concrete shall be sampled and tested to determine their compliance with the Specifications. Mix proportions shall be established by the Contractor for each strength and type of concrete and shall submit same to Laboratory. Laboratory shall review mix designs for compliance with the Specifications.

2. Concrete Plant Inspections: At all times during concrete operations, a representative of the laboratory at the batching plant shall witness the loading of each batch of concrete to determine that the approved mix designs are used

3. Sampling: The laboratory shall test the slump, air content, and temperature of the discharged concrete periodically from trucks selected at random and from all truckloads exhibiting visible inconsistencies. The laboratory representative shall have the authority to reject any truckload of concrete not delivered within the specified time limit, or not in compliance with the slump or air-entrainment requirements, or otherwise judged to be deficient.

4. Test cylinders: The laboratory shall cast a set of three (3) standard cylinders for each one hundred (100) cubic yards of concrete placed, but no less than one set per pour. The cylinders shall be broken in the laboratory to test the compressive strength; test one (1) at seven (7) days and two (2) at twenty-eight (28) days.

5. Testing procedures shall be in accordance with the following:

    a. Slump test, ASTM C143
    b. Sampling, ASTM C172
    c. Cylinder specimens, ASTM C31

d. Compression tests, ASTM C39
e. Criteria for acceptance, ACI 301 Chapter 17
f. Air content, ASTM C173 or C231
g. Obtaining and testing drilled cores and sawed beams of concrete, ASTM C42
h. Unit weight test, ASTM C138
i. Temperature of freshly mixed concrete, ASTM C1064

6. No testing laboratory services will be required for concrete in structurally unsupported sidewalks.

B. Soil Compaction: The Testing Laboratory shall obtain a sample of soil to be used as fill or backfill material and perform a sieve analysis test and a Moisture-Density Relation analysis per ASTM D698 or ASTM D1557 to determine optimum moisture content and maximum density in accordance with Section 02200 - Earthwork. If proposed fill material has more than 20% passing a number 200 sieve a complete soils classifications test shall be run per AASHTO M-145.

1. Fill under building structures and paving shall be analyzed for in place dry density and moisture content per ASTM D2922 and ASTM D3017. Test shall be taken no more than two days before placement of the next lift, slab or pavement. Fill must be retested if soil is heavily rained on after testing and before the next lift, pavement or slab is placed. Density tests shall be taken as follows:

2. Backfill of trench over 18" deep and behind grade walls; one test per 150 linear feet per 24" of depth.

3. Perform field density tests in accordance with ASTM D1556 (sand cone method) or ASTM D2922 (nuclear method).

4. Building Slab Subgrade: Make at least one (1) field density test of subgrade for every 5000 sq. ft. of building slab, but in no case less than four (4) tests.

5. Paved Areas Subgrade: Make at least one (1) field density test of subgrade for every 4500 sq. ft. of paved area but in no case less than four (4) tests. The testing laboratory shall also determine base course thickness at each density test.

6. Footing Subgrade: Visual inspection for type of soil and bearing capacity, and determining presence of loose materials.

C. Reinforcing Steel: The laboratory shall check mill test reports and monitor the placing of all reinforcing steel for compliance with the Specifications.

D. Structural Steel, Metal Deck and Steel Joists: The testing laboratory shall visually inspect all connections to determine quality, size, and compliance with reviewed erection drawings. Where the quality of a weld is in question, the Architect will be advised. The Contractor may then be required to remove and reweld the connection or if the Contractor desires, he may have the weld inspected further by radiography. The cost of this radiography inspection will be borne by the Contractor whether or not the weld is acceptable.

1. All welders shall be approved by the laboratory in accordance with American Welding Society Standards and qualified for the type of welding which they will perform. All field butt welds shall be witnessed by the laboratory while being welded. All field but welds shall be ultrasonic tested.

2. If high-strength bolts are used, the testing laboratory shall inspect the high-strength bolt connections in accordance with the requirements set forth in "Specifications for

Structural Joints Using ASTM A325 Bolts", by the American Institute of Steel Construction.

E. Grout: For every 5,000 sq. ft of wall area placed, grout strength shall be tested with a set of cubes in accordance with ASTM C1019.

PART 2 - PRODUCTS

Not Used

PART 3 - EXECUTION

Not Used

END OF SECTION 01 41 00

SECTION 01420 - REFERENCES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 DEFINITIONS

A. General: Basic Contract definitions are included in the Conditions of the Contract.

B. "Approved": When used to convey Architect's action on Contractor's submittals, applications, and requests, "approved" is limited to Architect's duties and responsibilities as stated in the Conditions of the Contract.

C. "Directed": A command or instruction by Architect. Other terms including "requested," "authorized," "selected," "required," and "permitted" have the same meaning as "directed."

D. "Indicated": Requirements expressed by graphic representations or in written form on Drawings, in Specifications, and in other Contract Documents. Other terms including "shown," "noted," "scheduled," and "specified" have the same meaning as "indicated."

E. "Regulations": Laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, and rules, conventions, and agreements within the construction industry that control performance of the Work.

F. "Furnish": Supply and deliver to Project site, ready for unloading, unpacking, assembly, installation, and similar operations.

G. "Install": Operations at Project site including unloading, temporarily storing, unpacking, assembling, erecting, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations.

H. "Provide": Furnish and install, complete and ready for the intended use.

I. "Project Site": Space available for performing construction activities. The extent of Project site is shown on Drawings and may or may not be identical with the description of the land on which Project is to be built.

1.3 INDUSTRY STANDARDS

A. Applicability of Standards: Unless the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into the Contract Documents to the extent referenced. Such standards are made a part of the Contract Documents by reference.

B. Publication Dates: Comply with standards in effect as of date of the Contract Documents unless otherwise indicated.

C. Copies of Standards: Each entity engaged in construction on Project should be familiar with industry standards applicable to its construction activity. Copies of applicable standards are not bound with the Contract Documents.

1. Where copies of standards are needed to perform a required construction activity, obtain copies directly from publication source.

1.4 ABBREVIATIONS AND ACRONYMS

A. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities indicated in Thomson Gale's "Encyclopedia of Associations" or in Columbia Books' "National Trade & Professional Associations of the U.S."

B. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Names, telephone numbers, and Web sites are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

AA	Aluminum Association (The) www.aluminum.org	(703) 358-2960
AABC	Associated Air Balance Council www.aabchq.com	(202) 737-0202
AAMA	American Architectural Manufacturers Association www.aamanet.org	(847) 303-5664
AASHTO	American Association of State Highway and Transportation Officials www.transportation.org	(202) 624-5800
AATCC	American Association of Textile Chemists and Colorists www.aatcc.org	(919) 549-8141
ABAA	Air Barrier Association of America www.airbarrier.org	(866) 956-5888
ABMA	American Bearing Manufacturers Association www.abma-dc.org	(202) 367-1155
ACI	American Concrete Institute www.concrete.org	(248) 848-3700
ACPA	American Concrete Pipe Association www.concrete-pipe.org	(972) 506-7216
AEIC	Association of Edison Illuminating Companies, Inc. (The) www.aeic.org	(205) 257-2530
AF&PA	American Forest & Paper Association www.afandpa.org	(800) 878-8878 (202) 463-2700
AGA	American Gas Association	(202) 824-7000

	www.aga.org	
AHAM	Association of Home Appliance Manufacturers www.aham.org	(202) 872-5955
AHRI	Air-Conditioning, Heating, andRefrigeration Institute, The www.ahrinet.org	(703) 524-8800
AI	Asphalt Institute www.asphaltinstitute.org	(859) 288-4960
AIA	American Institute of Architects (The) www.aia.org	(800) 242-3837 (202) 626-7300
AISC	American Institute of Steel Construction www.aisc.org	(800) 644-2400 (312) 670-2400
AISI	American Iron and Steel Institute www.steel.org	(202) 452-7100
AITC	American Institute of Timber Construction www.aitc-glulam.org	(303) 792-9559
ALSC	American Lumber Standard Committee, Incorporated www.alsc.org	(301) 972-1700
AMCA	Air Movement and Control Association International, Inc. www.amca.org	(847) 394-0150
ANSI	American National Standards Institute www.ansi.org	(202) 293-8020
AOSA	Association of Official Seed Analysts, Inc. www.aosaseed.com	(405) 780-7372
APA	APA - The Engineered Wood Association www.apawood.org	(253) 565-6600
APA	Architectural Precast Association www.archprecast.org	(239) 454-6989
API	American Petroleum Institute www.api.org	(202) 682-8000
ARI	Air-Conditioning & Refrigeration Institute www.ari.org	(703) 524-8800
ARMA	Asphalt Roofing Manufacturers Association www.asphaltroofing.org	(202) 207-0917
ASCE	American Society of Civil Engineers www.asce.org	(800) 548-2723 (703) 295-6300
ASCE/SEI	American Society of Civil Engineers/Structural Engineering Institute (See ASCE)	

ASHRAE	American Society of Heating, Refrigerating and Air-Conditioning Engineers www.ashrae.org	(800) 527-4723 (404) 636-8400
ASME	ASME International (American Society of Mechanical Engineers International) www.asme.org	(800) 843-2763 (973) 882-1170
ASSE	American Society of Sanitary Engineering www.asse-plumbing.org	(440) 835-3040
ASTM	ASTM International (American Society for Testing and Materials International) www.astm.org	(610) 832-9500
ATIS	Alliance for Telecommunications Industry Solutions www.atis.org	(202) 628-6380
AWCMA	American Window Covering Manufacturers Association (Now WCMA)	
AWCI	Association of the Wall and Ceiling Industry www.awci.org	(703) 534-8300
AWI	Architectural Woodwork Institute www.awinet.org	(571) 323-3636
AWPA	American Wood Protection Association (Formerly: American Wood Preservers' Association) www.awpa.com	(205) 733-4077
AWS	American Welding Society www.aws.org	(800) 443-9353 (305) 443-9353
AWWA	American Water Works Association www.awwa.org	(800) 926-7337 (303) 794-7711
BHMA	Builders Hardware Manufacturers Association www.buildershardware.com	(212) 297-2122
BIA	Brick Industry Association (The) www.bia.org	(703) 620-0010
BICSI	BICSI, Inc. www.bicsi.org	(800) 242-7405 (813) 979-1991
BIFMA	BIFMA International (Business and Institutional Furniture Manufacturer's Association International) www.bifma.com	(616) 285-3963
BISSC	Baking Industry Sanitation Standards Committee www.bissc.org	(866) 342-4772
CCC	Carpet Cushion Council	(610) 527-3880

	www.carpetcushion.org	
CDA	Copper Development Association www.copper.org	(800) 232-3282 (212) 251-7200
CEA	Canadian Electricity Association www.canelect.ca	(613) 230-9263
CEA	Consumer Electronics Association www.ce.org	(866) 858-1555 (703) 907-7600
CFFA	Chemical Fabrics & Film Association, Inc. www.chemicalfabricsandfilm.com	(216) 241-7333
CGA	Compressed Gas Association www.cganet.com	(703) 788-2700
CIMA	Cellulose Insulation Manufacturers Association www.cellulose.org	(888) 881-2462 (937) 222-2462
CISCA	Ceilings & Interior Systems Construction Association www.cisca.org	(630) 584-1919
CISPI	Cast Iron Soil Pipe Institute www.cispi.org	(423) 892-0137
CLFMI	Chain Link Fence Manufacturers Institute www.chainlinkinfo.org	(301) 596-2583
CPA	Composite Panel Association www.pbmdf.com	 (703) 724-1128
CRI	Carpet and Rug Institute (The) www.carpet-rug.com	(800) 882-8846 (706) 278-3176
CRRC	Cool Roof Rating Council www.coolroofs.org	(866) 465-2523 (510) 485-7175
CRSI	Concrete Reinforcing Steel Institute www.crsi.org	(847) 517-1200 (800) 328-6306
CRRC	Cool Roof Rating Council www.coolroofs.org	(866) 465-2523 (510) 485-7175
CSA	Canadian Standards Association www.csa.ca	(800) 463-6727 (416) 747-4000
CSA	CSA International (Formerly: IAS - International Approval Services) www.csa-international.org	(866) 797-4272 (416) 747-4000
CSI	Construction Specifications Institute (The) www.csinet.org	(800) 689-2900 (703) 684-0300
CSSB	Cedar Shake & Shingle Bureau www.cedarbureau.org	(604) 820-7700

CTI	Cooling Technology Institute (Formerly: Cooling Tower Institute) www.cti.org	(281) 583-4087
DHI	Door and Hardware Institute www.dhi.org	(703) 222-2010
ECA	Electrical Components Association www.ec-central.org	(703)907-8024
EIA	Electronic Industries Alliance www.eia.org	(703) 907-7500
EIMA	EIFS Industry Members Association www.eima.com	(800) 294-3462 (770) 968-7945
EJCDC	Engineers Joint Contract Documents Committee http://content.asce.org/ejcdc/	(703) 295-6000
EJMA	Expansion Joint Manufacturers Association, Inc. www.ejma.org	(914) 332-0040
ESD	ESD Association (Electrostatic Discharge Association) www.esda.org	(315) 339-6937
ETL SEMCO	Intertek ETL SEMCO (Formerly: ITS - Intertek Testing Service NA) www.intertek-etlsemko.com	(800) 967-5352
FIBA	Federation Internationale de Basketball (The International Basketball Federation) www.fiba.com	41 22 545 00 00
FIVB	Federation Internationale de Volleyball (The International Volleyball Federation) www.fivb.ch	41 21 345 35 35
FM Approvals	FM Approvals LLC www.fmglobal.com	(781) 762-4300
FM Global	FM Global (Formerly: FMG - FM Global) www.fmglobal.com	(401) 275-3000
FRSA	Florida Roofing, Sheet Metal & Air Conditioning Contractors Association, Inc. www.floridaroof.com	(407) 671-3772
FSA	Fluid Sealing Association www.fluidsealing.com	(610) 971-4850
FSC	Forest Stewardship Council www.fsc.org	49 228 367 66 0

GA	Gypsum Association www.gypsum.org	(301) 277-8686
GANA	Glass Association of North America www.glasswebsite.com	(785) 271-0208
GRI	(Part of GSI)	
GS	Green Seal www.greenseal.org	(202) 872-6400
GSI	Geosynthetic Institute www.geosynthetic-institute.org	(610) 522-8440
HI	Hydronics Institute www.gamanet.org	(908) 464-8200
HI/GAMA	Hydronics Institute/Gas Appliance Manufacturers Association Division of Air-Conditioning, Heating, and Refrigeration Institute (AHRI) www.ahrinet.org	(908) 464-8200
HMMA	Hollow Metal Manufacturers Association (Part of NAAMM)	
HPVA	Hardwood Plywood & Veneer Association www.hpva.org	(703) 435-2900
HPW	H. P. White Laboratory, Inc. www.hpwhite.com	(410) 838-6550
IAPSC	International Association of Professional Security Consultants www.iapsc.org	(515) 282-8192
ICBO	International Conference of Building Officials www.iccsafe.org	(888) 422-7233
ICEA	Insulated Cable Engineers Association, Inc. www.icea.net	(770) 830-0369
ICRI	International Concrete Repair Institute, Inc. www.icri.org	(847) 827-0830
ICPA	International Cast Polymer Association www.icpa-hq.org	(703) 525-0320
IEC	International Electrotechnical Commission www.iec.ch	41 22 919 02 11
IEEE	Institute of Electrical and Electronics Engineers, Inc. (The) www.ieee.org	(212) 419-7900
IES	Illuminating Engineering Society of North America www.iesna.org	(703) 525-0320
IEST	Institute of Environmental Sciences and Technology	(847) 255-1561

	www.iest.org	
IGMA	Insulating Glass Manufacturers Alliance www.igmaonline.org	(613) 233-1510
ILI	Indiana Limestone Institute of America, Inc. www.iliai.com	(812) 275-4426
ISA	Instrumentation, Systems, and Automation Society, The www.isa.org	(919) 549-8411
ISO	International Organization for Standardization www.iso.ch	41 22 749 01 11
ISSFA	International Solid Surface Fabricators Association www.issfa.net	(877) 464-7732 (801) 341-7360
ITS	Intertek Testing Service NA (Now ETL SEMCO)	
ITU	International Telecommunication Union www.itu.int/home	41 22 730 51 11
KCMA	Kitchen Cabinet Manufacturers Association www.kcma.org	(703) 264-1690
LGSEA	Light Gauge Steel Engineers Association www.arcat.com	(202) 263-4488
LMA	Laminating Materials Association (Now part of CPA)	
LPI	Lightning Protection Institute www.lightning.org	(800) 488-6864
MBMA	Metal Building Manufacturers Association www.mbma.com	(216) 241-7333
MCA	Metal Construction Association www.metalconstruction.org	(847) 375-4718
MFMA	Maple Flooring Manufacturers Association, Inc. www.maplefloor.org	(888) 480-9138
MFMA	Metal Framing Manufacturers Association, Inc. www.metalframingmfg.org	(312) 644-6610
MH	Material Handling (Now MHIA)	
MHIA	Material Handling Industry of America www.mhia.org	(800) 345-1815 (704) 676-1190
MIA	Marble Institute of America www.marble-institute.com	(440) 250-9222

MPI	Master Painters Institute www.paintinfo.com	(888) 674-8937 (604) 298-7578
MSS	Manufacturers Standardization Society of The Valve and Fittings Industry Inc. www.mss-hq.com	(703) 281-6613
NAAMM	National Association of Architectural Metal Manufacturers www.naamm.org	(630) 942-6591
NACE	NACE International (National Association of Corrosion Engineers International) www.nace.org	(800) 797-6223 (281) 228-6200
NADCA	National Air Duct Cleaners Association www.nadca.com	(202) 737-2926
NAGWS	National Association for Girls and Women in Sport www.aahperd.org/nagws/	(800) 213-7193, ext. 453
NAIMA	North American Insulation Manufacturers Association www.naima.org	(703) 684-0084
NBGQA	National Building Granite Quarries Association, Inc. www.nbgqa.com	(800) 557-2848
NCAA	National Collegiate Athletic Association (The) www.ncaa.org	(317) 917-6222
NCMA	National Concrete Masonry Association www.ncma.org	(703) 713-1900
NCTA	National Cable & Telecommunications Association www.ncta.com	(202) 222-2300
NEBB	National Environmental Balancing Bureau www.nebb.org	(301) 977-3698
NECA	National Electrical Contractors Association www.necanet.org	(301) 657-3110
NeLMA	Northeastern Lumber Manufacturers' Association www.nelma.org	(207) 829-6901
NEMA	National Electrical Manufacturers Association www.nema.org	(703) 841-3200
NETA	InterNational Electrical Testing Association www.netaworld.org	(888) 300-6382 (269) 488-6382
NFHS	National Federation of State High School Associations www.nfhs.org	(317) 972-6900
NFPA	NFPA (National Fire Protection Association)	(800) 344-3555 (617) 770-3000

	www.nfpa.org	
NFRC	National Fenestration Rating Council www.nfrc.org	(301) 589-1776
NGA	National Glass Association www.glass.org	(866) 342-5642 (703) 442-4890
NHLA	National Hardwood Lumber Association www.natlhardwood.org	(800) 933-0318 (901) 377-1818
NLGA	National Lumber Grades Authority www.nlga.org	(604) 524-2393
NOFMA	NOFMA: The Wood Flooring Manufacturers Association (Formerly: National Oak Flooring Manufacturers Association) www.nofma.org	(901) 526-5016
NOMMA	National Ornamental & Miscellaneous Metals Association www.nomma.org	(888) 516-8585
NRCA	National Roofing Contractors Association www.nrca.net	(800) 323-9545 (847) 299-9070
NRMCA	National Ready Mixed Concrete Association www.nrmca.org	(888) 846-7622 (301) 587-1400
NSF	NSF International (National Sanitation Foundation International) www.nsf.org	(800) 673-6275 (734) 769-8010
NSSGA	National Stone, Sand & Gravel Association www.nssga.org	(800) 342-1415 (703) 525-8788
NTMA	National Terrazzo & Mosaic Association, Inc. (The) www.ntma.com	(800) 323-9736 (540) 751-0930
NWFA	National Wood Flooring Association www.nwfa.org	(800) 422-4556 (636) 519-9663
PCI	Precast/Prestressed Concrete Institute www.pci.org	(312) 786-0300
PDI	Plumbing & Drainage Institute www.pdionline.org	(800) 589-8956 (978) 557-0720
PGI	PVC Geomembrane Institute http://pgi-tp.cee.uiuc.edu	(217) 333-3929
PTI	Post-Tensioning Institute www.post-tensioning.org	(248) 848-3180
RCSC	Research Council on Structural Connections www.boltcouncil.org	
RFCI	Resilient Floor Covering Institute	

	www.rfci.com	(706) 882-3833
RIS	Redwood Inspection Service www.redwoodinspection.com	(925) 935-1499
SAE	SAE International www.sae.org	(877) 606-7323 (724) 776-4841
SCAQMD	South Coast Air Quality Management District www.aqmd.com	(909) 396-2000
SCTE	Society of Cable Telecommunications Engineers www.scte.org	(800) 542-5040 (610) 363-6888
SDI	Steel Deck Institute www.sdi.org	(847) 458-4647
SDI	Steel Door Institute www.steeldoor.org	(440) 899-0010
SEFA	Scientific Equipment and Furniture Association www.sefalabs.com	(877) 294-5424 (516) 294-5424
SEI/ASCE	Structural Engineering Institute/American Society of Civil Engineers (See ASCE)	
SIA	Security Industry Association www.siaonline.org	(866) 817-8888 (703) 683-2075
SJI	Steel Joist Institute www.steeljoist.org	(843) 626-1995
SMA	Screen Manufacturers Association www.smacentral.org	(561) 533-0991
SMACNA	Sheet Metal and Air Conditioning Contractors' National Association www.smacna.org	(703) 803-2980
SMPTE	Society of Motion Picture and Television Engineers www.smpte.org	(914) 761-1100
SPFA	Spray Polyurethane Foam Alliance (Formerly: SPI/SPFD - The Society of the Plastics Industry, Inc.; Spray Polyurethane Foam Division) www.sprayfoam.org	(800) 523-6154
SPIB	Southern Pine Inspection Bureau (The) www.spib.org	(850) 434-2611
SPRI	Single Ply Roofing Industry www.spri.org	(781) 647-7026
SSINA	Specialty Steel Industry of North America www.ssina.com	(800) 982-0355 (202) 342-8630

SSPC	SSPC: The Society for Protective Coatings www.sspc.org	(877) 281-7772 (412) 281-2331
STI	Steel Tank Institute www.steeltank.com	(847) 438-8265
SWI	Steel Window Institute www.steelwindows.com	(216) 241-7333
SWPA	Submersible Wastewater Pump Association www.swpa.org	(847) 681-1868
TCA	Tilt-Up Concrete Association www.tilt-up.org	(319) 895-6911
TCNA	Tile Council of North America, Inc. www.tileusa.com	(864) 646-8453
TEMA	Tubular Exchanger Manufacturers Association www.tema.org	(914) 332-0040
TIA/EIA	Telecommunications Industry Association/Electronic Industries Alliance www.tiaonline.org	(703) 907-7700
TMS	The Masonry Society www.masonrysociety.org	(303) 939-9700
TPI	Truss Plate Institute, Inc. www.tpinst.org	(703) 683-1010
TPI	Turfgrass Producers International www.turfgrasssod.org	(800) 405-8873 (847) 649-5555
TRI	Tile Roofing Institute www.tileroofing.org	(312) 670-4177
UL	Underwriters Laboratories Inc. www.ul.com	(877) 854-3577 (847) 272-8800
UNI	Uni-Bell PVC Pipe Association www.uni-bell.org	(972) 243-3902
USAV	USA Volleyball www.usavolleyball.org	(888) 786-5539 (719) 228-6800
USGBC	U.S. Green Building Council www.usgbc.org	(800) 795-1747
USITT	United States Institute for Theatre Technology, Inc. www.usitt.org	(800) 938-7488 (315) 463-6463
WASTEC	Waste Equipment Technology Association www.wastec.org	(800) 424-2869 (202) 244-4700

WCLIB	West Coast Lumber Inspection Bureau www.wclib.org	(800) 283-1486 (503) 639-0651
WCMA	Window Covering Manufacturers Association www.wcmanet.org	(212) 297-2122
WDMA	Window & Door Manufacturers Association (Formerly: NWWDA - National Wood Window and Door Association) www.wdma.com	(800) 223-2301 (312) 321-6802
WI	Woodwork Institute (Formerly: WIC - Woodwork Institute of California) www.wicnet.org	(916) 372-9943
WMMPA	Wood Moulding & Millwork Producers Association www.wmmpa.com	(800) 550-7889 (530) 661-9591
WSRCA	Western States Roofing Contractors Association www.wsrca.com	(800) 725-0333 (650) 570-5441
WWPA	Western Wood Products Association www.wwpa.org	(503) 224-3930

C. Code Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Names, telephone numbers, and Web sites are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

DIN	Deutsches Institut fur Normung e.V. www.din.de	49 30 2601-0
IAPMO	International Association of Plumbing and Mechanical Officials www.iapmo.org	(909) 472-4100
ICC	International Code Council www.iccsafe.org	(888) 422-7233
ICC-ES	ICC Evaluation Service, Inc. www.icc-es.org	(800) 423-6587 (562) 699-0543

D. Federal Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Names, telephone numbers, and Web sites are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

COE	Army Corps of Engineers www.usace.army.mil	(202) 761-0011
CPSC	Consumer Product Safety Commission www.cpsc.gov	(800) 638-2772 (301) 504-7923
DOC	Department of Commerce www.commerce.gov	(202) 482-2000

DOD	Department of Defense http://dodssp.daps.dla.mil	(215) 697-6257
DOE	Department of Energy www.energy.gov	(202) 586-9220
EPA	Environmental Protection Agency www.epa.gov	(202) 272-0167
FAA	Federal Aviation Administration www.faa.gov	(866) 835-5322
FCC	Federal Communications Commission www.fcc.gov	(888) 225-5322
FDA	Food and Drug Administration www.fda.gov	(888) 463-6332
GSA	General Services Administration www.gsa.gov	(800) 488-3111
HUD	Department of Housing and Urban Development www.hud.gov	(202) 708-1112
LBL	Lawrence Berkeley National Laboratory www.lbl.gov	(510) 486-4000
NCHRP	National Cooperative Highway Research Program (See TRB)	
NIST	National Institute of Standards and Technology www.nist.gov	(301) 975-6478
OSHA	Occupational Safety & Health Administration www.osha.gov	(800) 321-6742 (202) 693-1999
PBS	Public Buildings Service (See GSA)	
PHS	Office of Public Health and Science http://www.hhs.gov/ophs/	(202) 690-7694
RUS	Rural Utilities Service (See USDA)	(202) 720-9540
SD	State Department www.state.gov	(202) 647-4000
TRB	Transportation Research Board http://gulliver.trb.org	(202) 334-2934
USDA	Department of Agriculture www.usda.gov	(202) 720-2791
USP	U.S. Pharmacopeia www.usp.org	(800) 227-8772

USPS	Postal Service www.usps.com	(202) 268-2000

E. Standards and Regulations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the standards and regulations in the following list. Names, telephone numbers, and Web sites are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

ADAAG	Americans with Disabilities Act (ADA)	(800) 872-2253
	Architectural Barriers Act (ABA)	(202) 272-0080
	Accessibility Guidelines for Buildings and Facilities Available from U.S. Access Board www.access-board.gov	
CFR	Code of Federal Regulations	(866) 512-1800
	Available from Government Printing Office	(202) 512-1800
	www.gpoaccess.gov/cfr/index.html	
DOD	Department of Defense Military Specifications and Standards	(215) 697-2664
	Available from Department of Defense Single Stock Point http://dodssp.daps.dla.mil	
DSCC	Defense Supply Center Columbus (See FS)	
FED-STD	Federal Standard (See FS)	
FS	Federal Specification	(215) 697-2664
	Available from Department of Defense Single Stock Point http://dodssp.daps.dla.mil/	
	Available from Defense Standardization Program www.dsp.dla.mil	
	Available from General Services Administration	(202) 619-8925
	www.gsa.gov	
	Available from National Institute of Building Sciences	(202) 289-7800
	www.wbdg.org/ccb	
FTMS	Federal Test Method Standard (See FS)	
MIL	(See MILSPEC)	

MIL-STD	(See MILSPEC)	
MILSPEC	Military Specification and Standards Available from Department of Defense Single Stock Point http://dodssp.daps.dla.mil	(215) 697-2664
UFAS	Uniform Federal Accessibility Standards Available from Access Board www.access-board.gov	(800) 872-2253 (202) 272-0080

F. State Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Names, telephone numbers, and Web sites are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

CBHF	State of California, Department of Consumer Affairs Bureau of Home Furnishings and Thermal Insulation www.dca.ca.gov/bhfti	(800) 952-5210 (916) 574-2041
CCR	California Code of Regulations www.calregs.com	(916) 323-6815
CDHS	California Department of Health Services www.dhcs.ca.gov	(916) 445-4171
CDPH	California Department of Public Health, Indoor Air Quality Section www.cal-iaq.org	
CPUC	California Public Utilities Commission www.cpuc.ca.gov	(415) 703-2782
TFS	Texas Forest Service Forest Resource Development http://txforestservice.tamu.edu	(979) 458-6606

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01420

SECTION 01500 - TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes requirements for temporary utilities, support facilities, and security and protection facilities.

B. Related Requirements:

1. Section 01100 "Summary" for limitations on work restrictions and utility interruptions.
2. Section 02751 "Cement Concrete Pavement" for construction and maintenance of cement concrete pavement for temporary roads and paved areas.

1.3 USE CHARGES

A. General: Installation and removal of and use charges for temporary facilities shall be included in the Contract Sum unless otherwise indicated. Allow other entities to use temporary services and facilities without cost, including, but not limited to, Owner's construction forces, Architect, testing agencies, and authorities having jurisdiction.

B. Sewer Service: Pay sewer-service use charges for sewer usage by all entities for construction operations.

C. Water Service: Pay water-service use charges for water used by all entities for construction operations.

D. Electric Power Service: Pay electric-power-service use charges for electricity used by all entities for construction operations.

1.4 INFORMATIONAL SUBMITTALS

A. Site Plan: Show temporary facilities, utility hookups, staging areas, and parking areas for construction personnel.

B. Fire-Safety Program: Show compliance with requirements of NFPA 241 and authorities having jurisdiction. Indicate Contractor personnel responsible for management of fire-prevention program.

C. Moisture-Protection Plan: Describe procedures and controls for protecting materials and construction from water absorption and damage.

1. Describe delivery, handling, and storage provisions for materials subject to water absorption or water damage.
2. Indicate procedures for discarding water-damaged materials, protocols for mitigating water intrusion into completed Work, and replacing water-damaged Work.
3. Indicate sequencing of work that requires water, such as sprayed fire-resistive materials, plastering, and terrazzo grinding, and describe plans for dealing with water from these operations. Show procedures for verifying that wet construction has dried sufficiently to permit installation of finish materials.

1.5 QUALITY ASSURANCE

A. Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.

B. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.

C. Accessible Temporary Egress: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines and ICC/ANSI A117.1.

1.6 PROJECT CONDITIONS

A. Temporary Use of Permanent Facilities: Engage Installer of each permanent service to assume responsibility for operation, maintenance, and protection of each permanent service during its use as a construction facility before Owner's acceptance, regardless of previously assigned responsibilities.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Chain-Link Fencing: Minimum 2-inch (50-mm), 0.148-inch- (3.8-mm-) thick, galvanized-steel, chain-link fabric fencing; minimum 6 feet (1.8 m) high with galvanized-steel pipe posts; minimum 2-3/8-inch- (60-mm-) OD line posts and 2-7/8-inch- (73-mm-) OD corner and pull posts, with 1-5/8-inch- (42-mm-) OD top rails .

2.2 TEMPORARY FACILITIES

A. Field Offices, General: Prefabricated or mobile units with serviceable finishes, temperature controls, and foundations adequate for normal loading.

B. Common-Use Field Office: Of sufficient size to accommodate needs of Owner, Architectand construction personnel office activities and to accommodate Project meetings specified in other Division 01 Sections. Keep office clean and orderly. Furnish and equip offices as follows:

1. Furniture required for Project-site documents including file cabinets, plan tables, plan racks, and bookcases.
2. Conference room of sufficient size to accommodate meetings of 10 individuals. Provide electrical power service and 120-V ac duplex receptacles, with no fewer than one receptacle on each wall. Furnish room with conference table, chairs, and 4-foot- (1.2-m-) square tack and marker boards.
3. Drinking water and private toilet.
4. Coffee machine and supplies.
5. Heating and cooling equipment necessary to maintain a uniform indoor temperature of 68 to 72 deg F (20 to 22 deg C).
6. Lighting fixtures capable of maintaining average illumination of 20 fc (215 lx) at desk height.

C. Storage and Fabrication Sheds: Provide sheds sized, furnished, and equipped to accommodate materials and equipment for construction operations.

1. Store combustible materials apart from building.

2.3 EQUIPMENT

A. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.

B. HVAC Equipment: Unless Owner authorizes use of permanent HVAC system, provide vented, self-contained, liquid-propane-gas or fuel-oil heaters with individual space thermostatic control.

1. Use of gasoline-burning space heaters, open-flame heaters, or salamander-type heating units is prohibited.
2. Heating Units: Listed and labeled for type of fuel being consumed, by a qualified testing agency acceptable to authorities having jurisdiction, and marked for intended location and application.
3. Permanent HVAC System: If Owner authorizes use of permanent HVAC system for temporary use during construction, provide filter with MERV of 8 at each return-air grille in system and remove at end of construction and clean HVAC system as required in Section 01770 "Closeout Procedures".

C. Air-Filtration Units: Primary and secondary HEPA-filter-equipped portable units with four-stage filtration. Provide single switch for emergency shutoff. Configure to run continuously.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required by progress of the Work.

1. Locate facilities to limit site disturbance as specified in Section 01100 "Summary."

B. Provide each facility ready for use when needed to avoid delay. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

3.2 TEMPORARY UTILITY INSTALLATION

A. General: Install temporary service or connect to existing service.

1. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.

B. Sewers and Drainage: Provide temporary utilities to remove effluent lawfully.

1. Connect temporary sewers to municipal system as directed by authorities having jurisdiction.

C. Water Service: Install water service and distribution piping in sizes and pressures adequate for construction.

D. Sanitary Facilities: Provide temporary toilets, wash facilities, and drinking water for use of construction personnel. Comply with requirements of authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities.

E. Heating and Cooling: Provide temporary heating and cooling required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of low temperatures or high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed.

F. Ventilation and Humidity Control: Provide temporary ventilation required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of high humidity. Select equipment that will

not have a harmful effect on completed installations or elements being installed. Coordinate ventilation requirements to produce ambient condition required and minimize energy consumption.

1. Provide dehumidification systems when required to reduce substrate moisture levels to level required to allow installation or application of finishes.

G. Electric Power Service: Provide electric power service and distribution system of sufficient size, capacity, and power characteristics required for construction operations.

1. Install electric power service underground unless otherwise indicated.

H. Lighting: Provide temporary lighting with local switching that provides adequate illumination for construction operations, observations, inspections, and traffic conditions.

1. Install and operate temporary lighting that fulfills security and protection requirements without operating entire system.
2. Install lighting for Project identification sign.

I. Telephone Service: Provide temporary telephone service in common-use facilities for use by all construction personnel. Install one telephone line(s) for each field office.

1. Provide additional telephone lines for the following:

    a. Provide a dedicated telephone line for each facsimile machine in each field office.

2. At each telephone, post a list of important telephone numbers.

    a. Police and fire departments.
    b. Ambulance service.
    c. Contractor's home office.
    d. Contractor's emergency after-hours telephone number.
    e. Architect's office.
    f. Engineers' offices.
    g. Owner's office.
    h. Principal subcontractors' field and home offices.

3. Provide superintendent with cellular telephone or portable two-way radio for use when away from field office.

J. Electronic Communication Service: Provide a desktop computer in the primary field office adequate for use by Architect and Owner to access Project electronic documents and maintain electronic communications. Equip computer with not less than the following:

1. Processor: Intel Pentium D or Intel CoreDuo, 3.0 GHz processing speed.
2. Memory: 4 gigabyte.

3. Disk Storage: 300 gigabyte hard-disk drive and combination DVD-RW/CD-RW drive.
4. Display: 22-inch (560-mm) LCD monitor with 256-Mb dedicated video RAM.
5. Full-size keyboard and mouse.
6. Network Connectivity: 10/100BaseT Ethernet.
7. Operating System: Microsoft Windows XP Professional or Microsoft Windows Vista Business.
8. Productivity Software:

    a. Microsoft Office Professional, XP or higher, including Word, Excel, and Outlook.
    b. Adobe Reader 7.0 or higher.
    c. WinZip 7.0 or higher.

9. Printer: "All-in-one" unit equipped with printer server, combining color printing, photocopying, scanning, and faxing, or separate units for each of these three functions.
10. Internet Service: Broadband modem, router and ISP, equipped with hardware firewall, providing minimum 384 Kbps upload and 1 Mbps download speeds at each computer.
11. Internet Security: Integrated software, providing software firewall, virus, spyware, phishing, and spam protection in a combined application.
12. Backup: External hard drive, minimum 40 gigabyte, with automated backup software providing daily backups.

3.3 SUPPORT FACILITIES INSTALLATION

A. General: Comply with the following:

1. Provide construction for temporary offices, shops, and sheds located within construction area or within 30 feet (9 m) of building lines that is noncombustible according to ASTM E 136. Comply with NFPA 241.
2. Maintain support facilities until Architect schedules Substantial Completion inspection. Remove before Substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to Owner.

B. Temporary Roads and Paved Areas: Construct and maintain temporary roads and paved areas adequate for construction operations. Locate temporary roads and paved areas within construction limits indicated on Drawings.

1. Provide dust-control treatment that is nonpolluting and nontracking. Reapply treatment as required to minimize dust.

C. Temporary Use of Permanent Roads and Paved Areas: Locate temporary roads and paved areas in same location as permanent roads and paved areas. Construct and maintain temporary roads and paved areas adequate for construction operations. Extend temporary roads and paved areas, within construction limits indicated, as necessary for construction operations.

1. Coordinate elevations of temporary roads and paved areas with permanent roads and paved areas.
2. Prepare subgrade and install subbase and base for temporary roads and paved areas according to Section 02300 "Earthwork."
3. Recondition base after temporary use, including removing contaminated material, regrading, proofrolling, compacting, and testing.

D. Traffic Controls: Comply with requirements of authorities having jurisdiction.

1. Protect existing site improvements to remain including curbs, pavement, and utilities.
2. Maintain access for fire-fighting equipment and access to fire hydrants.

E. Parking: Provide temporary parking areas for construction personnel.

F. Project Signs: Provide Project signs as indicated. Unauthorized signs are not permitted.

1. Identification Signs: Provide Project identification signs as indicated on Drawings.
2. Temporary Signs: Provide other signs as indicated and as required to inform public and individuals seeking entrance to Project.

    a. Provide temporary, directional signs for construction personnel and visitors.

3. Maintain and touchup signs so they are legible at all times.

G. Waste Disposal Facilities: Provide waste-collection containers in sizes adequate to handle waste from construction operations. Comply with requirements of authorities having jurisdiction. Comply with progress cleaning requirements in Section 01700 "Execution Requirements."

H. Lifts and Hoists: Provide facilities necessary for hoisting materials and personnel.

1. Truck cranes and similar devices used for hoisting materials are considered "tools and equipment" and not temporary facilities.

I. Temporary Stairs: Until permanent stairs are available, provide temporary stairs where ladders are not adequate.

1.

J. Temporary Use of Permanent Stairs: Use of new stairs for construction traffic will be permitted, provided stairs are protected and finishes restored to new condition at time of Substantial Completion.

3.4 SECURITY AND PROTECTION FACILITIES INSTALLATION

A. Protection of Existing Facilities: Protect existing vegetation, equipment, structures, utilities, and other improvements at Project site and on adjacent properties, except those indicated to be removed or altered. Repair damage to existing facilities.

B. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction as required to comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.

1. Comply with work restrictions specified in Section 01100 "Summary."

C. Temporary Erosion and Sedimentation Control: Provide measures to prevent soil erosion and discharge of soil-bearing water runoff and airborne dust to undisturbed areas and to adjacent properties and walkways, according to requirements of 2003 EPA Construction General Permit or authorities having jurisdiction, whichever is more stringent.

1. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross tree- or plant- protection zones.
2. Inspect, repair, and maintain erosion- and sedimentation-control measures during construction until permanent vegetation has been established.
3. Clean, repair, and restore adjoining properties and roads affected by erosion and sedimentation from Project site during the course of Project.
4. Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

D. Stormwater Control: Comply with requirements of authorities having jurisdiction. Provide barriers in and around excavations and subgrade construction to prevent flooding by runoff of stormwater from heavy rains.

E. Tree and Plant Protection: Comply with requirements specified in Section 02480 "Landscape Protection During Construction."

3.5 Tree and Plant Protection: Install temporary fencing located as indicated or outside the drip line of trees to protect vegetation from damage from construction operations. Protect tree root systems from damage, flooding, and erosion.

A. Pest Control: Engage pest-control service to recommend practices to minimize attraction and harboring of rodents, roaches, and other pests and to perform extermination and control procedures at regular intervals so Project will be free of pests and their residues at Substantial Completion. Perform control operations lawfully, using environmentally safe materials.

B. Site Enclosure Fence: Before construction operations begin , furnish and install site enclosure fence in a manner that will prevent people and animals from easily entering site except by entrance gates.

1. Extent of Fence:] As indicated on Drawings.
2. Maintain security by limiting number of keys and restricting distribution to authorized personnel. Furnish one set of keys to Owner.

C. Security Enclosure and Lockup: Install temporary enclosure around partially completed areas of construction. Provide lockable entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security. Lock entrances at end of each work day.

D. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.

E. Temporary Egress: Maintain temporary egress from existing occupied facilities as indicated and as required by authorities having jurisdiction.

F. Temporary Enclosures: Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities. Provide temporary weathertight enclosure for building exterior.

1. Where heating or cooling is needed and permanent enclosure is incomplete, insulate temporary enclosures.

G. Temporary Fire Protection: Install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241; manage fire-prevention program.

1. Prohibit smoking in construction areas.
2. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition according to requirements of authorities having jurisdiction.
3. Develop and supervise an overall fire-prevention and -protection program for personnel at Project site. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.
4. Provide temporary standpipes and hoses for fire protection. Hang hoses with a warning sign stating that hoses are for fire-protection purposes only and are not to be removed. Match hose size with outlet size and equip with suitable nozzles.

3.6 MOISTURE AND MOLD CONTROL

A. Contractor's Moisture-Protection Plan: Avoid trapping water in finished work. Document visible signs of mold that may appear during construction.

B. Exposed Construction Phase: Before installation of weather barriers, when materials are subject to wetting and exposure and to airborne mold spores, protect as follows:

1. Protect porous materials from water damage.
2. Protect stored and installed material from flowing or standing water.

3. Keep porous and organic materials from coming into prolonged contact with concrete.
4. Remove standing water from decks.
5. Keep deck openings covered or dammed.

C. Partially Enclosed Construction Phase: After installation of weather barriers but before full enclosure and conditioning of building, when installed materials are still subject to infiltration of moisture and ambient mold spores, protect as follows:

1. Do not load or install drywall or other porous materials or components, or items with high organic content, into partially enclosed building.
2. Keep interior spaces reasonably clean and protected from water damage.
3. Periodically collect and remove waste containing cellulose or other organic matter.
4. Discard or replace water-damaged material.
5. Do not install material that is wet.
6. Discard, replace, or clean stored or installed material that begins to grow mold.
7. Perform work in a sequence that allows any wet materials adequate time to dry before enclosing the material in drywall or other interior finishes.

D. Controlled Construction Phase of Construction: After completing and sealing of the building enclosure but prior to the full operation of permanent HVAC systems, maintain as follows:

1. Control moisture and humidity inside building by maintaining effective dry-in conditions.
2. Use permanent HVAC system to control humidity.
3. Comply with manufacturer's written instructions for temperature, relative humidity, and exposure to water limits.

    a. Hygroscopic materials that may support mold growth, including wood and gypsum-based products, that become wet during the course of construction and remain wet for 48 hours are considered defective.
    b. Measure moisture content of materials that have been exposed to moisture during construction operations or after installation. Record readings beginning at time of exposure and continuing daily for 48 hours. Identify materials containing moisture levels higher than allowed. Report findings in writing to Architect.
    c. Remove materials that can not be completely restored to their manufactured moisture level within 48 hours.

3.7 OPERATION, TERMINATION, AND REMOVAL

A. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.

B. Maintenance: Maintain facilities in good operating condition until removal.

1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.

C. Operate Project-identification-sign lighting daily from dusk until 12:00 midnight.

D. Temporary Facility Changeover: Do not change over from using temporary security and protection facilities to permanent facilities until Substantial Completion.

E. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.

1. Materials and facilities that constitute temporary facilities are property of Contractor. Owner reserves right to take possession of Project identification signs.
2. Remove temporary roads and paved areas not intended for or acceptable for integration into permanent construction. Where area is intended for landscape development, remove soil and aggregate fill that do not comply with requirements for fill or subsoil. Remove materials contaminated with road oil, asphalt and other petrochemical compounds, and other substances that might impair growth of plant materials or lawns. Repair or replace street paving, curbs, and sidewalks at temporary entrances, as required by authorities having jurisdiction.
3. At Substantial Completion, repair, renovate, and clean permanent facilities used during construction period. Comply with final cleaning requirements specified in Section 01770 "Closeout Procedures."

END OF SECTION 01500

SECTION 01505 - MOBILIZATION

PART 1 -- GENERAL

1.1 GENERAL

A. Mobilization shall include the obtaining of all permits; moving onto the site and equipment, and other construction facilities; and implementing security requirements; all as required for the proper performance and completion of the WORK. Mobilization shall include the following principal items:

1. Moving on to the site of all CONTRACTOR's equipment required for first month operations.

2. Installing temporary construction power, wiring, and lighting facilities.

3. Establishing fire protection system.

4. Developing construction water supply.

5. Providing on-site sanitary facilities and potable water facilities.

6. Arranging for and erection of CONTRACTOR's work and storage yard.

7. Constructing and implementing security features

8. Obtaining all required permits.

9. Having all OSHA required notices and establishment of safety programs.

10. Having the CONTRACTOR's superintendent at the job site full time.

11. Submitting initial submittals.

1.2 PAYMENT FOR MOBILIZATION

A. The CONTRACTOR's attention is directed to the condition that 3 percent of the total Contract Price will be deducted from any money due the CONTRACTOR as progress payments until all mobilization items listed above have been completed as specified. The aforementioned amount will be retained by the OWNER as the agreed, estimated value of completing all of the mobilization items listed. Any such retention of money for failure to complete all such mobilization items as a lump-sum item shall be in addition to the retention of any payments due to the CONTRACTOR as specified in Article 9 of the General Conditions of the Contract.

PART 2 -- PRODUCTS (Not Used)

PART 3 -- EXECUTION (Not Used)

- END OF SECTION -

SECTION 01530 - PROTECTION OF EXISTING FACILITIES

PART 1 -- GENERAL

1.1 GENERAL

A. The CONTRACTOR shall protect all existing utilities and improvements not designated for removal and shall restore damaged or temporarily relocated utilities and improvements to a condition equal to or better than prior to such damage or temporary relocation, all in accordance with the Contract Documents.

1.2 RIGHTS-OF-WAY

A. The CONTRACTOR shall not do any WORK that would affect any oil, gas, sewer, or water pipeline; any telephone, telegraph, or electric transmission line; any fence; or any other structure, nor shall the CONTRACTOR enter upon the rights-of-way involved until notified that the OWNER has secured authority therefore from the proper party. Copies of encroachment agreements, if any, for work in existing rights of way are included at the end of Section 01313 - Construction and Schedule Constraints. The CONTRACTOR shall implement actions required by those agreements.

B. After authority has been obtained, the CONTRACTOR shall give said party due notice of its intention to begin work, if required by said party, and shall remove, shore, support, or otherwise protect such pipeline, transmission line, ditch, fence, or structure, or replace the same.

1.3 PROTECTION OF STREET OR ROADWAY MARKERS

A. The CONTRACTOR shall not destroy, remove, or otherwise disturb any existing survey markers or other existing street or roadway markers without proper authorization. No pavement breaking or excavation shall be started until all survey or other permanent marker points that will be disturbed by the construction operations have been properly referenced. Survey markers or points disturbed by the CONTRACTOR shall be accurately restored after street or roadway resurfacing has been completed.

1.4 RESTORATION OF PAVEMENT

A. General: All paved areas including asphaltic concrete berms cut or damaged during construction shall be replaced with similar materials of equal thickness to match the existing adjacent undisturbed areas, except where specific resurfacing requirements have been called for in the Contract Documents or in the requirements of the agency issuing the permit. The pavement restoration requirement to match existing sections shall apply to all components of existing sections, including sub-base, base, and pavement. Temporary and permanent pavement shall conform to the requirements of the affected pavement owner. Pavements which are subject to partial removal shall be neatly saw cut in straight lines.

B. Temporary Resurfacing: Wherever required by the public authorities having jurisdiction, the CONTRACTOR shall place temporary surfacing promptly after backfilling and shall maintain such surfacing for the period of time fixed by said authorities before proceeding with the final restoration of improvements.

C. Permanent Resurfacing: In order to obtain a satisfactory junction with adjacent surfaces, the CONTRACTOR shall saw cut back and trim the edge so as to provide a clean, sound, vertical joint

before permanent replacement of an excavated or damaged portion of pavement. Damaged edges of pavement along excavations and elsewhere shall be trimmed back by saw cutting in straight lines. All pavement restoration and other facilities restoration shall be constructed to finish grades compatible with adjacent undisturbed pavement.

D. Restoration of Sidewalks or Private Driveways: Wherever sidewalks or private roads have been removed for purposes of construction, the CONTRACTOR shall place suitable temporary sidewalks or roadways promptly after backfilling and shall maintain them in satisfactory condition for the period of time fixed by the authorities having jurisdiction over the affected portions. If no such period of time is so fixed, the CONTRACTOR shall maintain said temporary sidewalks or roadways until the final restoration thereof has been made.

1.5 EXISTING UTILITIES AND IMPROVEMENTS

A. General: The CONTRACTOR shall protect underground Utilities and other improvements which may be impaired during construction operations, regardless of whether or not the Utilities are indicated on the Drawings. The CONTRACTOR shall take all possible precautions for the protection of unforeseen Utility lines to provide for uninterrupted service and to provide such special protection as may be necessary.

B. Except where the Drawings indicate Utilities have been field located during design or certain Utility locations shall be exposed as part of the WORK, the CONTRACTOR shall be responsible for exploratory excavations as it deems necessary to determine the exact locations and depths of Utilities which may interfere with its work. All such exploratory excavations shall be performed as soon as practicable after Notice to Proceed and, in any event, a sufficient time in advance of construction to avoid possible delays to the CONTRACTOR's progress. When such exploratory excavations show the Utility location as shown on the Drawings to be in error, the CONTRACTOR shall so notify the ENGINEER.

C. The number of exploratory excavations required shall be that number which is sufficient to determine the alignment and grade of the Utility.

D. Utilities to be Moved: In case it shall be necessary to move the property of any public utility or franchise holder, such utility company or franchise holder will, upon request of the CONTRACTOR, be notified by the OWNER to move such property within a specified reasonable time. When utility lines that are to be removed are encountered within the area of operations, the CONTRACTOR shall notify the ENGINEER a sufficient time in advance for the necessary measures to be taken to prevent interruption of service.

E. Utilities to be Removed: Where the proper completion of the WORK requires the temporary or permanent removal and/or relocation of an existing Utility or other improvement which is indicated, the CONTRACTOR shall remove and, without unnecessary delay, temporarily replace or relocate such Utility or improvement in a manner satisfactory to the ENGINEER and the owner of the facility. In all cases of such temporary removal or relocation, restoration to the former location shall be accomplished by the CONTRACTOR in a manner that will restore or replace the Utility or improvement as nearly as possible to its former locations and to as good or better condition than found prior to removal.

F. OWNER's Right of Access: The right is reserved to the OWNER and to the owners of public utilities and franchises to enter at any time upon any public street, alley, right-of-way, or easement for the purpose of making changes in their property made necessary by the WORK of this Contract.

G. Underground Utilities Indicated: Existing Utility lines that are indicated or the locations of which are made known to the CONTRACTOR prior to excavation and that are to be retained, and all Utility lines that are constructed during excavation operations shall be protected from damage during excavation and backfilling and, if damaged, shall be immediately repaired or replaced by the CONTRACTOR, unless otherwise repaired by the owner of the damaged Utility. If the owner of the damaged facility performs its own repairs, the CONTRACTOR shall reimburse said owner for the costs of repair.

H. Underground Utilities Not Indicated: In the event that the CONTRACTOR damages existing Utility lines that are not indicated or the locations of which are not made known to the CONTRACTOR prior to excavation, a verbal report of such damage shall be made immediately to the ENGINEER and a written report thereof shall be made promptly thereafter. The ENGINEER will immediately notify the owner of the damaged Utility. If the ENGINEER is not immediately available, the CONTRACTOR shall notify the Utility owner of the damage. If directed by the ENGINEER, repairs shall be made by the CONTRACTOR under the provisions for changes and extra work contained in the General Conditions.

I. Costs of locating and repairing damage not due to failure of the CONTRACTOR to exercise reasonable care, and removing or relocating such Utility facilities not indicated in the Contract Documents with reasonable accuracy, and for equipment on the project which was actually working on that portion of the WORK which was interrupted or idled by removal or relocation of such Utility facilities, and which was necessarily idled during such work will be paid for as extra work in accordance with the provisions of the General Conditions.

J. Approval of Repairs: All repairs to a damaged Utility or improvement are subject to inspection and approval by an authorized representative of the Utility or improvement owner before being concealed by backfill or other work.

K. Maintaining in Service: Unless indicated otherwise, oil and gasoline pipelines, power, and telephone or the communication cable ducts, gas and water mains, irrigation lines, sewer lines, storm drain lines, poles, and overhead power and communication wires and cables encountered along the line of the WORK shall remain continuously in service during all the operations under the Contract, unless other arrangements satisfactory to the ENGINEER are made with the owner of said pipelines, duct, main, irrigation line, sewer, storm drain, pole, or wire or cable. The CONTRACTOR shall be responsible for and shall repair all damage due to its operations, and the provisions of this Section shall not be abated even in the event such damage occurs after backfilling or is not discovered until after completion of the backfilling.

1.6 TREES OR SHRUBS WITHIN STREET RIGHTS-OF-WAY AND PROJECT LIMITS

A. General: Except where trees or shrubs are indicated to be removed, the CONTRACTOR shall exercise all necessary precautions so as not to damage or destroy any trees or shrubs, including those lying within street rights-of-way and project limits, and shall not trim or remove any trees unless such trees have been approved for trimming or removal by the jurisdictional agency or OWNER. Existing trees and shrubs which are damaged during construction shall be trimmed or replaced by the CONTRACTOR or a certified tree company under permit from the jurisdictional agency and/or the OWNER. Tree trimming and replacement shall be accomplished in accordance with the following paragraphs.

B. Trimming: Symmetry of the tree shall be preserved; no stubs or splits or torn branches left; clean cuts shall be made close to the trunk or large branch. Spikes shall not be used for climbing live trees. Cuts over 1-1/2 inches in diameter shall be coated with a tree paint product that is

waterproof, adhesive, and elastic, and free from kerosenes, coal tar, creosote, or other material injurious to the life of the tree.

C. Replacement: The CONTRACTOR shall immediately notify the jurisdictional agency and/or the OWNER if any tree or shrub is damaged by the CONTRACTOR's operations. If, in the opinion of said agency or the OWNER, the damage is such that replacement is necessary, the CONTRACTOR shall replace the tree or shrub at its own expense. The tree or shrub shall be of a like size and variety as the one damaged, or, if of a smaller size, the CONTRACTOR shall pay to the owner of said tree a compensatory payment acceptable to the tree or shrub owner, subject to the approval of the jurisdictional agency or OWNER. The size of the tree or shrub shall be not less than 1-inch diameter nor less than 6 feet in height. Planting of replacement trees and shrubs shall be in accordance with Section 02900 - Landscaping. Unless otherwise indicated, the CONTRACTOR shall water and maintain the replacement trees and shrubs for 6 months after planting.

1.7 LAWN AREAS

A. Lawn or landscaped areas damaged during construction shall be repaired to match the pre-construction condition to the satisfaction of the land owner and the OWNER.

1.8 NOTIFICATION BY THE CONTRACTOR

A. Prior to any excavation in the vicinity of any existing underground facilities, including all water, sewer, storm drain, gas, petroleum products, or other pipelines; all buried electric power, communications, or television cables; all traffic signal and street lighting facilities; and all roadway and state highway rights-of-way, the CONTRACTOR shall notify the respective authorities representing the owners or agencies responsible for such facilities not less than 3 days nor more than 7 days prior to excavation so that a representative of said owners or agencies can be present during such work if they so desire. The CONTRACTOR shall also notify Louisiana One Call at 1-800-272-3020 at least 2 days, but no more than 14 days, prior to such excavation.

1.9 Repair within an Existing Building

A. The CONTRACTOR shall protect all existing utilities, ~~fixtures~~ fixtures and improvements not designated for removal and shall restore damaged or temporarily relocated utilities, ~~fixtures~~ fixtures and improvements to a condition equal to or better than prior to such damage or temporary relocation, all in accordance with the Contract Documents.

PART 2 -- PRODUCTS (Not Used)

PART 3 -- EXECUTION (Not Used)

- END OF SECTION -

SECTION 01563 – LANDSCAPE PROTECTION DURING CONSTRUCTION

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes general protection and pruning of existing trees and plants that are affected by execution of the Work, whether temporary or permanent construction.

1.2 DEFINITIONS

A. Tree-Protection Zone: Area surrounding individual trees or groups of trees to be protected during construction and indicated on Drawings and defined by a circle concentric with each tree with a radius 1.5 times the diameter of the drip line unless otherwise indicated.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings:

1. Include plans, elevations, sections, and locations of protection-zone fencing and signage, showing relation of equipment-movement routes and material storage locations with protection zones.

C. Samples: For each type of the following:

1. Organic Mulch: Sealed plastic bags labeled with composition of materials by percentage of weight and source of mulch.
2. Protection-Zone Fencing: Assembled Samples.

D. Tree Pruning Schedule: Written schedule detailing scope and extent of pruning of trees to remain that interfere with or are affected by construction.

1.5 INFORMATIONAL SUBMITTALS

A. Certification: From arborist, certifying that trees indicated to remain have been protected during construction according to recognized standards and that trees were promptly and properly treated and repaired when damaged.

B. Maintenance Recommendations: From arborist, for care and protection of trees affected by construction during and after completing the Work.

C. Existing Conditions: Documentation of existing trees and plantings indicated to remain, which establishes preconstruction conditions that might be misconstrued as damage caused by construction activities.

1.6 QUALITY ASSURANCE

A. Arborist Qualifications: Certified Arborist as certified by ISA, licensed arborist in Louisiana, current member of ASCA, or registered Consulting Arborist as designated by ASCA.

1.7 FIELD CONDITIONS

A. The following practices are prohibited within protection zones:

1. Storage of construction materials, debris, or excavated material.
2. Moving or parking vehicles or equipment.
3. Foot traffic.
4. Erection of sheds or structures.
5. Impoundment of water.
6. Excavation or other digging unless otherwise indicated.
7. Attachment of signs to or wrapping materials around trees or plants unless otherwise indicated.

B. Do not direct vehicle or equipment exhaust toward protection zones.

C. Prohibit heat sources, flames, ignition sources, and smoking within or near protection zones and organic mulch.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Backfill Soil: Planting soil of suitable moisture content and granular texture for placing around tree; free of stones, roots, plants, sod, clods, clay lumps, pockets of coarse sand, concrete slurry, concrete layers or chunks, cement, plaster, building debris, and other extraneous materials harmful to plant growth.

B. Organic Mulch: Free from deleterious materials and suitable as a top dressing for trees and shrubs, consisting of one of the following:

1. Type: Pine needle mulch.

C. Protection-Zone Fencing: Fencing fixed in position and meeting the following requirements:

1. Plastic Protection-Zone Fencing: Plastic construction fencing constructed of high-density extruded and stretched polyethylene fabric with 2-inch (50-mm) maximum opening in pattern and supported by tubular or T-shape galvanized-steel posts spaced not more than 96 inches (2400 mm) apart. High-visibility orange color.

a. Height: 60 inches (1200 mm).

b. Manufacturer: Sentry Diamond Mesh Safety Fence by TENAX, or approved equal.

2. Gates: Swing access gates matching material and appearance of fencing, to allow for maintenance activities within protection zones.

D. Protection-Zone Signage: Shop-fabricated, rigid plastic or metal sheet with attachment holes prepunched and reinforced; legibly printed with nonfading lettering.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Erosion and Sedimentation Control: Examine the site to verify that temporary erosion- and sedimentation-control measures are in place. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross protection zones.

3.2 PREPARATION

A. Protect tree root systems from damage caused by runoff or spillage of noxious materials while mixing, placing, or storing construction materials. Protect root systems from ponding, eroding, or excessive wetting caused by dewatering operations.

3.3 PROTECTION ZONES

A. Protection-Zone Fencing: Install protection-zone fencing along edges of protection zones in a manner that will prevent people from easily entering protected areas except by entrance gates.
1. Posts: Set or drive posts into ground one-third the total height of the fence without concrete footings. Where a post is located on existing paving or concrete to remain, provide appropriate means of post support acceptable to Architect.

B. Protection-Zone Signage: Install protection-zone signage in visibly prominent locations in a manner approved by Architect.

C. Maintain protection zones free of weeds and trash.

D. Maintain protection-zone fencing and signage in good condition as acceptable to Architect and remove when construction operations are complete and equipment has been removed from the site.

3.4 EXCAVATION

A. General: Excavate at edge of protection zones and for trenches indicated within protection zones according to requirements in Section 312000 "Earth Moving" unless otherwise indicated.

B. Trenching within Protection Zones: Where utility trenches are required within protection zones, excavate under or around tree roots by hand or with air spade, or tunnel under the roots by drilling, auger boring, or pipe jacking. Do not cut main lateral tree roots or taproots; cut only smaller roots that interfere with installation of utilities. Cut roots as required for root pruning.

C. Do not allow exposed roots to dry out before placing permanent backfill.

3.5 ROOT PRUNING

A. Prune tree roots that are affected by temporary and permanent construction. Prune roots as follows:

1. The roots shall be pruned in accordance with generally accepted arboricultural practices.
2. The Contractor shall notify the Landscape Architect whenever trees or roots need to be pruned prior to beginning construction. All pruning is to be done under the supervision of a licensed Louisiana arborist.

B. Root Pruning at Edge of Protection Zone: Prune tree roots by cleanly cutting all roots to the depth of the required excavation.

C. Root Pruning within Protection Zone: Clear and excavate by hand or with air spade to the depth of the required excavation to minimize damage to tree root systems. If excavating by hand, use narrow-tine spading forks to comb soil to expose roots. Cleanly cut roots as close to excavation as possible.

3.6 CROWN PRUNING

A. Prune branches that are affected by temporary and permanent construction. Prune branches as directed by a licensed Louisiana arborist.

1. Prune to remove only broken, dying, or dead branches unless otherwise indicated. Do not prune for shape unless otherwise indicated.
2. Pruning Standards: Prune trees according to the National Arborist's Association "Pruning Standards for Shade Trees" and ANSI A300 (Part 1).

B. Cut branches with sharp pruning instruments; do not break or chop.

C. Do not paint or apply sealants to wounds.

3.7 REGRADING

A. Lowering Grade: Where new finish grade is indicated below existing grade around trees, slope grade beyond the protection zone. Maintain existing grades within the protection zone.

B. Raising Grade: Where new finish grade is indicated above existing grade around trees, slope grade beyond the protection zone. Maintain existing grades within the protection zone.

C. Minor Fill within Protection Zone: Where existing grade is 2 inches (50 mm) or less below elevation of finish grade, fill with backfill soil. Place backfill soil in a single uncompacted layer and hand grade to required finish elevations.

3.8 FIELD QUALITY CONTROL

A. Inspections: Engage a qualified arborist to direct plant-protection measures in the vicinity of trees, shrubs, and other vegetation indicated to remain and to prepare inspection reports.

3.9 REPAIR AND REPLACEMENT

A. General: Repair or replace trees, shrubs, and other vegetation indicated to remain or to be relocated that are damaged by construction operations, in a manner approved by Architect.

1. Perform repairs of damaged trunks, branches, and roots within 24 hours according to arborist's written instructions.
2. Replace trees and other plants that cannot be repaired and restored to full-growth status, as determined by Architect.
3. If trees outside of the property line are damaged, they shall be replaced or repaired according to the City of New Orleans requirements.
4. If trees are damaged beyond repair, they shall be replaced with a similar tree of equivalent type.

B. Excess Mulch: Rake mulched area within protection zones, being careful not to injure roots. Rake to loosen and remove mulch that exceeds a 2-inch (50-mm) uniform thickness to remain.

3.10 DISPOSAL OF SURPLUS AND WASTE MATERIALS

A. Disposal: Remove excess excavated material, displaced trees, trash, and debris and legally dispose of them off Owner's property.

END OF SECTION 015639

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SECTION 01566 - SOURCE CONTROLS FOR EROSION AND SEDIMENTATION

PART 1 -- GENERAL

1.1 SECTION INCLUDES

A. The CONTRACTOR shall perform the services and procedures defined herein for the duration of the project. All Contractors shall abide by the requirements listed herein.

B. Description of erosion and sediment control and other control-related practices which shall be utilized during construction activities.

PART 2 -- PRODUCTS - NOT USED

PART 3 -- EXECUTION

3.1 PREPARATION AND INSTALLATION

A. No clearing and grubbing or rough cutting shall be permitted until erosion and sediment control systems are in place, other than site work specifically directed by the ENGINEER to allow soil testing and surveying.

B. Equipment and vehicles shall be prohibited by the CONTRACTOR from maneuvering on areas outside of dedicated rights-of-way and easements for construction. Damage caused by construction traffic to erosion and sediment control systems shall be repaired immediately by the CONTRACTOR at no additional cost to the CITY.

C. The CONTRACTOR shall be responsible for collecting, storing, hauling, and disposing of spoil, silt, and waste materials as specified in this or other Specifications and in compliance with applicable federal, state, and local rules and regulations.

D.

E. CONTRACTOR shall conduct all construction operations under this Contract in conformance with the erosion control practices described in the Drawings and this Specification.

F. The CONTRACTOR shall install, maintain, and inspect erosion and sediment control measures and practices as specified in the Drawings and in this or other Specifications.

3.2 TOPSOIL PLACEMENT FOR EROSION AND SEDIMENT CONTROL SYSTEMS

A. When topsoil is specified as a component of another Specification, the CONTRACTOR shall conduct erosion control practices described in this Specification during topsoil placement operations.

1. When placing topsoil, maintain erosion and sediment control systems, such as swales, grade stabilization structures, berms, dikes, waterways, and sediment basins.

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2. Maintain grades which have been previously established on areas to receive topsoil.

3. After the areas to receive topsoil have been brought to grade, and immediately prior to dumping and spreading the topsoil, loosen the subgrade by discing or by scarifying to a depth of at least 2 inches to permit bonding of the topsoil to the subsoil.

4. No sod or seed shall be placed on soil which has been treated with soil sterilants until sufficient time has elapsed to permit dissipation of toxic materials.

3.3 DUST CONTROL

A. Implement dust control methods to control dust creation and movement on construction sites and roads and to prevent airborne sediment from reaching receiving streams or storm water conveyance systems, to reduce on-site and off-site damage, to prevent health hazards, and to improve traffic safety.

B. Control blowing dust by using one or more of the following methods:

1. Mulches bound with chemical binders.

2. Temporary vegetative cover.

3. Spray-on adhesives on mineral soils when not used by traffic.

4. Tillage to roughen surface and bring clods to the surface.

5. Irrigation by water sprinkling.

6. Barriers using solid board fences, snow fences, burlap fences, crate walls, bales of hay, or similar materials.

C. Implement dust control methods immediately whenever dust can be observed blowing on the project site.

3.4 KEEPING STREETS CLEAN

A. Keep streets clean of construction debris and mud carried by construction vehicles and equipment. If necessary to keep the streets clean, install stabilized construction exits at construction, staging, storage, and disposal areas. A vehicle/equipment wash area (stabilized with coarse aggregate) may be installed adjacent to the stabilized construction exit, as needed. Release wash water into a drainage swale or inlet protected by erosion and sediment control measures.

B. In lieu of or in addition to stabilized construction exits, shovel or sweep the pavement to the extent necessary to keep the street clean. Waterhosing or sweeping of debris and mud off of the street into adjacent areas is not allowed.

3.5 EQUIPMENT MAINTENANCE AND REPAIR

A. Confine maintenance and repair of construction machinery and equipment to areas specifically designated for that purpose. Locate such areas so that oils, gasoline, grease, solvents, and other potential pollutants cannot be washed directly into receiving streams or storm water conveyance

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systems. Provide these areas with adequate waste disposal receptacles for liquid as well as solid waste. Clean and inspect maintenance areas daily.

B. On a construction site where designated equipment maintenance areas are not feasible, take precautions during each individual repair or maintenance operation to prevent potential pollutants from washing into streams or conveyance systems. Provide temporary waste disposal receptacles.

3.6 WASTE COLLECTION AND DISPOSAL

A. CONTRACTOR shall formulate and implement a plan for the collection and disposal of waste materials on the construction site. In plan, designate locations for trash and waste receptacles and establish a collection schedule. Methods for ultimate disposal of waste shall be specified and carried out in accordance with applicable local, state, and federal health and safety regulations. Make special provisions for the collection and disposal of liquid wastes and toxic or hazardous materials.

B. Keep receptacles and waste collection areas neat and orderly to the extent possible. Waste shall not be allowed to overflow its container or accumulate from day-to-day. Locate trash collection points where they will least likely be affected by concentrated storm water runoff.

3.7 WASHING AREAS

A. Vehicles such as concrete delivery trucks or dump trucks and other construction equipment shall not be washed at locations where the runoff will flow directly into a watercourse or storm water conveyance system. Designate special areas for washing vehicles. Locate these areas where the wash water will spread out and evaporate or infiltrate directly into the ground, or where the runoff can be collected in a temporary holding or seepage basin. Beneath wash areas construct a gravel or rock base to minimize mud production.

3.8 STORAGE OF CONSTRUCTION MATERIALS AND CHEMICALS

A. Isolate sites where chemicals, cements, solvents, paints, or other potential water pollutants are stored in areas where they will not cause runoff pollution.

B. Store toxic chemicals and materials, such as pesticides, paints, and acids in accordance with manufacturers' guidelines. Protect groundwater resources from leaching by placing a plastic mat, packed clay, tar paper, or other impervious materials on any areas where toxic liquids are to be opened and stored.

3.9 DEMOLITION AREAS

A. Demolition activities which create large amounts of dust with significant concentrations of heavy metals or other toxic pollutants shall use dust control techniques to limit transport of airborne pollutants. However, water or slurry used to control dust contaminated with heavy metals or toxic pollutants shall be retained on the site and shall not be allowed to run directly into watercourses or storm water conveyance systems. Methods of ultimate disposal of these materials shall be carried out in accordance with applicable local, state, and federal health and safety regulations.

- END OF SECTION -

SECTION 01600 - PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for selection of products for use in Project; product delivery, storage, and handling; manufacturers' standard warranties on products; special warranties; and comparable products.

B. Related Requirements:
   1. Section 01635 "Substitution Procedures" for requests for substitutions.
   2. Section 01420 "References" for applicable industry standards for products specified.

1.3 DEFINITIONS

A. Products: Items obtained for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.

   1. Named Products: Items identified by manufacturer's product name, including make or model number or other designation shown or listed in manufacturer's published product literature, that is current as of date of the Contract Documents.
   2. New Products: Items that have not previously been incorporated into another project or facility. Products salvaged or recycled from other projects are not considered new products.
   3. Comparable Product: Product that is demonstrated and approved through submittal process to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.

B. Basis-of-Design Product Specification: A specification in which a specific manufacturer's product is named and accompanied by the words "basis-of-design product," including make or model number or other designation, to establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of additional manufacturers named in the specification.

1.4 ACTION SUBMITTALS

A. Comparable Product Requests: Submit request for consideration of each comparable product. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.

1. Include data to indicate compliance with the requirements specified in "Comparable Products" Article.
2. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within one week of receipt of a comparable product request. Architect will notify Contractor[**through Construction Manager** of approval or rejection of proposed comparable product request within 15 days of receipt of request, or seven days of receipt of additional information or documentation, whichever is later.

    a. Form of Approval: As specified in Section 01330 "Submittal Procedures."
    b. Use product specified if Architect does not issue a decision on use of a comparable product request within time allocated.

B. Basis-of-Design Product Specification Submittal: Comply with requirements in Section 01330 "Submittal Procedures." Show compliance with requirements.

1.5 QUALITY ASSURANCE

A. Compatibility of Options: If Contractor is given option of selecting between two or more products for use on Project, select product compatible with products previously selected, even if previously selected products were also options.

1. Each contractor is responsible for providing products and construction methods compatible with products and construction methods of other contractors.
2. If a dispute arises between contractors over concurrently selectable but incompatible products, Architect will determine which products shall be used.

1.6 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft and vandalism. Comply with manufacturer's written instructions.

B. Delivery and Handling:

1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.
2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
3. Deliver products to Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
4. Inspect products on delivery to determine compliance with the Contract Documents and to determine that products are undamaged and properly protected.

C. Storage:

1. Store products to allow for inspection and measurement of quantity or counting of units.
2. Store materials in a manner that will not endanger Project structure.
3. Store products that are subject to damage by the elements, under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation.

4. Protect foam plastic from exposure to sunlight, except to extent necessary for period of installation and concealment.
5. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
6. Protect stored products from damage and liquids from freezing.
7. Provide a secure location and enclosure at Project site for storage of materials and equipment by Owner's construction forces. Coordinate location with Owner.

1.7 PRODUCT WARRANTIES

A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.

1. Manufacturer's Warranty: Written warranty furnished by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.
2. Special Warranty: Written warranty required by the Contract Documents to provide specific rights for Owner.

B. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution.

1. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.
2. Specified Form: When specified forms are included with the Specifications, prepare a written document using indicated form properly executed.
3. See other Sections for specific content requirements and particular requirements for submitting special warranties.

C. Submittal Time: Comply with requirements in Section 01770 "Closeout Procedures."

PART 2 - PRODUCTS

2.1 PRODUCT SELECTION PROCEDURES

A. General Product Requirements: Provide products that comply with the Contract Documents, are undamaged and, unless otherwise indicated, are new at time of installation.

1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.
2. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.
3. Owner reserves the right to limit selection to products with warranties not in conflict with requirements of the Contract Documents.
4. Where products are accompanied by the term "as selected," Architect will make selection.
5. Descriptive, performance, and reference standard requirements in the Specifications establish salient characteristics of products.

6. Or Equal: For products specified by name and accompanied by the term "or equal," or "or approved equal," or "or approved," comply with requirements in "Comparable Products" Article to obtain approval for use of an unnamed product.

B. Product Selection Procedures:

1. Product: Where Specifications name a single manufacturer and product, provide the named product that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
2. Manufacturer/Source: Where Specifications name a single manufacturer or source, provide a product by the named manufacturer or source that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
3. Products:

    a. Restricted List: Where Specifications include a list of names of both manufacturers and products, provide one of the products listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
    b. Nonrestricted List: Where Specifications include a list of names of both available manufacturers and products, provide one of the products listed, or an unnamed product, that complies with requirements. Comply with requirements in "Comparable Products" Article for consideration of an unnamed product.

4. Manufacturers:

    a. Restricted List: Where Specifications include a list of manufacturers' names, provide a product by one of the manufacturers listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
    b. Nonrestricted List: Where Specifications include a list of available manufacturers, provide a product by one of the manufacturers listed, or a product by an unnamed manufacturer, that complies with requirements. Comply with requirements in "Comparable Products" Article for consideration of an unnamed manufacturer's product.

5. Basis-of-Design Product: Where Specifications name a product, or refer to a product indicated on Drawings, and include a list of manufacturers, provide the specified or indicated product or a comparable product by one of the other named manufacturers. Drawings and Specifications indicate sizes, profiles, dimensions, and other characteristics that are based on the product named. Comply with requirements in "Comparable Products" Article for consideration of an unnamed product by one of the other named manufacturers.

C. Visual Matching Specification: Where Specifications require "match Architect's sample", provide a product that complies with requirements and matches Architect's sample. Architect's decision will be final on whether a proposed product matches.

1. If no product available within specified category matches and complies with other specified requirements, comply with requirements in Section 01635 "Substitution Procedures" for proposal of product.

D. Visual Selection Specification: Where Specifications include the phrase "as selected by Architect from manufacturer's full range" or similar phrase, select a product that complies with

requirements. Architect will select color, gloss, pattern, density, or texture from manufacturer's product line that includes both standard and premium items.

2.2 COMPARABLE PRODUCTS

A. Conditions for Consideration: Architect will consider Contractor's request for comparable product when the following conditions are satisfied. If the following conditions are not satisfied, Architect may return requests without action, except to record noncompliance with these requirements:

1. Evidence that the proposed product does not require revisions to the Contract Documents, that it is consistent with the Contract Documents and will produce the indicated results, and that it is compatible with other portions of the Work.
2. Detailed comparison of significant qualities of proposed product with those named in the Specifications. Significant qualities include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
3. Evidence that proposed product provides specified warranty.
4. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners, if requested.
5. Samples, if requested.

PART 3 - EXECUTION (Not Used)

END OF SECTION 01600

SECTION 01635 - SUBSTITUTION PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for substitutions.

B. Related Requirements:
   1. Section 01230 "Alternates" for products selected under an alternate.
   2. Section 01600 "Product Requirements" for requirements for submitting comparable product submittals for products by listed manufacturers.

1.3 DEFINITIONS

A. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor.

   1. Substitutions for Cause: Changes proposed by Contractor that are required due to changed Project conditions, such as unavailability of product, regulatory changes, or unavailability of required warranty terms.
   2. Substitutions for Convenience: Changes proposed by Contractor or Owner that are not required in order to meet other Project requirements but may offer advantage to Contractor or Owner.

1.4 ACTION SUBMITTALS

A. Substitution Requests: Submit three copies of each request for consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.

   1. Substitution Request Form: Use CSI Form 1.5 C (During the Bidding Process) .
   2. Documentation: Show compliance with requirements for substitutions and the following, as applicable:

      a. Statement indicating why specified product or fabrication or installation cannot be provided, if applicable.
      b. Coordination information, including a list of changes or revisions needed to other parts of the Work and to construction performed by Owner and separate contractors, that will be necessary to accommodate proposed substitution.
      c. Detailed comparison of significant qualities of proposed substitution with those of the Work specified. Include annotated copy of applicable Specification Section. Significant qualities may include attributes such as performance, weight, size,

durability, visual effect, sustainable design characteristics, warranties, and specific features and requirements indicated. Indicate deviations, if any, from the Work specified.

d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
e. Samples, where applicable or requested.
f. Certificates and qualification data, where applicable or requested.
g. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners.
h. Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.
i. Detailed comparison of Contractor's construction schedule using proposed substitution with products specified for the Work, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on manufacturer's letterhead, stating date of receipt of purchase order, lack of availability, or delays in delivery.
j. Cost information, including a proposal of change, if any, in the Contract Sum.
k. Contractor's certification that proposed substitution complies with requirements in the Contract Documents except as indicated in substitution request, is compatible with related materials, and is appropriate for applications indicated.
l. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.

3. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within seven days of receipt of a request for substitution. Architect will notify Contractorof acceptance or rejection of proposed substitution within 15 days of receipt of request, or seven days of receipt of additional information or documentation, whichever is later.

   a. Forms of Acceptance: Change Order, Construction Change Directive, or Architect's Supplemental Instructions for minor changes in the Work.
   b. Use product specified if Architect does not issue a decision on use of a proposed substitution within time allocated.

1.5 QUALITY ASSURANCE

A. Compatibility of Substitutions: Investigate and document compatibility of proposed substitution with related products and materials. Engage a qualified testing agency to perform compatibility tests recommended by manufacturers.

1.6 PROCEDURES

A. Coordination: Revise or adjust affected work as necessary to integrate work of the approved substitutions.

PART 2 - PRODUCTS

2.1 SUBSTITUTIONS

A. Substitutions for Cause: Submit requests for substitution immediately on discovery of need for change, but not later than 15 days prior to time required for preparation and review of related submittals.

1. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:

a. Requested substitution is consistent with the Contract Documents and will produce indicated results.
b. Requested substitution provides sustainable design characteristics that specified product provided.
c. Substitution request is fully documented and properly submitted.
d. Requested substitution will not adversely affect Contractor's construction schedule.
e. Requested substitution has received necessary approvals of authorities having jurisdiction.
f. Requested substitution is compatible with other portions of the Work.
g. Requested substitution has been coordinated with other portions of the Work.
h. Requested substitution provides specified warranty.
i. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.

B. Substitutions for Convenience: Not allowed unless otherwise indicated.

PART 3 - EXECUTION (Not Used)

END OF SECTION 01635

SECTION 01700 - EXECUTION REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes general administrative and procedural requirements governing execution of the Work including, but not limited to, the following:

1. Construction layout.
2. Field engineering and surveying.
3. Installation of the Work.
4. Cutting and patching.
5. Coordination of Owner-installed products.
6. Progress cleaning.
7. Starting and adjusting.
8. Protection of installed construction.
9. Correction of the Work.

B. Related Requirements:

1. Section 01100 "Summary" for limits on use of Project site.
2. Section 01330 "Submittal Procedures" for submitting surveys.
3. Section 02060 "Site Demolition" for demolition and removal of selected portions remaining sitework and building components.
4. Section 01770 "Closeout Procedures" for submitting final property survey with Project Record Documents, recording of Owner-accepted deviations from indicated lines and levels, and final cleaning.
5. Section 07841 "Through-Penetration Firestop Systems" for patching penetrations in fire-rated construction.

1.3 DEFINITIONS

A. Cutting: Removal of in-place construction necessary to permit installation or performance of other work.

B. Patching: Fitting and repair work required to restore construction to original conditions after installation of other work.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For professional engineer.

B. Certificates: Submit certificate signed by professional engineer certifying that location and elevation of improvements comply with requirements.

C. Cutting and Patching Plan: Submit plan describing procedures at least 10 days prior to the time cutting and patching will be performed. Include the following information:

1. Extent: Describe reason for and extent of each occurrence of cutting and patching.
2. Changes to In-Place Construction: Describe anticipated results. Include changes to structural elements and operating components as well as changes in building appearance and other significant visual elements.
3. Products: List products to be used for patching and firms or entities that will perform patching work.
4. Dates: Indicate when cutting and patching will be performed.
5. Utilities and Mechanical and Electrical Systems: List services and systems that cutting and patching procedures will disturb or affect. List services and systems that will be relocated and those that will be temporarily out of service. Indicate length of time permanent services and systems will be disrupted.

    a. Include description of provisions for temporary services and systems during interruption of permanent services and systems.

D. Certified Surveys: Submit two copies signed by professional engineer.

E. Final Property Survey: Submit 10 copies showing the Work performed and record survey data.

1.5 QUALITY ASSURANCE

A. Land Surveyor Qualifications: A professional land surveyor who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing land-surveying services of the kind indicated.

B. Cutting and Patching: Comply with requirements for and limitations on cutting and patching of construction elements.

1. Structural Elements: When cutting and patching structural elements, notify Architect of locations and details of cutting and await directions from Architect before proceeding. Shore, brace, and support structural elements during cutting and patching. Do not cut and patch structural elements in a manner that could change their load-carrying capacity or increase deflection

2. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety. Operational elements include the following:

    a. Primary operational systems and equipment.
    b. Fire separation assemblies.
    c. Air or smoke barriers.
    d. Fire-suppression systems.
    e. Mechanical systems piping and ducts.
    f. Control systems.
    g. Communication systems.
    h. Fire-detection and -alarm systems.

i. Conveying systems.
j. Electrical wiring systems.
k. Operating systems of special construction.

3. Other Construction Elements: Do not cut and patch other construction elements or components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety. Other construction elements include but are not limited to the following:

a. Water, moisture, or vapor barriers.
b. Membranes and flashings.
c. Exterior curtain-wall construction.
d. Sprayed fire-resistive material.
e. Equipment supports.
f. Piping, ductwork, vessels, and equipment.
g. Noise- and vibration-control elements and systems.

4. Visual Elements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch exposed construction in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.

C. Cutting and Patching Conference: Before proceeding, meet at Project site with parties involved in cutting and patching, including mechanical and electrical trades. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.

D. Manufacturer's Installation Instructions: Obtain and maintain on-site manufacturer's written recommendations and instructions for installation of products and equipment.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General: Comply with requirements specified in other Sections.

B. In-Place Materials: Use materials for patching identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible.

1. If identical materials are unavailable or cannot be used, use materials that, when installed, will provide a match acceptable to Architect for the visual and functional performance of in-place materials.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Existing Conditions: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning sitework, investigate and verify the existence and location of underground utilities, mechanical and electrical systems, and other construction affecting the Work.

1. Before construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer, and water-service piping; underground electrical services, and other utilities.
2. Furnish location data for work related to Project that must be performed by public utilities serving Project site.

B. Examination and Acceptance of Conditions: Before proceeding with each component of the Work, examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.

1. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
2. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
3. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.

C. Written Report: Where a written report listing conditions detrimental to performance of the Work is required by other Sections, include the following:

1. Description of the Work.
2. List of detrimental conditions, including substrates.
3. List of unacceptable installation tolerances.
4. Recommended corrections.

D. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Existing Utility Information: Furnish information to local utility that is necessary to adjust, move, or relocate existing utility structures, utility poles, lines, services, or other utility appurtenances located in or affected by construction. Coordinate with authorities having jurisdiction.

B. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

C. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.

D. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents caused by differing field conditions outside the control of Contractor, submit a request for information to Architect according to requirements in Section 01310 "Project Management and Coordination."

E. Surface and Substrate Preparation: Comply with manufacturer's written recommendations for preparation of substrates to receive subsequent work.

3.3 CONSTRUCTION LAYOUT

A. Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation to the property survey and existing benchmarks. If discrepancies are discovered, notify Architect promptly.

B. General: Engage a land surveyor to lay out the Work using accepted surveying practices.

1. Establish benchmarks and control points to set lines and levels at each story of construction and elsewhere as needed to locate each element of Project.
2. Establish limits on use of Project site.
3. Establish dimensions within tolerances indicated. Do not scale Drawings to obtain required dimensions.
4. Inform installers of lines and levels to which they must comply.
5. Check the location, level and plumb, of every major element as the Work progresses.
6. Notify Architectwhen deviations from required lines and levels exceed allowable tolerances.
7. Close site surveys with an error of closure equal to or less than the standard established by authorities having jurisdiction.

C. Site Improvements: Locate and lay out site improvements, including pavements, grading, fill and topsoil placement, utility slopes, and rim and invert elevations.

D. Building Lines and Levels: Locate and lay out control lines and levels for structures, building foundations, column grids, and floor levels, including those required for mechanical and electrical work. Transfer survey markings and elevations for use with control lines and levels. Level foundations and piers from two or more locations.

E. Record Log: Maintain a log of layout control work. Record deviations from required lines and levels. Include beginning and ending dates and times of surveys, weather conditions, name and duty of each survey party member, and types of instruments and tapes used. Make the log available for reference by Architect.

3.4 FIELD ENGINEERING

A. Identification: Owner will identify existing benchmarks, control points, and property corners.

B. Reference Points: Locate existing permanent benchmarks, control points, and similar reference points before beginning the Work. Preserve and protect permanent benchmarks and control points during construction operations.

1. Do not change or relocate existing benchmarks or control points without prior written approval of Architect. Report lost or destroyed permanent benchmarks or control points

promptly. Report the need to relocate permanent benchmarks or control points to Architectbefore proceeding.

2. Replace lost or destroyed permanent benchmarks and control points promptly. Base replacements on the original survey control points.

C. Benchmarks: Establish and maintain a minimum of two permanent benchmarks on Project site, referenced to data established by survey control points. Comply with authorities having jurisdiction for type and size of benchmark.

1. Record benchmark locations, with horizontal and vertical data, on Project Record Documents.
2. Where the actual location or elevation of layout points cannot be marked, provide temporary reference points sufficient to locate the Work.
3. Remove temporary reference points when no longer needed. Restore marked construction to its original condition.

D. Certified Survey: On completion of foundation walls, major site improvements, and other work requiring field-engineering services, prepare a certified survey showing dimensions, locations, angles, and elevations of construction and sitework.

3.5 INSTALLATION

A. General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.

1. Make vertical work plumb and make horizontal work level.
2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
3. Conceal pipes, ducts, and wiring in finished areas unless otherwise indicated.
4. Maintain minimum headroom clearance of 96 inches (2440 mm) in occupied spaces and 90 inches (2300 mm) in unoccupied spaces.

B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.

C. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Substantial Completion.

D. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.

E. Sequence the Work and allow adequate clearances to accommodate movement of construction items on site and placement in permanent locations.

F. Tools and Equipment: Do not use tools or equipment that produce harmful noise levels.

G. Templates: Obtain and distribute to the parties involved templates for work specified to be factory prepared and field installed. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.

H. Attachment: Provide blocking and attachment plates and anchors and fasteners of adequate size and number to securely anchor each component in place, accurately located and aligned

with other portions of the Work. Where size and type of attachments are not indicated, verify size and type required for load conditions.

1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Architect.
2. Allow for building movement, including thermal expansion and contraction.
3. Coordinate installation of anchorages. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

I. Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.

J. Hazardous Materials: Use products, cleaners, and installation materials that are not considered hazardous.

3.6 CUTTING AND PATCHING

A. Cutting and Patching, General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.

1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.

B. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during installation or cutting and patching operations, by methods and with materials so as not to void existing warranties.

C. Temporary Support: Provide temporary support of work to be cut.

D. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.

E. Adjacent Occupied Areas: Where interference with use of adjoining areas or interruption of free passage to adjoining areas is unavoidable, coordinate cutting and patching according to requirements in Section 01100 "Summary."

F. Existing Utility Services and Mechanical/Electrical Systems: Where existing services/systems are required to be removed, relocated, or abandoned, bypass such services/systems before cutting to prevent interruption to occupied areas.

G. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.

1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots neatly to minimum size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.

3. Concrete and Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
4. Excavating and Backfilling: Comply with requirements in applicable Sections where required by cutting and patching operations.
5. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
6. Proceed with patching after construction operations requiring cutting are complete.

H. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other work. Patch with durable seams that are as invisible as practicable. Provide materials and comply with installation requirements specified in other Sections, where applicable.

1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate physical integrity of installation.
2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will minimize evidence of patching and refinishing.

    a. Clean piping, conduit, and similar features before applying paint or other finishing materials.
    b. Restore damaged pipe covering to its original condition.

3. Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove in-place floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.

    a. Where patching occurs in a painted surface, prepare substrate and apply primer and intermediate paint coats appropriate for substrate over the patch, and apply final paint coat over entire unbroken surface containing the patch. Provide additional coats until patch blends with adjacent surfaces.

4. Ceilings: Patch, repair, or rehang in-place ceilings as necessary to provide an even-plane surface of uniform appearance.
5. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weathertight condition and ensures thermal and moisture integrity of building enclosure.

I. Cleaning: Clean areas and spaces where cutting and patching are performed. Remove paint, mortar, oils, putty, and similar materials from adjacent finished surfaces.

3.7 OWNER-INSTALLED PRODUCTS

A. Site Access: Provide access to Project site for Owner's construction personnel.

B. Coordination: Coordinate construction and operations of the Work with work performed by Owner's construction personnel.

1. Construction Schedule: Inform Owner of Contractor's preferred construction schedule for Owner's portion of the Work. Adjust construction schedule based on a mutually

agreeable timetable. Notify Owner if changes to schedule are required due to differences in actual construction progress.

2. Preinstallation Conferences: Include Owner's construction personnel at preinstallation conferences covering portions of the Work that are to receive Owner's work. Attend preinstallation conferences conducted by Owner's construction personnel if portions of the Work depend on Owner's construction.

3.8 PROGRESS CLEANING

A. General: Clean Project site and work areas daily, including common areas. Enforce requirements strictly. Dispose of materials lawfully.

1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
2. Do not hold waste materials more than seven days during normal weather or three days if the temperature is expected to rise above 80 deg F (27 deg C).
3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.

    a. Use containers intended for holding waste materials of type to be stored.

4. Coordinate progress cleaning for joint-use areas where Contractor and other contractors are working concurrently.

B. Site: Maintain Project site free of waste materials and debris.

C. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.

1. Remove liquid spills promptly.
2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.

D. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.

E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.

F. Exposed Surfaces in Finished Areas: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.

G. Waste Disposal: Do not bury or burn waste materials on-site. Do not wash waste materials down sewers or into waterways. Comply with waste disposal requirements in Section 01500 "Temporary Facilities and Controls."

H. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.

I. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.

J. Limiting Exposures: Supervise construction operations to assure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

3.9 STARTING AND ADJUSTING

A. Coordinate startup and adjusting of equipment and operating components with requirements in Section 01810 "General Commissioning Requirements."

B. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.

C. Adjust equipment for proper operation. Adjust operating components for proper operation without binding.

D. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

E. Manufacturer's Field Service: Comply with qualification requirements in Section 01400 "Quality Requirements."

3.10 PROTECTION OF INSTALLED CONSTRUCTION

A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.

B. Comply with manufacturer's written instructions for temperature and relative humidity.

END OF SECTION 01700

SECTION 01710 - CLEANING

PART 1 -- GENERAL

1.1 DESCRIPTION

A. WORK included: Throughout the construction period, maintain all areas of new and existing buildings and site constructed or affected by the WORK OF THE Contract in a standard of cleanliness as described in this Section. Each CONTRACTOR is responsible to meet all requirements defined herein as necessitated by their work.

B. Related WORK described elsewhere: In addition to Standards described in this Section, comply with all requirements for cleaning up as described in various other Sections of these Specifications.

1.2 QUALITY ASSURANCE

A. Inspection: Conduct daily inspection, and more often if necessary, to verify that requirements of cleanliness are being met.

B. Codes and Standards: In addition to the Standards described in this Section, comply with all pertinent requirements of governmental agencies having jurisdiction and comply with OSHA Housekeeping Standards, Subpart C, Section 1926.25.

1.3 PAYMENT

A. No separate payment shall be made for the WORK described in this Section, and all costs in connection therewith shall be included in the cost of the items to which the WORK PERTAINS.

PART 2 -- PRODUCTS

2.1 Cleaning Materials and Equipment: Provide all required personnel, equipment, and materials needed to maintain the specified standard of cleanliness.

2.2 Compatibility: Use only the cleaning materials and equipment which are compatible with the surface being cleaned, as recommended by the manufacture of the material or as reviewed by the Design Engineer.

PART 3 -- EXECUTION

3.1 PROCESS CLEANING

A. General: Retain all stored items in an orderly arrangement allowing maximum access, not impeding drainage or traffic, and providing the required protection of materials. Do not allow the accumulation of scrap, debris, waste material, and other items not required for construction of the WORK. At least twice each month, and more often if necessary, completely remove all scrap, debris, and waste material from the job site. Comply with OSHA'S Section 1926-252 of Subpart H of Part 1926 Disposal of Waste Materials. Provide adequate storage for all items awaiting removal from job site, observing all requirements for fire protection and protection of the environment.

B. Site: Daily, and more often if necessary, inspect the site and pick up all scrap, debris, and waste material. Removal all such items from the site. Weekly, and more often if necessary, inspect all arrangements of materials stored on the site, restack, tidy, or otherwise service all arrangements to meet the requirements of Paragraph 3.01.A, of this Section. Maintain the site in a neat and orderly condition at all times and comply with OSHA Housekeeping Standards, Subpart C, Section 1926.25.

C. Structures: Comply with OSHA's Section 1926-252 of Subpart H of Part 1926 Disposal of Waste Materials.

1. Daily, and more often if necessary, inspect the structures, pick-up all scrap, debris, and waste material and removal all such items from the site.

2. Daily, and more often if necessary, sweep all interior spaces clean. "Clean", for the purpose of this subparagraph l shall be interpreted as meaning free from dust and other material capable of being removed by use of reasonable effort and hand held broom, except that vacuum cleaning shall also be employed if dust accumulates on surfaces above floor.

3. As required preparatory to installation of succeeding materials, clean the structures or pertinent portions thereof to the degree of cleanliness recommended by the manufacturer of the succeeding material, using all equipment and materials required to achieve the required cleanliness.

3.2 FINAL CLEANING

A. Definition: Except as otherwise specifically provided, "Clean" (for the purpose of this paragraph) shall be interpreted as meaning the level of cleanliness generally provided by skilled cleaners using commercial quality building maintenance materials.

B. General: Prior to completion of the WORK, remove from the job site all tools, surplus materials, equipment, scrap, debris, and waste.

C. Site: Unless otherwise specifically directed by the OWNER, broom clean all paved areas on the site and all public paved areas directly adjacent to the site. Completely remove all resultant debris. The Contractor shall clean the two closest catch basins including a water test to insure the storm sewer is operational and not clogged with construction debris and/or sediment.

D. Structures

1. Interior: Visually inspect all interior surfaces and remove all traces of soil, waste material, smudges, and other foreign matter. Remove all traces of splashed materials from adjacent surfaces. Remove all paint droppings, spots, stains, and dirt from finished surfaces. Use only the specified cleaning materials and equipment. Sweep, vacuum, and hand dust <u>all</u> areas, including concealed surfaces and overhead spaces, to remove all dust.

2. Glass: Clean all glass inside and outside.

3. Polished surfaces: To all surfaces requiring the routine application of buffed polish, apply the polish recommended by the manufacturer of the material being polished.

E. Timing: A coordinated schedule for final cleaning shall be agreed upon by all parties to enable the City to accept a completely clean Project.

- END OF SECTION -

SECTION 01770 - CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:

1. Substantial Completion procedures.
2. Final completion procedures.
3. Warranties.
4. Final cleaning.
5. Repair of the Work.

B. Related Requirements:
1. Section 01700 "Execution Requirements" for progress cleaning of Project site.
2. Section 01781 "Project Record Documents" for submitting record Drawings, record Specifications, and record Product Data.

1.3 ACTION SUBMITTALS

A. Product Data: For cleaning agents.

B. Contractor's List of Incomplete Items: Initial submittal at Substantial Completion.

C. Certified List of Incomplete Items: Final submittal at Final Completion.

1.4 CLOSEOUT SUBMITTALS

A. Certificates of Release: From authorities having jurisdiction.

B. Certificate of Insurance: For continuing coverage.

C. Field Report: For pest control inspection.

1.5 MAINTENANCE MATERIAL SUBMITTALS

A. Schedule of Maintenance Material Items: For maintenance material submittal items specified in other Sections.

1.6 SUBSTANTIAL COMPLETION PROCEDURES

A. Contractor's List of Incomplete Items: Prepare and submit a list of items to be completed and corrected (Contractor's punch list), indicating the value of each item on the list and reasons why the Work is incomplete.

B. Submittals Prior to Substantial Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.

1. Certificates of Release: Obtain and submit releases from authorities having jurisdiction permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
2. Submit closeout submittals specified in other Division 01 Sections, including project record documents, operation and maintenance manuals, final completion construction photographic documentation, damage or settlement surveys, property surveys, and similar final record information.
3. Submit closeout submittals specified in individual Sections, including specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
4. Submit maintenance material submittals specified in individual Sections, including tools, spare parts, extra materials, and similar items, and deliver to location designated by Architect. Label with manufacturer's name and model number where applicable.

    a. Schedule of Maintenance Material Items: Prepare and submit schedule of maintenance material submittal items, including name and quantity of each item and name and number of related Specification Section. Obtain Architect's signature for receipt of submittals.

5. Submit test/adjust/balance records.

C. Procedures Prior to Substantial Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.

1. Advise Owner of pending insurance changeover requirements.
2. Make final changeover of permanent locks and deliver keys to Owner. Advise Owner's personnel of changeover in security provisions.
3. Complete startup and testing of systems and equipment.
4. Perform preventive maintenance on equipment used prior to Substantial Completion.
5. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems. Submit demonstration and training video recordings specified in Section 01820 "Demonstration and Training."
6. Advise Owner of changeover in heat and other utilities.
7. Participate with Owner in conducting inspection and walkthrough with local emergency responders.
8. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
9. Complete final cleaning requirements, including touchup painting.
10. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.

D. Inspection: Submit a written request for inspection to determine Substantial Completion a minimum of 10 days prior to date the work will be completed and ready for final inspection and

tests. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare the Certificate of Substantial Completion after inspection or will notify Contractor of items, either on Contractor's list or additional items identified by Architect, that must be completed or corrected before certificate will be issued.

1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.
2. Results of completed inspection will form the basis of requirements for final completion.

1.7 FINAL COMPLETION PROCEDURES

A. Submittals Prior to Final Completion: Before requesting final inspection for determining final completion, complete the following:

1. Submit a final Application for Payment according to Section 01290 "Payment Procedures."
2. Certified List of Incomplete Items: Submit certified copy of Architect's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Architect. Certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
3. Certificate of Insurance: Submit evidence of final, continuing insurance coverage complying with insurance requirements.
4. Submit pest-control final inspection report.

B. Inspection: Submit a written request for final inspection to determine acceptance a minimum of 10 days prior to date the work will be completed and ready for final inspection and tests. On receipt of request, Architectwill either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare a final Certificate for Payment after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.

1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.

1.8 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

A. Organization of List: Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction. Use CSI Form 14.1A.

1. Organize list of spaces in sequential order, starting with exterior areas first .
2. Organize items applying to each space by major element, including categories for ceiling, individual walls, floors, equipment, and building systems.
3. Include the following information at the top of each page:

    a. Project name.
    b. Date.
    c. Name of Architect.
    d. Name of Contractor.
    e. Page number.

4. Submit list of incomplete items in the following format:

a. PDF electronic file. Architect will return annotated file.
b. Three paper copies. Architectwill return two copies.

1.9 SUBMITTAL OF PROJECT WARRANTIES

A. Time of Submittal: Submit written warranties on request of Architect for designated portions of the Work where commencement of warranties other than date of Substantial Completion is indicated, or when delay in submittal of warranties might limit Owner's rights under warranty.

B. Partial Occupancy: Submit properly executed warranties within 15 days of completion of designated portions of the Work that are completed and occupied or used by Owner during construction period by separate agreement with Contractor.

C. Organize warranty documents into an orderly sequence based on the table of contents of Project Manual.

1. Bind warranties and bonds in heavy-duty, three-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch (215-by-280-mm) paper.
2. Provide heavy paper dividers with plastic-covered tabs for each separate warranty. Mark tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product and the name, address, and telephone number of Installer.
3. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project name, and name of Contractor.

D.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.

1. Use cleaning products that comply with Green Seal's GS-37, or if GS-37 is not applicable, use products that comply with the California Code of Regulations maximum allowable VOC levels.

PART 3 - EXECUTION

3.1 FINAL CLEANING

A. General: Perform final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.

B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.

1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a designated portion of Project:

a. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.
b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
c. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.
d. Remove tools, construction equipment, machinery, and surplus material from Project site.
e. Remove snow and ice to provide safe access to building.
f. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
g. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
h. Sweep concrete floors broom clean in unoccupied spaces.
i. Vacuum carpet and similar soft surfaces, removing debris and excess nap; clean according to manufacturer's recommendations if visible soil or stains remain.
j. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Polish mirrors and glass, taking care not to scratch surfaces.
k. Remove labels that are not permanent.
l. Wipe surfaces of mechanical and electrical equipment **, elevator equipment,** and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
m. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
n. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
o. Clean ducts, blowers, and coils if units were operated without filters during construction or that display contamination with particulate matter on inspection.

1) Clean HVAC system in compliance with NADCA Standard 1992-01. Provide written report on completion of cleaning.

p. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency.
q. Leave Project clean and ready for occupancy.

C. Pest Control: Comply with pest control requirements in Section 01500 "Temporary Facilities and Controls." Prepare written report.

D. Construction Waste Disposal: Comply with waste disposal requirements in Section 01500 "Temporary Facilities and Controls."

3.2 REPAIR OF THE WORK

A. Complete repair and restoration operations before requesting inspection for determination of Substantial Completion.

B. Repair or remove and replace defective construction. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment. Where damaged or worn items cannot be repaired or restored, provide replacements. Remove and replace operating components that cannot be repaired. Restore damaged construction and permanent facilities used during construction to specified condition.

1. Remove and replace chipped, scratched, and broken glass, reflective surfaces, and other damaged transparent materials.
2. Touch up and otherwise repair and restore marred or exposed finishes and surfaces. Replace finishes and surfaces that that already show evidence of repair or restoration.

    a. Do not paint over "UL" and other required labels and identification, including mechanical and electrical nameplates. Remove paint applied to required labels and identification.

3. Replace parts subject to operating conditions during construction that may impede operation or reduce longevity.
4. Replace burned-out bulbs, bulbs noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.

END OF SECTION 01770

SECTION 01781 - PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for project record documents, including the following:

1. Record Drawings.
2. Record Specifications.
3. Record Product Data.

B. Related Requirements:
1. Section 01700 "Execution Requirements" for final property survey.
2. Section 01770 "Closeout Procedures" for general closeout procedures.

1.3 CLOSEOUT SUBMITTALS

A. Record Drawings: Comply with the following:

1. Number of Copies: Submit [] two set(s) of marked-up record prints.
2.

B. Record Specifications: Submit two paper copies and annotated PDF electronic files of Project's Specifications, including addenda and contract modifications.

C. Record Product Data: Submit two paper copies and annotated PDF electronic files and directories of each submittal.

PART 2 - PRODUCTS

2.1 RECORD DRAWINGS

A. Record Prints: Maintain one set of marked-up paper copies of the Contract Drawings and Shop Drawings, incorporating new and revised drawings as modifications are issued.

1. Preparation: Mark record prints to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to provide information for preparation of corresponding marked-up record prints.

a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
b. Accurately record information in an acceptable drawing technique.
c. Record data as soon as possible after obtaining it.
d. Record and check the markup before enclosing concealed installations.
e. Cross-reference record prints to corresponding archive photographic documentation.

2. Content: Types of items requiring marking include, but are not limited to, the following:

a. Dimensional changes to Drawings.
b. Revisions to details shown on Drawings.
c. Depths of foundations below first floor.
d. Locations and depths of underground utilities.
e. Revisions to routing of piping and conduits.
f. Revisions to electrical circuitry.
g. Actual equipment locations.
h. Duct size and routing.
i. Locations of concealed internal utilities.
j.
k. Changes made following Architect's written orders.
l. Details not on the original Contract Drawings.
m. Field records for variable and concealed conditions.
n. Record information on the Work that is shown only schematically.

3. Mark the Contract Drawings and Shop Drawings completely and accurately. Use personnel proficient at recording graphic information in production of marked-up record prints.
4. Mark record sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at same location.
5. Mark important additional information that was either shown schematically or omitted from original Drawings.
6. Note Construction Change Directive numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.

B. Newly Prepared Record Drawings: Prepare new Drawings instead of preparing record Drawings where Architect determines that neither the original Contract Drawings nor Shop Drawings are suitable to show actual installation.

1. New Drawings may be required when a Change Order is issued as a result of accepting an alternate, substitution, or other modification.
2. Consult Architect for proper scale and scope of detailing and notations required to record the actual physical installation and its relation to other construction. Integrate newly prepared record Drawings into record Drawing sets; comply with procedures for formatting, organizing, copying, binding, and submitting.

C. Format: Identify and date each record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location.

1. Record Prints: Organize record prints and newly prepared record Drawings into manageable sets. Bind each set with durable paper cover sheets. Include identification on cover sheets.

2. Record Digital Data Files: Organize digital data information into separate electronic files that correspond to each sheet of the Contract Drawings. Name each file with the sheet identification. Include identification in each digital data file.
3. Identification: As follows:

    a. Project name.
    b. Date.
    c. Designation "PROJECT RECORD DRAWINGS."
    d. Name of Architect.
    e. Name of Contractor.

2.2 RECORD SPECIFICATIONS

A. Preparation: Mark Specifications to indicate the actual product installation where installation varies from that indicated in Specifications, addenda, and contract modifications.

1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
2. Mark copy with the proprietary name and model number of products, materials, and equipment furnished, including substitutions and product options selected.
3. Record the name of manufacturer, supplier, Installer, and other information necessary to provide a record of selections made.
4. For each principal product, indicate whether record Product Data has been submitted in operation and maintenance manuals instead of submitted as record Product Data.
5. Note related Change Orders and record Drawings where applicable.

B. Format: Submit record Specifications as paper copy and scanned PDF electronic file(s) of marked-up paper copy of Specifications.

2.3 RECORD PRODUCT DATA

A. Preparation: Mark Product Data to indicate the actual product installation where installation varies substantially from that indicated in Product Data submittal.

1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
2. Include significant changes in the product delivered to Project site and changes in manufacturer's written instructions for installation.
3. Note related Change Orders, record Specifications, and record Drawings where applicable.

B. Format: Submit record Product Data as paper copy and scanned PDF electronic file(s) of marked-up paper copy of Product Data.

1. Include record Product Data directory organized by Specification Section number and title, electronically linked to each item of record Product Data.

2.4 MISCELLANEOUS RECORD SUBMITTALS

A. Assemble miscellaneous records required by other Specification Sections for miscellaneous record keeping and submittal in connection with actual performance of the Work. Bind or file miscellaneous records and identify each, ready for continued use and reference.

B. Format: Submit miscellaneous record submittals as paper copy and scanned PDF electronic file(s) of marked-up miscellaneous record submittals.

1. Include miscellaneous record submittals directory organized by Specification Section number and title, electronically linked to each item of miscellaneous record submittals.

PART 3 - EXECUTION

3.1 RECORDING AND MAINTENANCE

A. Recording: Maintain one copy of each submittal during the construction period for project record document purposes. Post changes and revisions to project record documents as they occur; do not wait until end of Project.

B. Maintenance of Record Documents and Samples: Store record documents and Samples in the field office apart from the Contract Documents used for construction. Do not use project record documents for construction purposes. Maintain record documents in good order and in a clean, dry, legible condition, protected from deterioration and loss. Provide access to project record documents for Architect's reference during normal working hours.

END OF SECTION 01781

DIVISION 02

SECTION 02060- SITE DEMOLITION

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A Drawings, General Conditions, Division 1 Specifications sections, and Appendix of the Specifications to apply to work of this section.

1.2 DESCRIPTION OF WORK

A The Contractor shall examine all Drawings and read all contract documents and specifications to avoid omissions and duplications and to insure complete execution of all work in the Section. The Contractor shall provide all labor, materials, tools, equipment, apparatus, shoring, scaffolding, vehicles and transportation, incidentals, etc., required to perform the Demolition Work indicated on the Drawings and specified herein. The Work shall include, but is not limited to:

1. The complete demolition of existing perimeter retaining wall, continuous foundation walls and footings of the demolished building. Demolition of associated walkway/driveway pavement (including common alley), water meter, and storm drain lines, inlets and valves. Disconnect and cap all utilities serving building at the property line in accordance with the Sewer & Water Board of New Orleans City of New Orleans requirements. Completion of all other related work as required in the contract documents.

1.3 OUTLINE OF THE WORK

A The work to be performed under this Section shall include, but is not limited to, the following:

1. Temporary removal of construction fencing.

2. The complete removal of all miscellaneous debris and trash from the site prior to demolition.

3. Expose existing cistern and privy, hiring and paying for services of a registered land surveyor to locate on a survey with dim-relation to property lines.

4. Exposing existing footings, hiring and paying for the services of a registered land surveyor to locate each footing and indicate on a survey with dimensional relationship to property lines. Exact location and estimated depths shall be submitted to structural engineer via architect.

5. The disconnection and capping of all existing utility lines remaining intact and to the demoed buildings at the property line including water, gas, sewer, storm drainage, telephone, etc. unless otherwise indicated. All electric lines are to be terminated at poles or transformers. Coordinate with all utility companies.

6. Removal of adjacent neighbor sewer line.

7. The demolition and removal of damaged sidewalks, paving, etc. as indicated within the drawings. Concrete is to be handled per item 2 above.

8. The complete removal of all demolished materials, rubble, rubbish, or other debris created by the demolition from the site including existing material other than earth - thus the final product will be earth.

9. Installation of silt fencing coordination re-installation of construction fencing to accommodate erosion control measures and erosion control measures indicated on the drawings.

1.4 SUBMITTALS

A Within ten (10) days of the signing of the Contract, the Contractor shall submit to the Architect and Project Manager, in writing, a schedule and timetable for the Demolition and Removal Work to be performed. This schedule shall be organized into daily segments, and shall indicate areas to be demolished, removed, etc. for each segment, and their approximate dollar value given for all the segments shall total the contract price for demolition.

B Schedule: Submit, at the same time, 2 copies of proposed methods and operations of building demolition to Architect and Project Manager for review prior to start of work. Include in schedule coordination of work. Include in schedule coordination for shut-off, capping and/or continuation of utility services as required.

C Provide a detailed sequence of demolition and removal work.

D Contractor is to submit a log of the names, locations and types, etc. of dumping sites used and the types of materials disposed of at each site during the execution of the contract work.

1.5 JOB CONDITIONS

B Condition of Structures: Owner assumes no responsibility for actual condition of structures to be demolished.

1. Conditions existing at time of inspection for bidding purposes will be maintained by Owner in so far as practicable. However, variations on site may occur by Owner’s removal and salvage operations prior to start of demolition work.

C Explosives: Use of explosives will not be permitted.

D Traffic: Conduct demolition operations and removal of debris to ensure minimum interference with roads, streets, walks, and other adjacent occupied or used facilities.

1. Do not close or obstruct streets, walks or other occupied or used facilities without permission from authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by governing regulations.

E Protections: Ensure safe passage of persons around area of demolition. Conduct operations to prevent injury to persons and damage to adjacent buildings, structures and other facilities.

1. Maintain temporary fencing with gates to prevent unauthorized access to the site.

2. Contractor will be held responsible for consequences resulting in any security breach occurring at the site.

F Damages: Promptly repair damages caused to adjacent facilities by demolition operations at no cost to Owner.

1. If the contractor causes any damage to existing utility lines or valves, they shall repair or replace as required.

G Peak particle vibrations shall not exceed 0.25 in/sec. outside adjacent buildings. Monitoring shall be provided by a testing service employed by the Contractor. All test reports shall be forwarded to the Owner and copied to the Architect, Project Manager and Engineer. If vibrations exceed the limits stated, the Owner reserves the right to cease all work due to non-compliance.

H Utility Services:

1. Disconnect all existing utilities to the site that remain active. Protect all utilities to remain at nearest valve, manhole and power pole unless otherwise indicated on the drawings.

2. Do not interrupt existing utilities serving occupied or adjacent properties, except when authorized in writing by authorities having jurisdiction and neighboring property where work will be performed. Provide temporary services during interruptions to existing utilities, as acceptable to Owner, adjacent neighbor and with notification to other adjacent properties.

3. Clean all areas and backfill per general description of this Section, and Division 32. - Verify / coordinate sections

4. Mark on a copy of the site survey as a record print, kept on the job site, all known locations of utilities and their abandoned piping conduit, foundation piles, etc. This record print shall be submitted to the Owner through the Engineer upon completion of the Work.

I Asbestos Containing Materials are not known to be present at the site.

J Contractor shall take all precautions necessary to protect the safety of its employees.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.1 DEMOLITION

A Pollution Controls: Use water sprinkling, temporary enclosures, and other suitable methods to limit dust and dirt rising and scattering in air to lowest practical level. Comply with governing regulations pertaining to environmental protection.

1. Do not use water when it may create hazardous or objectionable conditions such as ice, flooding, and pollution.

2. Clean adjacent structures and improvements of dust, dirt, and debris caused by demolition operations, as directed by Engineer or governing authorities. Return adjacent areas to condition existing prior to start of work.

B Demolition: Demolish retaining walls/foundation and paving completely and remove from site as directed. Use such methods as required to complete work within limitations of governing regulations. Small carriable items, such as bricks, may be removed intact when acceptable to Engineer and approved by authorities having jurisdiction. Proceed with demolition in a systematic manner, from top of structure to ground.

C Filling Depressions, Pits and Voids: Completely fill depressions, pits, and below-grade areas and voids resulting from demolition of structures, footings and paving.

1. Use soil materials as specified by Civil Engineer for depressions due to footings, privy and as noted on drawings.

2. Use satisfactory soil materials consisting of sand, free from debris, trash, frozen materials roots and other organic matter. Reference Eustis GeoTech Report for satisfactory soil and requirements.

3. Prior to placement of fill materials, ensure that areas to be filled are free of standing water, frost, frozen material, trash and debris.

4. Place fill materials in horizontal layers not exceeding 6” in loose depth. Compact each layer to 95% Standard Proctor Density and Optimum Moisture Content.

5. After fill placement and compaction, grade surface to meet adjacent contours and to provide flow to surface drainage structures.

3.2 DISPOSAL OF DEMOLISHED MATERIALS

A General: Upon completion of the work, Contractor shall leave the site “clean”. Remove from site debris, rubbish, broken glass, rubble, litter or other materials resulting from demolition operations, and any existing materials other than earth.

1. Storage or sale of removed materials will not be permitted on the site.

2. Burning of removed materials from demolished structures will not be permitted on site.

B Removal: Transport materials removed from demolished structures and disposed of offsite legally.

END OF SECTION

SECTION 02200 - EARTHWORK

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. Preparing subgrades for slabs-on-grade, walks, pavements, turf and grasses and plants.
2. Excavating and backfilling for buildings and structures.
3. Drainage course for concrete slabs-on-grade.
4. Subbase course for concrete walks and pavements.
5. Subbase course and base course for asphalt paving.
6. Excavating and backfilling for utility trenches.

1.2 DEFINITIONS

A. Backfill: Soil material used to fill an excavation as per Eustis Geotechnical Report
1. Initial Backfill: Backfill placed beside and over pipe in a trench, including haunches to support sides of pipe.
2. Final Backfill: Backfill placed over initial backfill to fill a trench.

B. Base Course: Aggregate layer placed between the subbase course and hot-mix asphalt paving.

C. Bedding Course: Aggregate layer placed over the excavated subgrade in a trench before laying pipe.

D. Borrow Soil: Satisfactory soil imported from off-site for use as fill or backfill.

E. Drainage Course: Aggregate layer supporting the slab-on-grade that also minimizes upward capillary flow of pore water.

F. Excavation: Removal of material encountered above subgrade elevations and to lines and dimensions indicated.
1. Authorized Additional Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions as directed by Architect. Authorized additional excavation and replacement material will be paid for according to Contract provisions for changes in the Work.
2. Unauthorized Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions without direction by Architect. Unauthorized excavation, as well as remedial work directed by Architect, shall be without additional compensation.

G. Fill: Soil materials used to raise existing grades as per Eustis Geotechnical Report.

H. Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below the ground surface.

I. Subbase Course: Aggregate layer placed between the subgrade and base course for hot-mix asphalt pavement, or aggregate layer placed between the subgrade and a cement concrete pavement or a cement concrete or hot-mix asphalt walk.

J. Subgrade: Uppermost surface of an excavation or the top surface of a fill or backfill immediately below subbase, drainage fill, drainage course, or topsoil materials.

K. Utilities: On-site underground pipes, conduits, ducts, and cables, as well as underground services within buildings.

1.3 QUALITY ASSURANCE

A. Pre-excavation Conference: Conduct conference at Project site at contractor's request.

1.4 PROJECT CONDITIONS

A. Utility Locator Service: Notify utility locator service for area where Project is located before beginning earth moving operations.

B. Do not commence earth moving operations until plant-protection measures specified are in place.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

A. General: Provide borrow soil materials when sufficient satisfactory soil materials are not available from excavations.

B. Satisfactory Soils: Shall be obtained from off-site and shall be locally available sand (AASHTO A-3) having a maximum of 10% of the material passing the #200 sieve; free of rock or gravel larger than 3 inches in any dimension, debris, waste, frozen materials, vegetation, and other deleterious matter with a maximum organic content of 5%.

C. Subbase Material: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; with at least 90 percent passing a 1-1/2-inch sieve and not more than 10 % passing a No. 200 sieve.

D. Base Course: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; with at least 95 percent passing a 1-1/2-inch sieve and not more than 8 percent passing a No. 200 sieve.

E. Drainage Course: Narrowly graded mixture of washed crushed stone, or crushed or uncrushed gravel; ASTM D 448; coarse-aggregate grading Size 57; with 100 percent passing a 1-1/2-inch sieve and 0 to 5 percent passing a No. 8 sieve.

2.2 ACCESSORIES

A. Warning Tape: Acid- and alkali-resistant, polyethylene film warning tape manufactured for marking and identifying underground utilities, 6 inches wide and 4 mils thick, continuously inscribed with a description of the utility; colored to comply with local practice or requirements of authorities having jurisdiction.

B. Detectable Warning Tape: Acid- and alkali-resistant, polyethylene film warning tape manufactured for marking and identifying underground utilities, a minimum of 6 inches wide and 4 mils thick, continuously inscribed with a description of the utility, with metallic core encased in a protective jacket for corrosion protection, detectable by metal detector when tape is buried up to 30 inches deep; colored to comply with local practice or requirements of authorities having jurisdiction.

PART 3 - EXECUTION

3.1 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earth moving operations.

B. Protect and maintain erosion and sedimentation controls during earth moving operations.

C. Protect subgrades and foundation soils from freezing temperatures and frost. Remove temporary protection before placing subsequent materials.

3.2 EXCAVATION, GENERAL

A. Unclassified Excavation: Excavate to subgrade elevations regardless of the character of surface and subsurface conditions encountered. Unclassified excavated materials may include rock, soil materials, and obstructions. No changes in the Contract Sum or the Contract Time will be authorized for rock excavation or removal of obstructions.

1. If excavated materials intended for fill and backfill include unsatisfactory soil materials and rock, replace with satisfactory soil materials.

3.3 EXCAVATION FOR STRUCTURES

A. Excavate to indicated elevations and dimensions within a tolerance of plus or minus 1 inch. If applicable, extend excavations a sufficient distance from structures for placing and removing concrete formwork, for installing services and other construction, and for inspections.
1. Excavations for Footings and Foundations: Do not disturb bottom of excavation. Excavate by hand to final grade just before placing concrete reinforcement. Trim bottoms to required lines and grades to leave solid base to receive other work.

B. Excavations at Edges of Tree- and Plant-Protection Zones:

1. Excavate by hand to indicated lines, cross sections, elevations, and subgrades. Use narrow-tine spading forks to comb soil and expose roots. Do not break, tear, or chop exposed roots. Do not use mechanical equipment that rips, tears, or pulls roots.
2. Cut and protect roots according to requirements in Division 2 Section "Tree Protection and Trimming."

3.4 EXCAVATION FOR WALKS AND PAVEMENTS

A. Excavate surfaces under walks and pavements to indicated lines, cross sections, elevations, and subgrades.

3.5 EXCAVATION FOR UTILITY TRENCHES

A. Excavate trenches to indicated gradients, lines, depths, and elevations.

B. Excavate trenches to uniform widths to provide the following clearance on each side of pipe or conduit. Excavate trench walls vertically from trench bottom to 12 inches higher than top of pipe or conduit unless otherwise indicated.

1. Clearance: 12 inches each side of pipe or conduit.

C. Trench Bottoms: Excavate and shape trench bottoms to provide uniform bearing and support of pipes and conduit. Shape subgrade to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits. Remove projecting stones and sharp objects along trench subgrade.

1. Excavate trenches 6 inches deeper than elevation required in rock or other unyielding bearing material, 4 inches deeper elsewhere, to allow for bedding course.

D. Trenches in Tree- and Plant-Protection Zones:

1. Hand-excavate to indicated lines, cross sections, elevations, and subgrades. Use narrow-tine spading forks to comb soil and expose roots. Do not break, tear, or chop exposed roots. Do not use mechanical equipment that rips, tears, or pulls roots.
2. Do not cut main lateral roots or taproots; cut only smaller roots that interfere with installation of utilities.
3. Cut and protect roots according to requirements of tree protection and trimming specifications.

3.6 SUBGRADE INSPECTION

A. Proof-roll subgrade below the building slabs and pavements with a pneumatic-tired dump truck to identify soft pockets and areas of excess yielding. Do not proof-roll wet or saturated subgrades.

B. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as directed by Architect, without additional compensation.

3.7 UNAUTHORIZED EXCAVATION

A. Fill unauthorized excavation under foundations or wall footings by extending bottom elevation of concrete foundation or footing to excavation bottom, without altering top elevation. Lean concrete fill, with 28-day compressive strength of 2500 psi, may be used when approved by Architect.

1. Fill unauthorized excavations under other construction, pipe, or conduit as directed by Architect.

3.8 STORAGE OF SOIL MATERIALS

A. Stockpile borrow soil materials and excavated satisfactory soil materials without intermixing. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.

1. Stockpile soil materials away from edge of excavations. Do not store within drip line of remaining trees.

3.9 UTILITY TRENCH BACKFILL

A. Place backfill on subgrades free of mud, frost, snow, or ice.

B. Place and compact bedding course on trench bottoms and where indicated. Shape bedding course to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits.

C. Trenches under Footings: Backfill trenches excavated under footings and within 18 inches of bottom of footings with satisfactory soil; fill with concrete to elevation of bottom of footings. Concrete is specified in Division 3 Section "Cast-in-Place Concrete."

D. Trenches under Roadways: Provide 4-inch-thick, concrete-base slab support for piping or conduit less than 30 inches below surface of roadways. After installing and testing, completely encase piping or conduit in a minimum of 4 inches of concrete before backfilling or placing roadway subbase course. Concrete is specified in Division 3 Section "Cast-in-Place Concrete."

E. Place and compact initial backfill of satisfactory soil], free of particles larger than 1 inch in any dimension, to a height of 12 inches over the pipe or conduit.
1. Carefully compact initial backfill under pipe haunches and compact evenly up on both sides and along the full length of piping or conduit to avoid damage or displacement of piping or conduit. Coordinate backfilling with utilities testing.

F. Place and compact final backfill of satisfactory soil to final subgrade elevation.

G. Install warning tape directly above utilities, 12 inches below finished grade, except 6 inches below subgrade under pavements and slabs.

3.10 SOIL FILL

A. Plow, scarify, bench, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so fill material will bond with existing material.

B. Place and compact fill material in layers to required elevations as follows:

1. Under grass and planted areas, use satisfactory soil material.
2. Under walks and pavements, use engineered fill.
3. Under steps and ramps, use engineered fill.

3.11 SOIL MOISTURE CONTROL

A. Uniformly moisten or aerate subgrade and each subsequent fill or backfill soil layer before compaction to within 2 percent of optimum moisture content.

1. Do not place backfill or fill soil material on surfaces that are muddy, frozen, or contain frost or ice.
2. Remove and replace, or scarify and air dry, otherwise satisfactory soil material that exceeds optimum moisture content by 2 percent and is too wet to compact to specified dry unit weight.

3.12 COMPACTION OF SOIL BACKFILLS AND FILLS

A. Place backfill and fill soil materials in layers not more than 8 inches in loose depth for material compacted by heavy compaction equipment, and not more than 4 inches in loose depth for material compacted by hand-operated tampers.

B. Place backfill and fill soil materials evenly on all sides of structures to required elevations, and uniformly along the full length of each structure.

C. Compact soil materials to not less than the following percentages of maximum dry unit weight according to ASTM D 698:

1. Under structures, building slabs, steps, and pavements, scarify and recompact top 12 inches of existing subgrade and each layer of backfill or fill soil material at 95 percent.

3.13 GRADING

A. General: Uniformly grade areas to a smooth surface, free of irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated.

B. Site Rough Grading: Slope grades to direct water away from buildings and to prevent ponding. Finish subgrades to required elevations within the following tolerances:

1. Turf or Unpaved Areas: Plus or minus 1 inch.
2. Walks: Plus or minus 1 inch.

3. Pavements: Plus or minus 1/2 inch.

C. Grading inside Building Lines: Finish subgrade to a tolerance of 1/2 inch when tested with a 10-foot (3-m) straightedge.

3.14 SUBBASE UNDER PAVEMENTS AND WALKS

A. Place subbase course on subgrades free of mud, frost, snow, or ice.

B. On prepared subgrade, place subbase course under pavements and walks as follows:

1. Shape subbase course to required crown elevations and cross-slope grades.
2. Place subbase course that exceeds 6 inches in compacted thickness in layers of equal thickness, with no compacted layer more than 6 inches thick or less than 3 inches thick.
3. Compact subbase course at optimum moisture content to required grades, lines, cross sections, and thickness to not less than 95 percent of maximum dry unit weight according ASTM D 698.

3.15 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified geotechnical engineering testing agency to perform tests and inspections.

B. Allow testing agency to inspect and test subgrades and each fill or backfill layer. Proceed with subsequent earth moving only after test results for previously completed work comply with requirements.

C. Footing Subgrade: At footing subgrades, at least one test of each soil stratum will be performed to verify design bearing capacities. Subsequent verification and approval of other footing subgrades may be based on a visual comparison of subgrade with tested subgrade when approved by Architect.

D. When testing agency reports that subgrades, fills, or backfills have not achieved degree of compaction specified, scarify and moisten or aerate, or remove and replace soil materials to depth required; re-compact and retest until specified compaction is obtained.

E. Report test results to the Architect and Structural Engineer.

F. The Contractor shall be responsible for notifying the Testing Laboratory and ensuring that compaction tests are made on each lift of fill or backfill and on any other compacted soil.

3.16 PROTECTION

A. Protecting Graded Areas: Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.

B. Repair and reestablish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction due to subsequent construction operations or weather conditions.

C. Where settling occurs before Project correction period elapses, remove finished surfacing, backfill with additional soil material, compact, and reconstruct surfacing.

1. Restore appearance, quality, and condition of finished surfacing to match adjacent work, and eliminate evidence of restoration to greatest extent possible.

3.17 DISPOSAL OF SURPLUS AND WASTE MATERIALS

A. Remove surplus satisfactory soil and waste materials, including unsatisfactory soil, trash, and debris, and legally dispose of them off Owner's property.

END OF SECTION 02200

SECTION 02361 - TERMITE CONTROL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Soil treatment with termiticide.

2. Wood treatment with termiticide at storage areas
3. Bait-station system.
4. Polymer barrier fittings with termiticide for installation around utility penetrations.

B. Related Sections:

1. Section 06100 "Rough Carpentry" for wood preservative treatment by pressure process.

1.3 SUBMITTALS

A. Product Data: For each type of termite control product.

1. Include the EPA-Registered Label for termiticide products.

B. Qualification Data: For qualified Installer.

C. Product Certificates: For termite control products, from manufacturer.

D. Soil Treatment Application Report: After application of termiticide is completed, submit report for Owner's records and include the following:

1. Date and time of application.
2. Moisture content of soil before application.
3. Termiticide brand name and manufacturer.
4. Quantity of undiluted termiticide used.
5. Dilutions, methods, volumes used, and rates of application.
6. Areas of application.

7. Water source for application.

E. Wood Treatment Application Report: After application of termiticide is completed, submit report for Owner's records and include the following:

1. Date and time of application.
2. Termiticide brand name and manufacturer.
3. Quantity of undiluted termiticide used.
4. Dilutions, methods, volumes used, and rates of application.
5. Areas of application.

F. Bait-Station System Application Report: After installation of bait-station system is completed, submit report for Owner's records and include the following:

1. Location of areas and sites conducive to termite feeding and activity.
2. Plan drawing showing number and locations of bait stations.
3. Dated report for each monitoring and inspection occurrence indicating level of termite activity, procedure, and treatment applied before time of Substantial Completion.
4. Termiticide brand name and manufacturer.
5. Quantities of [**termiticide**] [**and**] [**nontoxic termite bait**] used.

G. Schedule of inspections for one year from date of Substantial CompletionPolymer Barrier Fittings with Termiticide Application Report: After installation of polymer barrier fittings with termiticide is completed, submit report for Owner’s records and include the following:
1. Plan drawing showing number and locations of each type of polymer barrier fitting with termiticide.
2. Termiticide brand name and manufacturer
3. Schedule of inspections for one year from date of Substantial Completion

H. Warranties: Sample of special warranties.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: A specialist who is licensed according to regulations of authorities having jurisdiction to apply termite control treatment and products in jurisdiction where Project is located, and who employs workers trained and approved by manufacturer to install manufacturer's products.

B. Regulatory Requirements: Formulate and apply termiticides and termiticide devices according to the EPA-Registered Label.

C. Source Limitations: Obtain termite control products from single sourcefrom single manufacturer].

D. Preinstallation Conference: Conduct conference at Project site.

1.5 PROJECT CONDITIONS

A. Environmental Limitations: To ensure penetration, do not treat soil that is water saturated or frozen. Do not treat soil while precipitation is occurring. Comply with requirements of the EPA-Registered Label and requirements of authorities having jurisdiction.

B. Coordinate soil treatment application with excavating, filling, grading, and concreting operations. Treat soil under footings, grade beams, and ground-supported slabs before construction.

C. Apply wood treatment after framing, sheathing, and exterior weather protection is completed but before electrical and mechanical systems are installed.

D. Install bait-station system after construction, including landscaping, is completed.

E. Install polymer barrier fittings with termiticide around utility penetrations prior to pouring concrete and after installation and inspection of plumbing and electrical pipes and conduits, slab vapor barrier, and concrete slab reinforcement.

1.6 WARRANTY

A. Soil Treatment Special Warranty: Manufacturer's standard form, signed by Applicator and Contractor, certifying that termite control work, consisting of applied soil termiticide treatment, will prevent infestation of subterranean termites. If subterranean termite activity or damage is discovered during warranty period, re-treat soil and repair or replace damage caused by termite infestation.

1. Warranty Period: **Five**years from date of Substantial Completion.

B. Wood Treatment Special Warranty: Manufacturer's standard form, signed by Applicator and Contractor, certifying that termite control work, consisting of applied wood termiticide treatment, will prevent infestation of subterranean termites. If subterranean termite damage is discovered during warranty period, repair or replace damage caused by termite infestation and treat replacement wood.

1. Warranty Period: 12 years from date of Substantial Completion.

C. Polymer Barrier Fittings with Termiticide Special Warranty: Manufacturer's standard form, signed by Applicator and Contractor, certifying that termite control work, consisting of installation of polymer barrier fittings with termiticide, will prevent infestation of subterranean termites. If subterranean termite activity or damage is discovered during warranty period, re-treat and repair or replace damage caused by termite infestation.

1. Warranty Period: Five years from date of Substantial Completion.

1.7 MAINTENANCE SERVICE

A. Continuing Service: Beginning at Substantial Completion, provide 12 months' continuing service including monitoring, inspection, and re-treatment for occurrences of termite activity. Provide a standard continuing service agreement. State services, obligations, conditions, terms for agreement period, and terms for future renewal options.

PART 2 - PRODUCTS

2.1 SOIL TREATMENT

A. Termiticide: Provide an EPA-Registered termiticide, complying with requirements of authorities having jurisdiction, in an aqueous solution formulated to prevent termite infestation. Provide quantity required for application at the label volume and rate for the maximum termiticide concentration allowed for each specific use, according to product's EPA-Registered Label.

1. Products: Subject to compliance with requirements, provide one of the following:

a. BASF Corporation, Agricultural Products; Termidor.
b. FMC Corporation, Agricultural Products Group; Dragnet FT .

2. Service Life of Treatment: Soil treatment termiticide that is effective for not less than five years against infestation of subterranean termites.

2.2 WOOD TREATMENT

A. Borate: Provide an EPA-Registered borate temiticide, complying with requirements of authorities having jurisdiction, in an aqueous solution for spray application and a gel solution for pressure injection, formulated to prevent termite infestation in wood. Provide quantity required for application at the label volume and rate for the maximum diffusible borate concentration allowed for each specific use, according to product's EPA-Registered Label.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. Nisus Corp.; Bora-Care or Tim-Bor.

2.3 BAIT-STATION SYSTEM

A. Provide bait stations based on the dimensions of building perimeter indicated on Drawings, according to manufacturer's EPA-Registered Label for product, manufacturer's written instructions, and the following:

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

   a. BASF Corporation, Agricultural Products; Subterfuge.
   b. Dow AgroSciences LLC; Sentricon System.
   c. Ensystex, Inc.; Exterra System.
   d. FMC Corporation, Agricultural Products Group; First Line.
   e. Whitmire Micro-Gen Research Laboratories, Inc.; Advance TBS.

2. No fewer than one bait station per 8 linear feet <**Insert value**>.
3. No fewer than one cluster of bait stations per 20 linear feet (6.1 linear meters), consisting of no fewer than three bait stations per cluster.

2.4 POLYMER BARRIER FITTINGS

A. Products: Subject to compliance with requirements, [**provide the following**] [**provide one of the following**] [**available products that may be incorporated into the Work include, but are not limited to, the following**]:

   1. Syngenta; IMPASSE Termite Blockers.
   2. Termimesh LLC>.

B. Pipe/Conduit Fitting: Integral 2-1/2-inch- (65-mm-) long polymer sleeve and 1-inch- (25-mm-) wide circular flange with lambda-cyhalothrin termiticide sealed between two outer polymer layers; with fasteners.

C. Tub Trap Fitting: Integral polymer boot and 23-by-23-inch (585-by-585-mm) flange with lambda-cyhalothrin termiticide sealed between two outer polymer layers; with fasteners.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Applicator present, for compliance with requirements for moisture content of soil per termiticide label requirements, interfaces with earthwork, slab and foundation work, landscaping, utility installation, and other conditions affecting performance of termite control.

B. Proceed with application only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. General: Comply with the most stringent requirements of authorities having jurisdiction and with manufacturer's written instructions for preparation before beginning application of termite control treatment. Remove all extraneous sources of wood

cellulose and other edible materials such as wood debris, tree stumps and roots, stakes, formwork, and construction waste wood from soil within and around foundations.

B. Soil Treatment Preparation: Remove foreign matter and impermeable soil materials that could decrease treatment effectiveness on areas to be treated. Loosen, rake, and level soil to be treated except previously compacted areas under slabs and footings. Termiticides may be applied before placing compacted fill under slabs if recommended in writing by termiticide manufacturer.

1. Fit filling hose connected to water source at the site with a backflow preventer, complying with requirements of authorities having jurisdiction.

3.3 APPLICATION, GENERAL

A. General: Comply with the most stringent requirements of authorities having jurisdiction and with manufacturer's EPA-Registered Label for products.

3.4 APPLYING SOIL TREATMENT

A. Application: Mix soil treatment termiticide solution to a uniform consistency. Provide quantity required for application at the label volume and rate for the maximum specified concentration of termiticide, according to manufacturer's EPA-Registered Label, to the following so that a continuous horizontal and vertical termiticidal barrier or treated zone is established around and under building construction. Distribute treatment evenly.

1. Slabs-on-Grade and Basement Slabs: Under ground-supported slab construction, including footings, building slabs, and attached slabs as an overall treatment. Treat soil materials before concrete footings and slabs are placed.
2. Foundations: Adjacent soil, including soil along the entire inside perimeter of foundation walls; along both sides of interior partition walls; around plumbing pipes and electric conduit penetrating the slab; around interior column footers, piers, and chimney bases; and along the entire outside perimeter, from grade to bottom of footing. Avoid soil washout around footings.
3. Crawlspaces: Soil under and adjacent to foundations as previously indicated. Treat adjacent areas including around entrance platform, porches, and equipment bases. Apply overall treatment only where attached concrete platform and porches are on fill or ground.
4. Masonry: Treat voids.
5. Penetrations: At expansion joints, control joints, and areas where slabs will be penetrated.

B. Avoid disturbance of treated soil after application. Keep off treated areas until completely dry.

C. Protect termiticide solution, dispersed in treated soils and fills, from being diluted until ground-supported slabs are installed. Use waterproof barrier according to EPA-Registered Label instructions.

D. Post warning signs in areas of application.

E. Reapply soil treatment solution to areas disturbed by subsequent excavation, grading, landscaping, or other construction activities following application.

3.5 APPLYING WOOD TREATMENT

A. Application: Mix wood treatment solution to a uniform consistency. Provide quantity required for application at the label volume and rate for the maximum specified concentration of borate, according to manufacturer's EPA-Registered Label, so that wood framing, sheathing, siding, and structural members subject to infestation receive treatment.

1. Framing and Sheathing: Apply termiticide solution by spray to bare wood for complete coverage.

3.6 INSTALLING BAIT-STATION SYSTEM

A. Place bait stations according to the EPA-Registered Label for the product and manufacturer's written instructions, in the following areas that are conducive to termite feeding and activity:

1. Conducive sites and locations indicated on Drawings.
2. In and around infested trees and stumps.
3. In mulch beds.
4. Where wood directly contacts soil.
5. Areas of high soil moisture.
6. Near irrigation sprinkler heads.
7. Each area where roof drainage system, including downspouts and scuppers, drains to soil.
8. Along driplines of roof overhangs without gutters.
9. Where condensate lines from mechanical equipment drip or drain to soil.
10. At plumbing penetrations through ground-supported slabs.
11. Other sites and locations as determined by licensed Installer.

B. Inspect and service bait stations from time of their application until Substantial Completion unless extended by continuing service agreement, according to the EPA-Registered Label for product and manufacturer's written instructions for termite management system and bait products.

1. Service Frequency: Inspect bait stations not less than once every threemonth(s).

3.7 INSTALLING POLYMER BARRIER FITTINGS

A. Remove any pipe wrap material so that the polymer barrier fittings can be applied directly to the pipe or conduit. After installing the barrier, reapply pipe wrap material both below and above the blocker to protect the pipe from contact with concrete.

B. Install polymer barrier fittings around each utility pipe and conduit penetrating concrete **slab** and **foundation walls** according to the EPA-Registered Label for the product and manufacturer's written instructions.

END OF SECTION 02361

SECTION 02751 – PORTLAND CEMENT CONCRETE PAVEMENT

PART 1 - GENERAL

1.1 SUMMARY

A. All work performed under this section shall be in accordance with Sections 601, 706, 707, 901 and 1005 of the Louisiana Standard Specifications for Roads and Bridges 2016 Edition (and latest revisions) unless herein specified or indicated on the plans. This Section includes Portland Cement Concrete Pavement for the following applications:

1. Pavement, Curbs and Walkways.

2. Joints.

1.2 SUBMITTALS

A. Product Data: For each manufactured material and product indicated.

B. Design Mixes: For each concrete mix indicated.

C. Material certificates.

1.3 QUALITY ASSURANCE

A. Manufacturer Qualifications: Manufacturer of ready-mixed concrete products complying with ASTM C 94 requirements for production facilities and equipment.

B. ACI Publications: Comply with ACI 301, "Specification for Structural Concrete," unless modified by the requirements of the Contract Documents.

PART 2 - PRODUCTS

2.1 STEEL REINFORCEMENT

A. Steel reinforcement shall be in accordance with Sections 806 and 1009 of the Louisiana Standard Specifications for Roads and Bridges 2016 Edition (and latest revisions).

2.2 CONCRETE MATERIALS

A. Concrete Materials shall be in accordance with Sections 901 of the Louisiana Standard Specifications for Roads and Bridges 2016 Edition (and latest revisions).

2.3 TRAFFIC PAINT

A. Traffic paint shall be alkyd-resin ready-mixed complying with AASHTO M 248, Type S.

1. Color: White (Parking)

2. Color: Yellow (Traffic control)

3. Color: Blue (Handicapped)

4. Color: Red (Fire zone and no parking)

PART 3 - EXECUTION

3.1 CURBS

A. Curbs. If slip-formed, the concrete shall have not more than a 1-1/2" slump and an air entraining admixture in accordance with the Standard Specifications referred to above.

3.2 SIDEWALKS

A. The concrete shall be deposited on a moist sub-grade, struck off and compacted to the required thickness. The surface shall be finished with a wood float or steel trowel, provided that the surface is finally brushed in order to leave a slightly rough finish.

B. The sidewalk shall be divided into sections by control joints, spaced 5 no more than feet apart, which shall extend into the concrete for at least 1/4 of the depth and shall be approximately 1/8" wide. Construction joints of 1/4" pre-molded expansion joint shall be installed around all appurtenances; such as manholes, utility poles, etc., extending and through sidewalk. Expansion joints of ½" thick performed joint filler (non-extruding type) or redwood shall be installed every 20 feet or fraction thereof, between intersecting sidewalks, and any fixed structure such as building, bridge or curbing. This expansion joint material shall extend for the full depth of the walk.

C. Wire fabric where required shall conform to ASTM A-185.

3.3 CONCRETE PAVEMENT

A. The P.C.C. Pavement thickness shown on the plans are minimum thickness. There will be no tolerance for thickness deficiencies. The Owner reserves the right to require removal and replacement of all pavement that does not meet the minimum required thickness. There will be no adjustment of payment for pavement exceeding the minimum required thickness. Concrete surface shall be finished with a light to medium broom to leave a slightly rough finish.

3.4 JOINTS

A. All joints shall be installed in accordance with the details in the plans and using materials in accordance with Section 1005 of the Louisiana Standard Specifications for Roads and Bridges, 2016 Edition

3.5 TESTING

A. All testing and inspection shall be in accordance with Louisiana Standard Specifications for Roads and Bridges, 2016 Edition, and latest revisions.

3.6 REPAIRS AND PROTECTION

A. Remove and replace concrete pavement that is broken, damaged, or defective, or does not meet requirements in this Section.

B. Protect concrete from damage. Exclude traffic from pavement for at least 14 days after placement.

C. Maintain concrete pavement free of stains, discoloration, dirt, and other foreign material. Sweep concrete pavement not more than two days before date scheduled for Substantial Completion inspections.

3.7 TRAFFIC PAINT

A. Traffic Paint: Apply traffic paint for striping and other markings with mechanical equipment to produce uniform straight edges. Apply at manufacturer's recommended rates to provide a 15-mil minimum wet film thickness.

END OF SECTION 02751

SECTION 02764 – PAVEMENT JOINT SEALANTS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes hot applied pavement joint sealants in the following locations.

1. Portland cement concrete pavement expansion and contraction joints.

1.2 SUBMITTALS

A. Product Data: For each product indicated.

B. Samples: For each type and color of joint sealant indicated.

C. Product certificates.

D. Sealant compatibility and adhesion test reports.

1.3 QUALITY ASSURANCE

A. Sealant Compatibility and Adhesion Testing: Use sealant manufacturer's standard test methods to determine whether priming and other specific joint preparation techniques are required to obtain rapid, optimum adhesion of joint sealants to joint substrates.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where subparagraph titles below introduce lists, the following requirements apply for product selection:

1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the products specified.

2. Products: Subject to compliance with requirements, provide one of the products specified.

2.2 MATERIALS – GENERAL

A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.

1. Primers: Product recommended in writing by joint sealant manufacturer for adhesion of sealant to joint substrates indicated, as determined from sealant compatibility and adhesion tests and prior experience.

B. Colors of Exposed Joint Sealants: Match samples

C. Joint-Sealant Backer Materials: Non-staining; compatible with joint substrates, sealants, primers, and other joint fillers; and approved for applications indicated by joint sealant manufacturer based on field experience and laboratory testing.

1. Round Backer Rod for Cold- and Hot-Applied Sealants: ASTM D 5249, Type 1, of diameter and density required to control sealant depths and prevent bottom-side adhesion of sealant.

2. Backer Strips for Cold- and Hot-Applied Sealants: ASTM D 5249; Type 2; of thickness and width required to control sealant depths, prevent bottom-side adhesion of sealant, and fill remainder of joint opening under sealant.

3. Round Backer Rods for Cold-Applied Sealants: ASTM D 5249, Type 3, of diameter and density required to control sealant depths and prevent bottom-side adhesion of sealant.

2.3 HOT-APPLIED JOINT SEALANTS

A. Elastomeric Sealant for Concrete: ASTM D 3406.

1. Products:

a. Crafco, Inc.; Superseal 444/777.

b. Meadows, W. R., Inc.; POLY-JET 3406.

c. Or Equal

B. Sealant for Concrete and Asphalt: ASTM D 3405.

1. Products:

a. Crafco Inc.; ROADSAVER 221.

b. Koch Materials Company;

c. Meadows, W. R., Inc.; SEALTIGHT HI-SPEC.

d. Or Equal

PART 3 - EXECUTION

3.1 INSTALLATION

A. Clean out joints immediately before installing joint sealants.

B. Joint Priming: Prime joint substrates where indicated or recommended in writing by joint sealant manufacturer, based on sealant compatibility and adhesion tests and prior expe-

rience. Confine primers to areas of joint-sealant bond; do not spill primers or allow them to migrate onto adjoining surfaces.

C. Sealant Installation: Comply with applicable recommendations in ASTM C 1193.

D. Install backer materials to support sealants during application and at position required to produce optimum sealant movement capability

1. Do not leave gaps between ends of backer materials.

2. Do not stretch, twist, puncture, or tear backer materials.

3. Remove absorbent backer materials that have become wet before sealant application and replace them with dry materials.

E. Install sealants at same time backer materials are installed.

1. Place sealants so they directly contact and fully wet joint substrates.

2. Completely fill recesses provided for each joint configuration.

3. Produce uniform, cross-sectional shapes and depths optimize sealant movement capability.

F. Tooling of Non-sag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.

1. Remove excess sealants from surfaces adjacent to joint.

2. Use tooling agents that are approved in writing by joint sealant manufacturer and that do not discolor sealants or adjacent surfaces.

G. Clean excess sealants or sealant smears adjacent to joints as installation progresses by methods and with cleaning materials approved by manufacturers of joint sealants and of products in which joints occur.

END OF SECTION 02764

SECTION 02821 - CHAIN-LINK FENCES AND GATES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes chain-link fences, swing and horizontal gate.

1.2 PERFORMANCE REQUIREMENTS

A. Delegated Design: Design chain-link fences and gates, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

B. Structural Performance: Chain-link fence and gate framework shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated according to ASCE/SEI 7

1. Minimum Post Size: Determine according to ASTM F 1043 for framework up to 12 feet (3.66 m) high, and post spacing not to exceed 8 feet (3 m) for
2. Minimum Post Size and Maximum Spacing: Determine according to CLFMI WLG 2445, based on mesh size and pattern specified and on the following:

    a. Wind Loads: 130 mph
    b. Exposure Category: B
    c. Fence Height: 7 feet
    d. Material Group: IC, electric-resistance-welded round steel pipe.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated

B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.

C. Samples: For each polymer-coated product and for each color and texture specified, in 6-inch lengths for components and on full-sized units for accessories.

D. Delegated-Design Submittal: For chain-link fences and gate framework indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.4 INFORMATIONAL SUBMITTALS

A. Product Certificates: For each type of chain-link fence and gate, from manufacturer.

B. Product Test Reports: For framing strength according to ASTM F 1043.

C. Sample of special warranty.

1.5 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

1.6 WARRANTY

A. Special Warranty: Manufacturer's standard form in which Manufacturer or Installer agrees to repair or replace components of chain-link fences and gates that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, deterioration of metals, metal finishes, and other materials beyond normal weathering.
2. Warranty Period: **15** years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 CHAIN-LINK FENCE AND GATE FABRIC

A. General: Provide fabric in one-piece heights measured between top and bottom of outer edge of selvage knuckle or twist. Comply with CLFMI Product Manual and with requirements indicated below:

1. Fabric Height: As indicated on Drawings**.**
2. Steel Wire Fabric: Wire with a diameter of 0.148 inch (3.76 mm).

a. Mesh Size: 2 inches (50 mm)m)].
b. Zinc-Coated Fabric: ASTM A 392, Type II, Class 2, 2.0 oz./sq. ft. (610 g/sq. m) with zinc coating applied after weaving.
c. Polymer-Coated Fabric: ASTM F 668, Class 2a over zinc-coated steel wire.

1) Color: Dark As selected by Architect from manufacturer's full range, complying with ASTM F 934.

3. Aluminum Wire Fabric: ASTM F 1183, with mill finish, and wire diameter of 0.148 inch (3.76 mm).

a. Mesh Size: 2 inches (50 mm).

4. Selvage: Twisted top and knuckled bottom

2.2 FENCE FRAMING

A. Posts and Rails: Comply with ASTM F 1043 for framing, including rails, braces, and line; terminal; and corner posts. Provide members with minimum dimensions and wall thickness according to ASTM F 1043 or ASTM F 1083 based on the following:

1. Fence Height: As indicated on Drawings
2. Light Industrial Strength: Material Group IC-L, round steel pipe, electric-resistance-welded pipe

a. Line Post 2.375 inches (60 mm) in diameter min
b. End, Corner and Pull Post: 2.375 inches (60 mm) min

3. Horizontal Framework Members: [Intermediate, top and bottom rails complying with ASTM F 1043.
4. Brace Rails: Comply with ASTM F 1043.
5. Metallic Coating for Steel Framing:

a. Type A zinc coating.

6. Polymer coating over metallic coating.

a. Color: Match chain-link fabric [As selected by Architect from manufacturer's full range, complying with ASTM F 934.

2.3 TENSION WIRE

A. Polymer-Coated Steel Wire: 0.177-inch- (4.5-mm-) diameter, tension wire complying with ASTM F 1664, Class 2a over zinc-coated steel wire.

1. Color: Match chain-link fabric [] As selected by Architect from manufacturer's full range, complying with ASTM F 934.

2.4 SWING GATES

A. General: Comply with ASTM F 900 for gate posts and single double] swing gate types.

1. Gate Leaf Width: As indicated.
2. Gate Fabric Height: As indicated.

B. Pipe and Tubing:

1. Zinc-Coated Steel: Comply with ASTM F 1043 and ASTM F 1083; protective coating and finish to match fence framing.
2. Gate Posts: Round tubular steel
3. Gate Frames and Bracing: Round tubular steel

C. Frame Corner Construction: Welded.

D. Hardware:

1. Hinges: 180-degree
2. Latches permitting operation from both sides of gate with provision for padlocking accessible from both sides of gate.
3. Lock: Manufacturer's standard internal device.
4. Closer: Manufacturer's standard.
5. .

2.5 FITTINGS

A. General: Comply with ASTM F 626.

B. Finish:

1. Metallic Coating for Pressed Steel or Cast Iron: Not less than 1.2 oz. /sq. ft. (366 g /sq. m) zinc.

a. Polymer coating over metallic coating.

2. Aluminum: Mill finish.

2.6 GROUT AND ANCHORING CEMENT

A. Nonshrink, Nonmetallic Grout: Premixed, factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107. Provide grout, recommended in writing by manufacturer, for exterior applications.

B. Erosion-Resistant Anchoring Cement: Factory-packaged, nonshrink, nonstaining, hydraulic-controlled expansion cement formulation for mixing with potable water at Project site to create pourable anchoring, patching, and grouting compound. Provide formulation that is resistant to erosion from water exposure without needing protection by a sealer or waterproof coating and that is recommended in writing by manufacturer, for exterior applications.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Examine areas and conditions, with Installer present, for compliance with requirements for a verified survey of property lines and legal boundaries, site clearing, earthwork, pavement work, and other conditions affecting performance of the Work.

1. Do not begin installation before final grading is completed unless otherwise permitted by Architect.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

C. Stake locations of fence lines, gates, and terminal posts. Do not exceed intervals of 500 feet (152.5 m) or line of sight between stakes. Indicate locations of utilities, lawn sprinkler system, underground structures, benchmarks, and property monuments.

D. Install chain-link fencing to comply with ASTM F 567 and more stringent requirements indicated.

E. Post Excavation: Drill or hand-excavate holes for posts to diameters and spacings indicated, in firm, undisturbed soil.

F. Post Setting: Set posts in concrete at indicated spacing into firm, undisturbed soil.

1. Verify that posts are set plumb, aligned, and at correct height and spacing, and hold in position during setting with concrete or mechanical devices.
2. Concrete Fill: Place concrete around posts to dimensions indicated and vibrate or tamp for consolidation. Protect aboveground portion of posts from concrete splatter.

a. Exposed Concrete: Extend 2 inches (50 mm) above grade; shape and smooth to shed water.
b. Posts Set into Concrete in Sleeves: Use steel pipe sleeves preset and anchored into concrete for installing posts. After posts have been inserted into sleeves, fill annular space between post and sleeve with anchoring cement, mixed and placed to comply with anchoring material manufacturer's written instructions, and finished sloped to drain water away from post.

G. Terminal Posts: Locate terminal end, corner, and gate posts per ASTM F 567 and terminal pull posts at changes in horizontal or vertical alignment of 15 degrees or more.

H. Line Posts: Space line posts uniformly at 10 feet (3 m) o.c.

I. Tension Wire: Install according to ASTM F 567, maintaining plumb position and alignment of fencing. Provide horizontal tension wire at the following locations:

1. Extended along top and bottom of fence fabric.

J. Chain-Link Fabric: Apply fabric to outside of enclosing framework. Leave 2 inches (50 mm) between finish grade or surface and bottom selvage unless otherwise indicated.

K. Install gates according to manufacturer's written instructions, level, plumb, and secure for full opening without interference. Attach fabric as for fencing. Attach hardware using tamper-resistant or concealed means. Install ground-set items in concrete for anchorage. Adjust hardware for smooth operation and lubricate where necessary.

L. Gates: Adjust gates to operate smoothly, easily, and quietly, free of binding, warp, excessive deflection, distortion, nonalignment, misplacement, disruption, or malfunction, throughout entire operational range. Confirm that latches and locks engage accurately and securely without forcing or binding.

END OF SECTION 02821

DIVISION 03

PART 1 - GENERAL

1.1 SUMMARY

A. Scope: The work included in this section of the specifications includes all labor, materials, equipment and services necessary for cast-in-place concrete including formwork, reinforcing, mix design, placement and finishes as indicated on the drawings and herein specified.

1.2 CAST-IN-PLACE CONCRETE includes:

A. Foundations.

B. Ramps and Stairs

C. Slabs on grade.

D. Under slab vapor barrier

E. Equipment pads and bases.

1. Include all concrete pads and supports for mechanical and electrical equipment where indicated. Unless otherwise indicated, provide 500 lbs. of reinforcing per cubic yard of concrete placed to the size required to support the equipment purchased.

1.3 RELATED SECTIONS include the following:

A. Division 32 Section " Concrete Pavement" for concrete pavement and walks.
B. Division 03 Section “Architectural Concrete” for forming and finishing vertical concrete surfaces.
C. Division 09 Section “Exterior & Interior Painting” for painting of concrete surfaces and traffic coatings

1.4 SUBMITTALS

A. Product Data: For each type of manufactured material and product indicated.

B. Steel Reinforcement Shop Drawings: Details of fabrication, bending, and placement, prepared according to ACI 315, "Details and Detailing of Concrete Reinforcement." Include material, grade, bar schedules, stirrup spacing, bent bar diagrams, arrangement, and supports of concrete reinforcement. Include special reinforcement required for openings through concrete structures.

C. Laboratory Test Reports: From a qualified testing agency for concrete materials and mix design

D. Material Certificates: Signed by manufacturers and contractor certifying that each material item complies with or exceeds specified requirements. Provide certification from admixture manufacturer that chloride content complies with specifications.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who has completed concrete Work similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.

B. Codes and Standards: Comply with the provisions of the following codes, specifications, and standards, except where more stringent requirements are shown or specified.

1. American Concrete Institute (ACI) 301, “Specifications for Structural Concrete for Buildings”.
2. ACI 318-95, “Building Code Requirements for Reinforced Concrete”.
3. Concrete Reinforcing Steel Institute (CRSI), “Manual of Standard Practice”, current edition.
4. ACI 117 Standards

C. Concrete Testing Service: Employ an independent testing agency to perform material evaluation tests and to review and approve mix designs.

D. Materials and installed work may require testing and re-testing at any time during the progress of work. Re-testing and replacement of rejected materials shall be performed at the contractor’s expense.

E. Testing Agency Qualifications: An independent testing agency, acceptable to authorities having jurisdiction, qualified according to ASTM C 1077 and ASTM E 329 to conduct the testing indicated, as documented according to ASTM E 548.

1. Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-1 or an equivalent certification program.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle steel reinforcement to prevent bending and damage.

1.7 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site
   a. Require representative of each entity directly concerned with cast-in-place concrete to attend, including the following:
      i. Contractor’s superintendent
      ii. Cast-in-place concrete Subcontractor
      iii. Architect

PART 2 - PRODUCTS

2.1 FORM-FACING MATERIALS

A. Rough-Formed Finished Concrete: Plywood, lumber, metal, or another approved material. Provide lumber dressed on at least two edges and one side for tight fit.

B. Chamfer Strips: Wood, metal, PVC, or rubber strips, 3/4 by 3/4 inch (19 by 19 mm), minimum.

C. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.

D. Form Ties: Factory-fabricated, removable or snap-off metal or glass-fiber-reinforced plastic form ties designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on removal.

1. Furnish units that will leave no metal closer than 1.5 inches (25 mm) to the plane of the exposed concrete surface.

2.2 STEEL REINFORCEMENT

A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60, deformed.

B. Welded Wire Fabric: ASTM A 185, welded steel wire fabric.

C. Deformed-Steel Wire: ASTM A 496.

2.3 REINFORCEMENT ACCESSORIES

A. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire fabric in place. Manufacture bar supports according to CRSI's "Manual of Standard Practice" from steel wire, plastic, or precast concrete or fiber-reinforced concrete of greater compressive strength than concrete, and as follows:

1. For slabs on grade, use precast concrete blocks with the same compressive strength as specified for cast-in-place concrete.

B. Underslab Vapor Barrier: 15 mil Stego Wrap, or approved equal; maximum 0.012 perms; multi-layer, fabric-, cord-, grid-, or aluminum-reinforced polyethylene or equivalent, complying with ASTM E 1745, Class A; stated by manufacturer as suitable for installation in contact with soil or granular fill under concrete slabs. Single ply polyethylene is prohibited.

2.4 CONCRETE MATERIALS

A. Portland Cement: ASTM C 150, Type I.

1. Use one brand of cement throughout project unless otherwise acceptable to architect/engineer.

B. Fly Ash: ASTM C 618, Class F.

C. Normal-Weight Aggregate: ASTM C 33, uniformly graded, and as follows:

1. Class: Moderate weathering region, but not less than 5M.

D. Lightweight Aggregate: ASTM C 330.

E. Water: Potable and complying with ASTM C 94.

F. Admixtures: General: Admixtures certified by manufacturer to contain not more than 0.1 percent water-soluble chloride ions.

G. Air-Entraining Admixture: ASTM C 260, Certified by manufacturer to be compatible with other admixtures.

H. Water-Reducing Admixture: ASTM C 494, Type A.

I. High-Range, Water-Reducing Admixture: ASTM C 494, Type F.

J. Water-Reducing and Accelerating Admixture: ASTM C 494, Type E.

K. Water-Reducing and Retarding Admixture: ASTM C 494, Type D.

2.5 FIBER REINFORCEMENT

A. Synthetic Fiber: Fibrillated or monofilament polypropylene fibers engineered and designed for use in concrete, complying with ASTM C 1116, Type III, 1/2 to 1-1/2 inches (13 to 38 mm) long.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Fibrillated Fibers:
1) Fibermesh; Fibermesh, Div. of Synthetic Industries.
2) Grace Fibers; W. R. Grace & Co., Construction Products Div.

b. Monofilament Fibers:
1) Fiberstrand 100; Euclid Chemical Co.
2) Fibermix Stealth; Fibermesh, Div. of Synthetic Industries.
3) Grace MicroFiber; W. R. Grace & Co., Construction Products Div.

2.6 VAPOR RETARDERS

A. Vapor Retarder: 15 mil Stego Wrap, or approved; maximum 0.012 perms; multi-layer, fabric-, cord-, grid-, or aluminum-reinforced polyethylene or equivalent, complying with ASTM E 1745, Class A; stated by manufacturer as suitable for installation in contact with soil or granular fill under concrete slabs. Single ply polyethylene is prohibited.

2.7 CURING MATERIALS

A. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.

B. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. (305 g/sq. m) dry.

C. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.

D. Water: Potable.

E. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B.

F. Clear, Waterborne, Membrane-Forming Curing and Sealing Compound: ASTM C 1315, Type 1, Class A.

2.8 RELATED MATERIALS

A. Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber, or ASTM D 1752, cork or self-expanding cork.

B. Epoxy Joint Filler: Two-component, semirigid, 100 percent solids, epoxy resin with a Shore A hardness of 80 per ASTM D 2240.

C. Bonding Agent: ASTM C 1059, Type II, non-redispersible, acrylic emulsion or styrene butadiene.

D. Epoxy-Bonding Adhesive: ASTM C 881, two-component epoxy resin, capable of humid curing and bonding to damp surfaces, of class and grade to suit requirements, and as follows:

1. Type: Class II, non-load bearing, for bonding freshly mixed concrete to hardened concrete.
2. Type: Class I and II, non-load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.
3. Type: Class IV and V, load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.

2.9 CONCRETE MIXES

A. Prepare design mixes for each type and strength of concrete determined by either laboratory trial batch or field experience methods as specified in ACI 301. For trial batch method, use an independent testing agency acceptable to the Architect for preparing and reporting proposed mix designs.

B. Submit written reports to Architect of each proposed mix for each class of concrete at least 15 days prior to start of Work. Do not begin concrete production until proposed mix designs have been reviewed by Architect.

C. Design mixes to provide normal weight concrete with the 28-day compressive strength as indicated on drawings.

D. Slump Limits: Proportion and design mixes to result in concrete slump at point of placement as follows.

1. Not more than 4 inches.

E. Adjustment to Concrete Mixes: Mix design adjustments may be requested by Contractor when characteristics of materials, job conditions, weather, test results, or other circumstances warrant, as accepted by Architect. Laboratory test data for revised mix design and strength results must be submitted to and accepted by Architect before using in Work.

2.10 CONCRETE MIXING

A. Ready-Mixed Concrete: Comply with requirements of ASTM C 94, and as specified.

B. When air temperature is between 85 and 90 deg F (30 and 32 deg C), reduce mixing and delivery time from 1-1/2 hours to 75 minutes, and when air temperature is above 90 deg F (32 deg C), reduce mixing and delivery time to 60 minutes. Ice may be added to concrete so that delivery time can remain at 1-1/2 hours.

PART 3 - EXECUTION

3.1 FORMWORK

A. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until concrete structure can support such loads. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117. Provide concrete with surface irregularities, complying with the following ACI 34

1. Provide Class A, tolerances for concrete exposed to view.
2. Provide Class C, tolerances for other concrete surfaces.

B. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical. Kerf wood inserts for forming keyways, reglets, recesses, and the like, for easy removal.

C. Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and slopes in finished concrete surfaces. Provide and secure units to support screed strips; use strike-off templates or compacting-type screeds.

D. Provide temporary openings for cleanouts and inspection ports where interior area of formwork is inaccessible. Close openings with panels tightly fitted to forms and securely braced to prevent loss of concrete mortar. Locate temporary openings in forms at inconspicuous locations.

E. Chamfer exterior corners and edges as indicated using wood, metal, PVC or rubber chamfer strips fabricated to produce uniform smooth lines and tight edge joints.

F. Form openings, chases, offsets, sinkages, keyways, reglets, blocking, screeds, and bulkheads required in the Work. Determine sizes and locations from trades providing such items.

G. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.

3.2 EMBEDDED ITEMS

A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use Setting Drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.

1. Install anchor bolts, accurately located, to elevations required.

3.3 REMOVING AND REUSING FORMS

A. General: Formwork, for sides of beams, walls, columns, and similar parts of the Work, that does not support weight of concrete may be removed after cumulatively curing at not less than 50 deg F (10 deg C) for 24 hours after placing concrete provided concrete is hard enough to not be damaged by form-removal operations and provided curing and protection operations are maintained.

B. Leave formwork, for beam soffits, joists, slabs, and other structural elements, that supports weight of concrete in place until concrete has achieved the following:

1. At least 70 percent of 28-day design compressive strength.

C. Comply with ACI 301-89 for shoring requirements.

3.4 VAPOR RETARDERS

A. Vapor Retarder: Place, protect, and repair vapor-retarder sheets according to ASTM E 1643 and manufacturer's written instructions. Lap joints at minimum of 6 inches and seal watertight by taping edges and ends.

3.5 STEEL REINFORCEMENT

A. General: Comply with CRSI's "Manual of Standard Practice" for placing reinforcement.

1. Do not cut or puncture vapor retarder where occurs. Repair damage and reseal vapor retarder before placing concrete.

B. Clean reinforcement of loose rust and mill scale, earth, ice, and other materials that reduce or destroy bond with concrete.

C. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcement with bar supports to maintain minimum concrete cover. Do not tack weld crossing reinforcing bars.

D. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.

E. Install welded wire fabric in longest practicable lengths on bar supports spaced to minimize sagging. Lap edges and ends of adjoining sheets at least one mesh spacing. Offset laps of adjoining sheet widths to prevent continuous laps in either direction. Lace overlaps with wire.

3.6 JOINTS

A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.

B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect. Place joints perpendicular to main reinforcement. Continue reinforcement across construction joints, unless otherwise indicated.

C. Form from preformed galvanized steel, plastic keyway-section forms, or bulkhead forms with keys, unless otherwise indicated. Embed keys at least 1-1/2 inches (38 mm) into concrete.

D. Locate joints for beams, slabs, joists, and girders in the middle third of spans. Offset joints in girders a minimum distance of twice the beam width from a beam-girder intersection. Locate horizontal joints in walls and columns at underside of floors, slabs, beams, and girders and at the top of footings or floor slabs.

E. Use a bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.

3.7 CONCRETE PLACEMENT

A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections have been performed.

B. Comply with the provisions of ACI 304, “Guide for Measuring, Mixing, Transporting and Placing Concrete”, and as specified.

1. Deposit concrete continuously or in layers of such thickness that no new concrete will be placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as specified. Deposit concrete to avoid segregation.

C. Deposit concrete in forms in horizontal layers no deeper than 24 inches (600 mm) and in a manner to avoid inclined construction joints. Place each layer while preceding layer is still plastic, to avoid cold joints.

1. Consolidate placed concrete with mechanical vibrating equipment. Use equipment and procedures for consolidating concrete complying with by ACI 309R.

2. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations no farther than the visible effectiveness of the vibrator. Place vibrators to rapidly penetrate placed layer and at least 6 inches (150 mm) into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mix constituents to segregate.

D. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.

1. Consolidate concrete during placement operations so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
2. Maintain reinforcement in position on chairs during concrete placement.
3. Slope surfaces uniformly to drains where required.
4. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, free of humps or hollows, before excess moisture or bleedwater appears on the surface. Do not further disturb slab surfaces before starting finishing operations.

E. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.

F. Hot-Weather Placement: Place concrete according to recommendations in ACI 305R and as follows, when hot-weather conditions exist:

1. Use approved water reducing retarding admixture when required by high temperatures or other adverse paving conditions.

3.8 FINISHING FORMED SURFACES

A. Rough-Formed Finished: Provide a rough-formed finish on formed concrete surfaces not exposed to view in the finished Work or concealed by other construction. This is the concrete surface having texture imparted by form-facing material used, with tie holes and defective areas repaired and patched, and fins and other projections exceeding ¼ inch in height rubbed down or chipped off.

B. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar uniformed surfaces adjacent to formed surfaces, strike-off smoother and finish with a texture matching adjacent formed surfaces.

3.9 FINISHING FLOORS AND SLABS

A. General: Comply with ADA for acceptable finish tolerances and with recommendations in ACI 302.1R for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.

B. Scratch Finish: While still plastic, texture concrete surface that has been screeded and bull-floated or darbied. Use stiff brushes, brooms, or rakes. Apply scratch finish to surfaces indicated and to surfaces to receive concrete floor topping or mortar setting beds for ceramic or quarry tile, and other bonded cementitious floor finishes.

C. Float Finish: Consolidate surface with power-driven floats or by hand floating if area is small or inaccessible to power driven floats. Restraighten, cut down high spots, and fill low spots. Repeat float passes and restraightening until surface is left with a uniform, smooth, granular texture. Apply float finish to surfaces indicated, to surfaces to receive trowel finish, and to floor and slab surfaces to be covered with fluid-applied or sheet waterproofing, built-up or membrane roofing.

D. Trowel Finish: After applying float finish, apply first trowel finish and consolidate concrete by hand or power-driven trowel. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings. Apply a trowel finish to surfaces indicated and to floor and slab surfaces exposed to view or to be covered with resilient flooring, carpet, ceramic or quarry tile set over a cleavage membrane, paint, or another thin film-finish coating system.

1. Standard Concrete Floor Slabs: Finish surfaces to the following tolerances, according to ASTM E 1155, for a randomly trafficked floor surface:
    a. Specified overall values of flatness, F(F) 50; and of levelness, F(L) 25; with minimum local values of flatness, F(F) 35; and of levelness F(L)20.

E. Trowel and Fine-Broom Finish: Apply a partial trowel finish, stopping after second troweling, to surfaces indicated and to surfaces where ceramic or quarry tile is to be installed by either thickset or thin-set method. Immediately after second troweling, and when concrete is still plastic, slightly scarify surface with a fine broom.

F. Broom Finish: Apply a broom finish to exterior concrete platforms, steps, and ramps, and elsewhere as indicated.

1. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route. Coordinate required final finish with Architect before application.

3.10 MISCELLANEOUS CONCRETE ITEMS

A. Filling In: Fill in holes and openings left in concrete structures, unless otherwise indicated, after work of other trades is in place. Mix, place, and cure concrete, as specified, to blend with in-place construction. Provide other miscellaneous concrete filling indicated or required to complete Work.

B. Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and by steel-troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.

C. Equipment Bases and Foundations: Provide machine and equipment bases and foundations as shown on Drawings. Set anchor bolts for machines and equipment at correct elevations, complying with diagrams or templates of manufacturer furnishing machines and equipment.

3.11 CONCRETE PROTECTION AND CURING

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and with recommendations in ACI 305R for hot-weather protection during curing.

B. Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces. If forms remain during curing period, moist cure after loosening forms. If removing forms before end of curing period, continue curing by one or a combination of the following methods:

C. Unformed Surfaces: Begin curing immediately after finishing concrete. Cure unformed surfaces, including floors and slabs, concrete floor toppings, and other surfaces, by one or a combination of the following methods:
1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:

    a. Water.
    b. Continuous water-fog spray.
    c. Absorptive cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with 12-inch (300-mm) lap over adjacent absorptive covers.

2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least

12 inches (300 mm), and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period using cover material and waterproof tape.

a. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive floor coverings.
b. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive penetrating liquid floor treatments.
c. Cure concrete surfaces to receive floor coverings with either a moisture-retaining cover or a curing compound that the manufacturer recommends for use with floor coverings.
d. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.
e. Curing and Sealing Compound: Apply uniformly to floors and slabs indicated in a continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Repeat process 24 hours later and apply a second coat. Maintain continuity of coating and repair damage during curing period.

3.12 CONCRETE SURFACE REPAIRS

A. Defective Concrete: Repair and patch defective areas when approved by Architect. Remove and replace concrete that cannot be repaired and patched to Engineer’s approval.

B. Patching Mortar: Mix dry-pack patching mortar, consisting of one part portland cement to two and one-half parts fine aggregate passing a No. 16 (1.2-mm) sieve, using only enough water for handling and placing.

C. Repairing Formed Surfaces: Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycombs, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning.
1. Immediately after form removal, cut out honeycombs, rock pockets, and voids more than 1/2 inch (13 mm) in any dimension in solid concrete but not less than 1 inch (25 mm) in depth. Make edges of cuts perpendicular to concrete surface. Clean, dampen with water, and brush-coat holes and voids with bonding agent. Fill and compact with patching mortar before bonding agent has dried. Fill form-tie voids with patching mortar or cone plugs secured in place with bonding agent.
2. Repair defects on surfaces exposed to view by blending white portland cement and standard portland cement so that, when dry, patching mortar will match surrounding color. Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching. Compact mortar in place and strike off slightly higher than surrounding surface.
3. Repair defects on concealed formed surfaces that affect concrete's durability and structural performance as determined by Architect.

D. Repairing Unformed Surfaces: Test unformed surfaces, such as floors and slabs, for finish and verify surface tolerances specified for each surface. Correct low and high areas. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.

1. Repair finished surfaces containing defects. Surface defects include spalls, popouts, honeycombs, rock pockets, crazing and cracks in excess of 0.01 inch (0.25 mm) wide or that penetrate to reinforcement or completely through unreinforced sections regardless of width, and other objectionable conditions.
2. After concrete has cured at least 14 days, correct high areas by grinding.
3. Correct localized low areas during or immediately after completing surface finishing operations by cutting out low areas and replacing with patching mortar. Finish repaired

areas to blend into adjacent concrete. Proprietary underlayment compounds may be used when acceptable to Architect/Engineer.

4. Repair defective areas, except random cracks and single holes 1 inch (25 mm) or less in diameter, by cutting out and replacing with fresh concrete. Remove defective areas with clean, square cuts and expose steel reinforcement with at least 3/4 inch (19 mm) clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding agent. Mix patching concrete of same materials and mix as original concrete except without coarse aggregate. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.

3.13 QUALITY CONTROL TESTING DURING CONSTRUCTION

A. General: Employ a testing agency to perform tests and to submit test reports.

B. Sampling and testing for quality control during concrete placement shall include the following, as directed by Architect.

1. Sampling Fresh Concrete: ASTM C 172, except modified for slump to comply with ASTM C 94.
2. Slump: ASTM C 143; one test at point of discharge for each day's pour of each type of concrete, additional tests when concrete consistency seems to have changed.
3. Air Content: ASTM C 173, volumetric method for lightweight or normal weight concrete; ASTM C 231, pressure method for normal weight concrete; one for each day's pour of each type of air-entrained concrete.
4. Concrete Temperature: ASTM C 1064; one test hourly when air temperature is 40 deg F (4 deg C) and below, when 80 deg F (27 deg C) and above, and one test for each set of compressive-strength specimens.
5. Compression Test Specimen: ASTM C 31, one set of four standard cylinders for each compressive-strength test, unless otherwise directed. Mold and store cylinders for laboratory-cured test specimens except when field-cured test specimens are required.
6. Compressive-Strength Tests: ASTM C 39; one set for each day's pour exceeding 5 cu. yd. Plus additional sets for each 50 cu. yd more than the first 25 cu. yd. of each concrete class placed in any one day; one specimen tested 7 days, two specimens tested at 28 days, and one specimen retained in reserve for later testing if required.

C. When frequency of testing will provide fewer than five strength tests for a given class of concrete, conduct testing from at least five randomly selected batches or from each batch if fewer than five are used.

D. Test results will be reported in writing to Architect, Structural Engineer, ready-mix producer, and Contractor within 24 hours after tests. Reports of compressive strength tests shall contain the Project identification name and number, date of concrete placement, name of concrete testing service, concrete type and class, location of concrete batch in structure, design compressive strength at 28 days, concrete mix proportions and materials, compressive breaking strength, and type of break for both 7-day tests and 28-day test.

E. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by shall not be used as the sole basis for acceptance or rejection.

F. Additional Test: The testing agency will make additional tests of in-place concrete when test results indicate specified concrete strengths and other characteristics have not been attained in the structure, as directed by Architect. Testing agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42, or by other methods as directed.

END OF SECTION 03 30 0

SECTION 033300 - ARCHITECTURAL CONCRETE

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Cast-in-place architectural concrete, including form facings, reinforcement accessories, concrete materials, concrete mixtures, concrete placement, and concrete finishes for exposed foundations, stairs and ramps surfaces
2. Requirements in Section 03300 "Cast-in-Place Concrete" apply to this Section.
3. Requirements in Section 09911” Exterior Painting” for painting exposed concrete surfaces and traffic coatings.

1.2 DEFINITIONS

A. Aggregate Exposure: Projection of coarse aggregate from matrix or mortar after completion of exposure operations.

B. Cast-in-Place Architectural Concrete: Concrete that is exposed to view, is designated as architectural concrete, and that requires special concrete materials, formwork, placement, or finishes to obtain specified architectural appearance.

C. Cementitious Materials: Portland cement alone or in combination with one or more of the following: blended hydraulic cement, fly ash, slag cement, other pozzolans, and silica fume; materials subject to compliance with requirements.

D. Design Reference Sample: Sample designated by Architect in the Contract Documents that reflects acceptable surface quality and appearance of cast-in-place architectural concrete.

E. Water/Cement Ratio (w/cm): The ratio by weight of water to cementitious materials.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site
1. Require representatives of each entity directly concerned with cast-in-place architectural concrete to attend, including the following:
    a. Contractor’s superintendent
    b. Cast-in-place architectural concrete Subcontractor
2. Review concrete finishes and finishing, curing procedures, construction joints, forms and form removal limitations, reinforcement accessory installation, concrete repair procedures, and protection of cast-in-place architectural concrete.
3. Before submitting design mixtures, review concrete design mixture and examine procedures for ensuing quality of concrete materials.

1.4 ACTION SUBMITTALS

A. Product Data: For each of the following:

1. Form-facing panels.
2. Form joint tape.
3. Form joint sealant.
4. Wood sealer.
5. Form-release agent.
6. Surface retarder.
7. Form ties.
8. Bar supports.
9. Portland cement.
10. Fly ash.
11. Slag cement.
12. Blended hydraulic cement.
13. Aggregates.
14. Admixtures:

a. Include limitations of use, including restrictions on cementitious materials, supplementary cementitious materials, air entrainment, aggregates, temperature at time of concrete placement, relative humidity at time of concrete placement, curing conditions, and use of other admixtures.

B. Shop Drawings:

1. Formwork: Show formwork construction, including form-facing joints, construction and contraction joints, form joint-sealant details, form tie locations and patterns, inserts and embedments, cutout, cleanout panels, and other items that visually affect cast-in-place architectural concrete.

C. Samples: For each of the following materials:

1. Form-facing panels.
2. Form ties.
3. Chamfers.

D. Samples for Verification: Architectural concrete Sample, cast vertically, approximately 18 by 18 by 2 inches, of finished, colors, and textures to match design reference sample. Include Sample sets showing the full range of variations expected in these characteristics.

E. Placement Schedule: Submit before start of placement operations.

F. Minutes of preinstallation conference.

1.5 QUALITY ASSURANCE

A. Mockups: Before casting architectural concrete, build mockups, to verify selections made under Sample submittal and to demonstrate typical joints, surface finish, texture, tolerances, and

standard of workmanship. Build mockups to comply with the following requirements, using materials indicated for the completed Work:

1. Build mockups in the location and of the size indicated or, if not indicated, as directed by Architect.
2. Build mockups of typical wall of cast-in-place architectural concrete as shown on Drawings,
3. Construct mockups to include at least two lifts having heights equal to those anticipated for construction.
4. Demonstrate curing, cleaning, and protecting of cast-in-place architectural concrete, finishes, and contraction joints, as applicable.
5. In presence of Architect, damage part of the exposed-face surface for each finish, color, and texture, and demonstrate materials and techniques proposed for repair to match adjacent undamaged surfaces.
6. Obtain Architect's approval of mockups before casting architectural concrete.
7. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.6 FIELD CONDITIONS

A. Hot-Weather Placement: Comply with ACI 301 and as follows:

1. Maintain concrete temperature below 90 deg F at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor’s option.

2. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.

PART 2 - PRODUCTS

2.1 CONCRETE, GENERAL

A. ACI Publications: Comply with ACI 301 or ACI 303.1 unless modified by requirements in the Contract Documents.

2.2 FORM-FACING MATERIALS

A. Comply with Section 03100 "Concrete Forming and Accessories" for formwork and other form-facing material requirements, and as specified in this Section.

B. Source Limitations: Obtain each type of form-facing material from single source from single manufacturer.

C. Form-Facing Panels for As-Cast Finishes:

1. Exterior-grade plywood panels, nonabsorptive, that will provide continuous, true, and smooth architectural concrete surfaces, medium-density overlay, Class 1, or better, mill-applied release agent and edge sealed, complying with DOC PS 1, or Finnish phenolic overlaid birch plywood.

D. Chamfer Strips: Metal, rigid plastic, elastomeric rubber, or dressed wood, 3/4 by 3/4 inch, minimum; nonstaining; in longest practicable lengths.

E. Form Joint Tape: Compressible foam tape; pressure sensitive; AAMA 800; minimum 1/4 inch thick.

F. Form Joint Sealant: Elastomeric sealant complying with ASTM C920, Type M or Type S, Grade NS, that adheres to form joint substrates, does not stain, does not adversely affect concrete surfaces, and does not impair subsequent treatments and finishes of concrete surfaces.

G. Sealer: Penetrating, clear, polyurethane wood sealer formulated to reduce absorption of bleed water and prevent migration of set-retarding chemicals from wood and does not stain, does not adversely affect concrete surfaces, and does not impair subsequent treatments and finishes of concrete surfaces.

H. Form-Release Agent: Commercially formulated, colorless form-release agent that does not bond with, stain, or adversely affect architectural concrete surfaces and will not impair subsequent treatments and finishes of architectural concrete surfaces.

1. Formulate form-release agent with rust inhibitor for steel form-facing materials.

2. Furnish ties with tapered tie cone spreaders that, when removed, will leave holes no larger than 1 inch in diameter on architectural concrete surface.
3. Furnish internally disconnecting ties that will leave no metal closer than 1-1/2 inches from architectural concrete surface.

2.3 CURING MATERIALS

A. Comply with Section 033000 "Cast-in-Place Concrete."

B. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz/sq. yd. when dry.

C. Moisture-Retaining Cover: ASTM C171, polyethylene film or white burlap-polyethylene sheet.

2.4 REPAIR MATERIALS

A. Bonding Agent: ASTM C 1059/1059M, Type II, nonredisperible, acrylic emulsion or styrene butadiene.

B. Epoxy Bonding Adhesive: ASTM C 881/C881M two-component epoxy resin, capable of humid curing and bonding to damp surfaces, of class suitable for application temperature and of grade to suit requirements:

1. Types I and II, nonload bearing, for bonding hardened or freshly mixed concrete to harden concrete.

2.5 CONCRETE MIXTURES, GENERAL

A. Obtain each color, size, type, and variety of concrete mixture from single manufacturer with resources to provide cast-in-place architectural concrete of consistent quality in appearance and physical properties.

B. Prepare design mixtures for each type and strength of cast-in-place architectural concrete proportioned on basis of laboratory trial mixture or field test data, or both, in accordance with ACI 301.

PART 3 - EXECUTION

3.1 INSTALLATION OF FORMWORK

A. Comply with Section 03300 "Cast in Place Concrete" for formwork, embedded items, and shoring and reshoring, and as specified in this Section.

B. Limit deflection of form-facing panels to not exceed ACI 301 requirements.

C. In addition to ACI 303.1 limits on form-facing panel deflection, limit cast-in-place architectural concrete surface irregularities, designated by ACI 347 as abrupt or gradual, as follows:
1. Class A, 1/8 inch.

D. Construct forms to result in cast-in-place architectural concrete that complies with ACI 117 (ACI 117M).

E. Seal form joints, chamfers, rustication joints, and penetrations at form ties with form joint tape or form joint sealant to prevent cement paste leakage.

1. Provide closure backing materials if indented rustication is used over a ribbed form line, and seal joint between rustication strip and form with joint sealant.

F. Construct forms for easy removal without hammering or prying against concrete surfaces. Provide crush or wrecking plates where stripping may damage cast-in-place surfaces. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical.
1. Seal forms joints and penetrations at form ties with form joint tape or form joint sealant to prevent cement past leakage.
2. Do not use rust-stained steel form-facing material.

G. Provide temporary openings for cleanouts and inspection ports where interior area of formwork is inaccessible. Close openings with panels tightly fitted to forms and securely braced to prevent loss of concrete mortar. Locate temporary openings in forms at inconspicuous locations.

H. Chamfer exterior corners and edges of cast-in-place architectural concrete.

I. Coat contact surfaces of chamfer strips with wood sealer before placing reinforcement, anchoring devices, and embedded items.

J. Form openings, chases, offsets, sinkages, keyways, reglets, blocking, screeds, and bulkheads required in the Work. Determine sizes and locations from trades providing such items.

K. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.

L. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.

M. Coat contact surfaces of forms with form-release agent, in accordance with manufacturer's written instructions, before placing reinforcement, anchoring devices, and embedded items.

N. Coat contact surfaces of forms with surface retarder, in accordance with manufacturer's written instructions, before placing reinforcement, anchoring devices, and embedded items.

3.2 INSTALLATION OF REINFORCEMENT AND INSERT INSTALLATION

A. Comply with Section 03300 "Cast in Place Concrete" for fabricating and installing steel reinforcement and accessories. Securely fasten steel reinforcement and wire ties against shifting during concrete placement.

3.3 REMOVING AND REUSING FORMS

A. Formwork for sides of ramps, stairs and similar parts of the Work that does not support weight of concrete may be removed after cumulatively curing at not less than 50 deg F for 24 hours after placing concrete if concrete is hard enough to not be damaged by form-removal operations and curing and protection operations are maintained.
   1. Schedule form removal to maintain surface appearance that matches approved mockups.
   2. Cut off and grind glass fiber reinforced plastic form ties flush with surface of concrete.

B. Leave formwork for ramps, stairs and other structural elements that support weight of concrete in place until concrete has achieved at least 70 percent of 28-day design compressive strength. Remove forms only if shores have been arranged to permit removal of forms without loosening or disturbing shores.

C. Clean and repair surfaces of forms to be reused in the Work. Do not use split, frayed, delaminated, or otherwise damaged form-facing material. Apply new form-release agent.

D. When forms are reused, clean surfaces, remove fins and laitance, and tighten to close joints. Align and secure joints to avoid offsets. Do not use patched forms for cast-in-place architectural concrete surfaces.

3.4 JOINTS

A. Construction Joints: Install construction joints true to line, with faces perpendicular to surface plane of cast-in-place architectural concrete, so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.

1. Place joints perpendicular to main reinforcement. Continue reinforcement across construction joints unless otherwise indicated.
2. Form keyed joints as indicated. Embed keys at least 1-1/2 inches into concrete. Align construction joint within rustications attached to form-facing material.
3. Space vertical joints in walls as directed by Architect. Unless otherwise indicated on Drawings, locate joints beside piers integral with walls, near corners, and in concealed locations where possible.

B. Use epoxy-bonding adhesive at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.

C. Contraction Joints: Form weakened-plane contraction joints true to line, with faces perpendicular to surface plane of cast-in-place architectural concrete, so strength and appearance of concrete are not impaired, at locations indicated on Drawings or as approved by Architect.

3.5 CONCRETE PLACEMENT

A. Before placing concrete, verify that installation of formwork, form-release agent, reinforcement, and embedded items is complete and that required inspections have been performed.

B. Do not add water to concrete during delivery, at Project site, or during placement unless approved by Architect.

C. Before test sampling and placing concrete, water may be added at Project side, subject to limitations of ACI 301.

D. Deposit concrete continuously between construction joints. Deposit concrete to avoid segregation.
1. Deposit concrete in horizontal layers of depth to not exceed formwork design pressures and in a manner to avoid inclined construction joints.
2. Consolidate placed concrete with mechanical vibrating equipment according to ACI 303.1
3. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layout and at least 6 inches into proceeding layer. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity. Do not permit vibrators to contact forms.

3.6 FINISHING , GENERAL

A. Comply with Section 03300 "Cast-in-Place Concrete."

B. Architectural Concrete Finish: Match Architect's design reference sample, identified and described as indicated, to satisfaction of Architect.

C. Related to Unformed Surfaces: Horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces.
   1. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.

D. Maintain uniformity of special finishes over construction joints unless otherwise indicated.

3.7 AS-CAST FORMED FINISHES

A. Rubbed Finish: Apply the following to smooth-formed-finished as-cast concrete where indicated:
   1. Grout-Cleaned Finish: Wet concrete surfaces and apply grout of a consistency of thick paint to coat surfaces and fill small holes. Mix 1 part Portland cement to 1- ½ parts fine sand with a 1:1 mixture of bonding admixture and water. Add white Portland cement in amounts determined by trail patches, so color of dry grout matches adjacent surface. Scrub grout into voids and remove excess grout. When grout whitens, rub surface with clean burlap and keep surface damp by fog spray for at least 36 hours.

3.8 CONCRETE PROTECTING AND CURING

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 308.1, by one or a combination of the following methods that will not mottle, discolor, or stain concrete:
   1. Moisture curing: Keep surfaces continuously moist of not less than seen days with the following materials:
      a. Water
      b. Continuous water-fog spray
      c. Absorptive cover, water saturated and kept continuously wet. Cover concrete surfaces and edges with 12-inch lap over adjacent absorptive covers.
   2. Moisture Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period, using cover material and waterproof tape

3.9 REPAIR

A. Comply with ACI 301 (ACI 301M).

B. Repair damaged finished surfaces of cast-in-place architectural concrete when repairing is approved by Architect.

C. Match repairs to color, texture, and uniformity of surrounding surfaces and to repairs on approved mockups.

D. Remove and replace cast-in-place architectural concrete that cannot be repaired to Architect's approval.

3.10 FIELD QUALITY CONTROL

A. Comply with Section 03300 "Cast-in-Place Concrete."

3.11 CLEANING

A. Clean cast-in-place architectural concrete surfaces after finish treatment to remove stains, markings, dust, and debris.

B. Wash and rinse surfaces in accordance with concrete finish applicator's written instructions.

1. Protect other Work from staining or damage due to cleaning operations.
2. Do not use cleaning materials or processes that could change the appearance of cast-in-place architectural concrete finishes.

3.12 PROTECTION

A. Protect corners, edges, and surfaces of cast-in-place architectural concrete from damage; use guards and barricades.

B. Protect cast-in-place architectural concrete from staining, laitance, and contamination during remainder of construction period.

SECTION 03450 - ARCHITECTURAL PRECAST CONCRETE

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Architectural precast concrete panels.
2. Parapet Copings
3. Window Sills

1.2 DEFINITION

A. Design Reference Sample: Sample of approved architectural precast concrete color, finish and texture, preapproved by Architect.

1.3 PERFORMANCE REQUIREMENTS

A. Structural Performance: Provide architectural precast concrete units, copings and connections capable of withstanding the following design loads within limits and under conditions indicated:

1. Loads: As indicated
2. Coping: SPRI Wind Design Standard: install coping capable of resisting the following design pressures:
   a. Design Pressure: As indicated on Structural Drawings.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Design Mixtures: For each precast concrete mixture. Include compressive strength Shop Drawings: Design and Detail fabrication and installation of architectural precast concrete units and connections as per latest IBC code. Indicate locations, plans, elevations, dimensions, shapes, and cross sections of each unit. Indicate joints, reveals, and extent and location of each surface finish. Indicate details at building corners.

1. Comprehensive engineering analysis signed and sealed by the qualified professional engineer responsible for its preparation and who is registered in the State of Louisiana. The design shall include, but not limited to, stresses such as dead, live, wind, transportation, erection, etc. Show governing panel types, connections, and types of reinforcement, including special reinforcement. Indicate location, type, magnitude, and direction of loads imposed on the building structural frame from architectural precast concrete.

C. Samples: For each type of finish indicated on exposed surfaces of architectural precast concrete units, in sets of 3, illustrating full range of finish, color, and texture variations expected; approximately 12 by 12 by 2 inches (300 by 300 by 50 mm).

1.5 INFORMATIONAL SUBMITTALS

A. Welding certificates.

B. Material Certificates: Signed by manufacturers:

C. Material test reports: For aggregates.

D. Field quality-control test and special inspection reports.

1.6 QUALITY ASSURANCE

A. Fabricator Qualifications: A firm that assumes responsibility for engineering architectural precast concrete units to comply with performance requirements. This responsibility includes preparation of Shop Drawings and comprehensive engineering analysis by a qualified professional engineer, registered in the State of Louisiana.

1. Participates in PCI's plant certification program **at time of bidding** and is designated a PCI-certified plant for Group A, Category A1 - Architectural Cladding and Load Bearing Units **or participates in APA's "Plant Certification Program for Production of Architectural Precast Concrete Products" and is designated an APA-certified plant**.

B. Design Standards: Comply with ACI 318 (ACI 318M) and design recommendations of PCI MNL 120, "PCI Design Handbook - Precast and Prestressed Concrete," applicable to types of architectural precast concrete units indicated.

C. Quality-Control Standard: For manufacturing procedures and testing requirements, quality-control recommendations, and dimensional tolerances for types of units required, comply with PCI MNL 117, "Manual for Quality Control for Plants and Production of Architectural Precast Concrete Products."

D. Welding: Qualify procedures and personnel according to AWS D1.1/D.1.1M, "Structural Welding Code - Steel"; and AWS D1.4, "Structural Welding Code - Reinforcing Steel."

E. Sample Panels: After sample approval and before fabricating architectural precast concrete units, produce a minimum of**3** sample panels approximately [**24 sq. ft.** in area for review by Architect. Incorporate full-scale details of architectural features, finishes, textures, and transitions in sample panels.

PART 2 - PRODUCTS

2.1 REINFORCING MATERIALS

A. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than **60** percent.

B. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 (Grade 420), deformed.

C. Low-Alloy-Steel Reinforcing Bars: ASTM A 706/A 706M, deformed.

D. Plain-Steel Welded Wire Reinforcement: ASTM A 185, fabricated as drawn and stainless steel wire into flat sheets.

E. Deformed-Steel Welded Wire Reinforcement: ASTM A 497/A 497M, flat sheet.

F. Supports: Suspend reinforcement from back of mold or use bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire reinforcement in place according to PCI MNL 117.

2.2 CONCRETE MATERIALS

A. Portland Cement: ASTM C 150, Type I or Type III, gray, unless otherwise indicated.

1. For surfaces exposed to view in finished structure, mix gray with white cement, of same type, brand, and mill source.

B. Supplementary Cementitious Materials:

1. Fly Ash: ASTM C 618, Class C or F, with maximum loss on ignition of 3 percent.
2. Metakaolin Admixture: ASTM C 618, Class N.
3. Silica Fume Admixture: ASTM C 1240, with optional chemical and physical requirement.
4. Ground Granulated Blast-Furnace Slag: ASTM C 989, Grade 100 or 120.

C. Normal-Weight Aggregates: Except as modified by PCI MNL 117, ASTM C 33, with coarse aggregates complying with Class 5S. Stockpile fine and coarse aggregates for each type of exposed finish from a single source (pit or quarry) for Project.

1. Face-Mixture-Coarse Aggregates: Selected, hard, and durable; free of material that reacts with cement or causes staining; to match selected finish sample.

a. Gradation: Uniformly graded

2. Face-Mixture-Fine Aggregates: Selected, natural or manufactured sand of same material as coarse aggregate, unless otherwise approved by Architect.

D. Coloring Admixture: ASTM C 979, synthetic or natural mineral-oxide pigments or colored water-reducing admixtures, temperature stable, and nonfading.

E. Air-Entraining Admixture: ASTM C 260, certified by manufacturer to be compatible with other required admixtures.

F. Chemical Admixtures: Certified by manufacturer to be compatible with other admixtures and to not contain calcium chloride, or more than 0.15 percent chloride ions or other salts by weight of admixture.

2.3 STAINLESS-STEEL CONNECTION MATERIALS

A. Stainless-Steel Plate: ASTM A 666, Type 304, of grade suitable for application.

B. Stainless-Steel Bolts and Studs: ASTM F 593, Alloy 304 or 316, hex-head bolts and studs; stainless-steel nuts; and flat, stainless-steel washers.

1. Lubricate threaded parts of stainless-steel bolts with an antiseize thread lubricant during assembly.

C. Stainless-Steel-Headed Studs: ASTM A 276, with minimum mechanical properties of PCI MNL 117, Table 3.2.3.

2.4 GROUT MATERIALS

A. Sand-Cement Grout: Portland cement, ASTM C 150, Type I, and clean, natural sand, ASTM C 144 or ASTM C 404. Mix at ratio of 1 part cement to 2-1/2 parts sand, by volume, with minimum water required for placement and hydration.

B. Nonmetallic, Nonshrink Grout: Premixed, nonmetallic, noncorrosive, nonstaining grout containing selected silica sands, portland cement, shrinkage-compensating agents, plasticizing and water-reducing agents, complying with ASTM C 1107, Grade A for drypack and Grades B and C for flowable grout and of consistency suitable for application within a 30-minute working time.

C. Epoxy-Resin Grout: Two-component, mineral-filled epoxy resin; ASTM C 881/C 881M, of type, grade, and class to suit requirements.

2.5 CONCRETE MIXTURES

A. Prepare design mixtures for each type of precast concrete required.

1. Limit use of fly ash and silica fume to 20 percent of portland cement by weight; limit metakaolin and silica fume to 10 percent of portland cement by weight.

B. Design mixtures may be prepared by a qualified independent testing agency or by qualified precast plant personnel at architectural precast concrete fabricator's option.

C. Limit water-soluble chloride ions to maximum percentage by weight of cement permitted by ACI 318 (ACI 318M) or PCI MNL 117 when tested according to ASTM C 1218/C 1218M.

D. Normal-Weight Concrete Mixtures: Proportion mixtures by either laboratory trial batch or field test data methods according to ACI 211.1, with materials to be used on Project, to provide normal-weight concrete with the following properties:

1. Compressive Strength (28 Days): 5000 psi (34.5 MPa) minimum.

E. Water Absorption: 6 percent by weight or 14 percent by volume, tested according to PCI MNL 117.

F. Add air-entraining admixture at manufacturer's prescribed rate to result in concrete at point of placement having an air content complying with PCI MNL 117.

G. When included in design mixtures, add other admixtures to concrete mixtures according to manufacturer's written instructions.

2.6 FABRICATION

A. Cast-in Anchors, Inserts, Plates, Angles, and Other Anchorage Hardware: Fabricate anchorage hardware with sufficient anchorage and embedment to comply with design requirements. Accurately position for attachment of loose hardware, and secure in place during precasting operations. Locate anchorage hardware where it does not affect position of main reinforcement or concrete placement.

1. Weld headed studs and deformed bar anchors used for anchorage according to AWS D1.1/D1.1M and AWS C5.4, "Recommended Practices for Stud Welding."

B. Furnish loose hardware items including steel plates, clip angles, seat angles, anchors, dowels, cramps, hangers, and other hardware shapes for securing architectural precast concrete units to supporting and adjacent construction.

C. Cast-in reglets, slots, holes, and other accessories in architectural precast concrete units as indicated on the Contract Drawings.

D. Reinforcement: Comply with recommendations in PCI MNL 117 for fabricating, placing, and supporting reinforcement.

E. Reinforce architectural precast concrete units to resist handling, transportation, and erection stresses.

F. Prestress tendons for architectural precast concrete units by either pretensioning or post-tensioning methods. Comply with PCI MNL 117.

G. Comply with requirements in PCI MNL 117 and requirements in this Section for measuring, mixing, transporting, and placing concrete. After concrete batching, no additional water may be added.

H. Place face mixture to a minimum thickness after consolidation of the greater of 1 inch (25 mm) or 1.5 times the maximum aggregate size, but not less than the minimum reinforcing cover specified.

I. Place concrete in a continuous operation to prevent seams or planes of weakness from forming in precast concrete units.

1. Place backup concrete mixture to ensure bond with face-mixture concrete.

J. Thoroughly consolidate placed concrete by internal and external vibration without dislocating or damaging reinforcement and built-in items, and minimize pour lines, honeycombing, or entrapped air on surfaces. Use equipment and procedures complying with PCI MNL 117.

1. Place self-consolidating concrete without vibration according to PCI TR-6, "Interim Guidelines for the Use of Self-Consolidating Concrete in Precast/Prestressed Concrete Institute Member Plants."

K. Comply with PCI MNL 117 for hot- and cold-weather concrete placement.

L. Identify pickup points of architectural precast concrete units and orientation in structure with permanent markings, complying with markings indicated on Shop Drawings. Imprint or permanently mark casting date on each architectural precast concrete unit on a surface that will not show in finished structure.

M. Cure concrete, according to requirements in PCI MNL 117, by moisture retention without heat or by accelerated heat curing using low-pressure live steam or radiant heat and moisture. Cure units until compressive strength is high enough to ensure that stripping does not have an effect on performance or appearance of final product.

N. Discard and replace architectural precast concrete units that do not comply with requirements, including structural, manufacturing tolerance, and appearance, unless repairs meet requirements in PCI MNL 117 and Architect's approval.

2.7 FABRICATION TOLERANCES

A. Fabricate architectural precast concrete units straight and true to size and shape with exposed edges and corners precise and true so each finished panel complies with PCI MNL 117 product tolerances as well as position tolerances for cast-in items.

2.8 FINISHES

A. Panel faces shall be free of joint marks, grain, and other obvious defects. Corners, including false joints shall be uniform, straight, and sharp. Finish exposed-face surfaces of architectural precast concrete units to match approved sample panels and as follows:
   1. PCI's "Architectural Precast Concrete - Color and Texture Selection Guide," of plate numbers indicated.
   2. Abrasive-Blast Finish: Use abrasive grit, equipment, application techniques, and cleaning procedures to expose aggregate and surrounding matrix surfaces.
   3. Acid-Etched Finish: Use acid and hot-water solution, equipment, application techniques, and cleaning procedures to expose aggregate and surrounding matrix surfaces. Protect hardware, connections, and insulation from acid attach. Exposure to be light.

B. Finish exposed top, bottom and back surfaces of architectural precast concrete units to match face-surface finish.

C. Finish exposed top, bottom and back surfaces of architectural precast concrete units by smooth, steel-trowel finish.

D. Finish unexposed surfaces of architectural precast concrete units by float finish.

2.9 SOURCE QUALITY CONTROL

A. Quality-Control Testing: Test and inspect precast concrete according to PCI MNL 117 requirements. If using self-consolidating concrete, also test and inspect according to PCI TR-6, "Interim Guidelines for the Use of Self-Consolidating Concrete in Precast/Prestressed Concrete Institute Member Plants."

B. Owner will employ an independent testing agency to evaluate architectural precast concrete fabricator's quality-control and testing methods.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install clips, hangers, bearing pads, and other accessories required for connecting architectural precast concrete units to supporting members and backup materials.

B. Erect architectural precast concrete level, plumb, and square within specified allowable tolerances. Provide temporary supports and bracing as required to maintain position, stability, and alignment as units are being permanently connected.

1. Maintain horizontal and vertical joint alignment and uniform joint width as erection progresses.
2. Unless otherwise indicated, provide for uniform joint widths of 3/4 inch (19 mm).

C. Connect architectural precast concrete units in position by bolting, welding, grouting, or as otherwise indicated on Shop Drawings. Remove temporary shims, wedges, and spacers as soon as practical after connecting and grouting are completed.

D. Welding: Comply with applicable AWS D1.1/D1.1M and AWS D1.4 for welding, welding electrodes, appearance, quality of welds, and methods used in correcting welding work.

E. At bolted connections, use lock washers, tack welding, or other approved means to prevent loosening of nuts after final adjustment.

F. Grouting Connections: Grout connections where required or indicated. Retain grout in place until hard enough to support itself. Pack spaces with stiff grout material, tamping until voids are completely filled. Place grout to finish smooth, level, and plumb with adjacent concrete surfaces. Keep grouted joints damp for not less than 24 hours after initial set. Promptly remove grout material from exposed surfaces before it affects finishes or hardens.

G. Erect architectural precast concrete units level, plumb, square, true, and in alignment without exceeding the noncumulative erection tolerances of PCI MNL 117, Appendix I.

3.2 FIELD QUALITY CONTROL

A. Special Inspections: Engage a qualified special inspector to perform the following special inspections and prepare reports:

1. Erection of precast concrete members.

B. Testing Agency: Engage a qualified testing agency to perform tests and inspections and prepare test reports.

C. Field welds will be subject to visual inspections and nondestructive testing according to ASTM E 165 or ASTM E 709. High-strength bolted connections will be subject to inspections.

D. Testing agency will report test results promptly and in writing to Contractor and Architect.

E. Repair or remove and replace work where tests and inspections indicate that it does not comply with specified requirements.

F. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.3 REPAIRS

A. Repair damaged architectural precast concrete units if permitted by Architect. The Architect reserves the right to reject repaired units that do not comply with requirements.

B. Mix patching materials and repair units so cured patches blend with color, texture, and uniformity of adjacent exposed surfaces and show no apparent line of demarcation between original and repaired work, when viewed in typical daylight illumination from a distance of 20 feet (6 m).

C. Prepare and repair damaged galvanized coatings with galvanizing repair paint according to ASTM A 780.

D. Wire brush, clean, and paint damaged prime-painted components with same type of shop primer.

E. Remove and replace damaged architectural precast concrete units when repairs do not comply with requirements.

3.4 CLEANING

A. Clean surfaces of precast concrete units exposed to view.

B. Clean mortar, plaster, fireproofing, weld slag, and other deleterious material from concrete surfaces and adjacent materials immediately.

C. Clean exposed surfaces of precast concrete units after erection and completion of joint treatment to remove weld marks, other markings, dirt, and stains.

1. Perform cleaning procedures, if necessary, according to precast concrete fabricator's recommendations. Clean soiled precast concrete surfaces with detergent and water, using stiff fiber brushes and sponges, and rinse with clean water. Protect other work from staining or damage due to cleaning operations.
2. Do not use cleaning materials or processes that could change the appearance of exposed concrete finishes or damage adjacent materials.

END OF SECTION 03450

DIVISION 04

SECTION 04220 -CONCRETE UNIT MASONRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Concrete masonry units for ground floor walls, property line walls, elevator and stair walls.

2. Ground face concrete masonry units at property line and exposed CMU exterior walls
3. Mortar and grout.

4. Masonry joint reinforcement.
5. Embedded flashing
6. Ties and anchors.
7. Miscellaneous masonry accessories.
8. Grouting for elevator door frames and sills

B. Related Sections:

1. Division 3 “Cast-in place concrete” structural requirements and assemblies.
2. Division 7 "Sheet Metal Flashing and Trim" for exposed sheet metal flashing and for furnishing manufactured reglets installed in masonry joints.
3. Division 7 “Fluid Applied membrane air barriers
4. Division 7 “Non-Structural Steel Framing” for Z channels anchored to CMU walls
5. Division 9 “Interior Painting” for CMU Walls
6. Division 14 “ Electric Traction Elevators”

1.3 PERFORMANCE REQUIREMENTS

A. Provide structural unit masonry that develops indicated net-area compressive strengths at 28 days.

1. Determine net-area compressive strength of masonry from average net-area compressive strengths of masonry units and mortar types (unit-strength method) according to Tables 1 and 2 in ACI 530.1/ASCE 6/TMS 602.
2. Determine net-area compressive strength of masonry by testing masonry prisms according to ASTM C 1314.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

1.5 QUALITY ASSURANCE

A. Testing Agency Qualifications: Qualified according to ASTM C 1093 for testing indicated.

B. Preinstallation conference: Conduct conference at Project site.

1.6 PROJECT CONDITIONS

A. Protection of Masonry: During construction, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work. Cover partially completed masonry when construction is not in progress.

B. Stain Prevention: Prevent grout, mortar, and soil from staining the face of masonry to be left exposed or painted. Immediately remove grout, mortar, and soil that come in contact with such masonry.

C. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.

PART 2 - PRODUCTS

2.1 MANUFACTURERERS

A. Source Limitations for Masonry Units: Obtain exposed masonry units of a uniform texture and color, or a uniform blend within the ranges accepted for these characteristics, from a single source from single manufacturer for each product required.

B. Source Limitations for Mortar Materials: Obtain mortar ingredients of a uniform quality, including color for exposed masonry, from single manufacturer for each cementitious component and from single source or producer for each aggregate.

2.2 MASONRY UNITS, GENERAL

A. Defective Units: Referenced masonry unit standards may allow a certain percentage of units to contain chips, cracks, or other defects exceeding limits stated in the standard. Do not use units where such defects will be exposed in the completed Work.

B. Fire-Resistance Rating: Comply with the requirements for fire-resistance-rated assembly designs indicated.
   1. Where fire-resistance-rated construction is indicated, units shall be listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction.

2.3 CONCRETE MASONRY UNITS

A. Shapes: Provide shapes indicated and as follows, with exposed surfaces matching exposed faces of adjacent units unless otherwise indicated.

1. Provide special shapes for lintels, corners, jambs, sashes, movement joints, headers, bonding, and other special conditions.

B. Integral Water Repellent: Provide units made with integral water repellent for exposed units including property line walls and where indicated.

1. Integral Water Repellent: Liquid polymeric, integral water-repellent admixture that does not reduce flexural bond strength. Units made with integral water repellent, when tested according to ASTM E 514 as a wall assembly made with mortar containing integral water-repellent manufacturer's mortar additive, with test period extended to 24 hours, shall show no visible water or leaks on the back of test specimen.

a. Products: Subject to compliance with requirements, provide one, but are not limited to, the following:

1) ACM Chemistries, Inc.; RainBloc.
2) BASF Aktiengesellschaft; Rheopel Plus.
3) Grace Construction Products, W. R. Grace & Co. - Conn.; Dry-Block.

C. CMUs: ASTM C 90.

2.4 GROUND FACE CONCRETE MASONRY UNITS (EXTERIOR VENEER)

A. Shapes: Provide shales indicated and as follows, with exposed surfaces matching exposed faces of adjacent units unless otherwise indicated.
1. Provide special shapes for lintels, corners, jambs, sashes, movement joints, headers, bonding, and other special conditions.
2. Provide square edged units for outside corners unless otherwise indicated.

B. CMUs: ASTM C90

a. Products: Subject to compliance with requirements, provide one, but are not limited to, the following:

1) Treadstone, Northfield Block Company

2) Verastone Ground face units, Northfield Block Company
3) Ground Faced Polished Concrete, Genest
4) Premier Line Ground Face, E. Dillon & Company

2. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of 4000 psi
3. Initial Rate of Absorption: no more than 8 g/cu. Ft. when tested per ASTM C-140.
4. Density Classification: 130lbs/cu ft. minimum when tested per ASTM C-140
5. Shrinkage no ore than .30 when tested per ASTM C-426
6. Freeze/Thaw Durability: <1% when tested per ASTM C-1262
7. Size (Wx H x L): 8” x 8” x 16” nominal
8. Pattern and Texture:

a. Standard, polished-ground face finish (one side). Match Manufacturer's Standard.
b. Colors: As selected by Architect from manufacturer's full range.
c. Provide Manufacturer's standard sealer.

C. Portland Cement: ASTM C150, Type I or II. Provide natural color or white cement as required to produce mortar color indicated.

D. Hydrated Lime: ASTM C 207, Type S

E. Portland Cement-Lime Mix: Packaged blend of Portland cement and hydrated lie containing no other ingredients.

F. Aggregate for Mortar: ASTM C 144
1. For mortar that is exposed to view, use washed aggregate consisting of national sand or crushed stone.

G. For joints less than ¼ inch thick, use aggregate graded with 100 percent passing the No. 16 sieve Aggregate for Grout: ASTM C 404

H. Water-Repellant Admixture System:
1. Integral Liquid polymeric admixture added to ground face concrete masonry units during the production of units by ground face CMU manufacturer or equal approved by manufacturer.
2. Liquid-water repellent mortar admixture intended for use with CMUs, containing integral water repellant by same manufacturer of concrete unit masonry admixture or equal approved by Ground Face CMU manufacturer.
3. Water Repellent Sealer post applied to integrally water-repellant-treated CMU wall construction by same manufacturer of integral admixtures or equal approved by ground face CMU manufacturer.
4. Basis of Design: Subject to compliance to requirements, provide Grace Dry-Block system for Integral Water Repellant Admixtures for Block and Mortar and INFISEAL DB Sealer or approved equal.

I. Water: Potable

2.5 CONCRETE AND MASONRY LINTELS

A. General: Provide one of the following:

B. Concrete Lintels: Precast or formed-in-place concrete lintels complying with requirements in Section 03300 "Cast-in-Place Concrete," and with reinforcing bars indicated.

C. Masonry Lintels: Prefabricated or built-in-place masonry lintels made from bond beam CMUs matching adjacent CMUs in color, texture, and density classification, with reinforcing bars placed as indicated and filled with coarse grout. Cure precast lintels before handling and installing. Temporarily support built-in-place lintels until cured.

2.6 MORTAR AND GROUT MATERIALS

A. Portland Cement: ASTM C 150, Type I or II. Provide natural color or white cement as required to produce mortar color indicated.

B. Hydrated Lime: ASTM C 207, Type S.

C. Portland Cement-Lime Mix: Packaged blend of portland cement and hydrated lime containing no other ingredients.

D. Aggregate for Mortar: ASTM C 144.

1. For mortar that is exposed to view, use washed aggregate consisting of natural sand or crushed stone.
2. For joints less than 1/4 inch thick, use aggregate graded with 100 percent passing the No. 16 sieve.
3. White-Mortar Aggregates: Natural white sand or crushed white stone.
4. Colored-Mortar Aggregates: Natural sand or crushed stone of color necessary to produce required mortar color.

E. Aggregate for Grout: ASTM C 404.

F. Water-Repellent Admixture: Liquid water-repellent mortar admixture intended for use with CMUs at exposed exterior walls, containing integral water repellent by same manufacturer.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. ACM Chemistries, Inc.; RainBloc for Mortar.
b. BASF Aktiengesellschaft; Rheopel Mortar Admixture.
c. Grace Construction Products, W. R. Grace & Co. - Conn.; Dry-Block Mortar Admixture.

G. Water: Potable.

2.7 REINFORCEMENT

A. Uncoated Steel Reinforcing Bars: ASTM A 615or ASTM A 996, Grade 60 (Grade 420).

B. Masonry Joint Reinforcement, General: ASTM A 951/A 951M.

1. Interior Walls: Hot-dip galvanized, carbon steel.
2. Exterior Walls: Stainless steel.
3. Wire Size for Side Rods: 0.187-inch (4.76-mm) diameter.
4. Wire Size for Cross Rods: 0.187-inch (4.76-mm) diameter.
5. Wire Size for Veneer Ties 0.187-inch diameter.
6. Spacing of Cross Rods, Tabs, and Cross Ties: Not more than 16 inches o.c.
7. Provide in lengths of not less than 10 feet with prefabricated corner and tee units.

C. Masonry Joint Reinforcement for Single-Wythe Masonry: Either ladder or truss type with single pair of side rods.

2.8 EMBEDDED FLASHING MATERIALS

A. Metal Flashing: Provide metal flashing complying with SMACNA's "Architectural Sheet Metal Manual" and as follows:
   1. Stainless steel: ASTM A240/A240M or ASTM A666, Type 304, 0.016 inch
   2. Fabricate through-wall flashing with snaplock receiver on exterior face where indicated to receive counterflashing.
   3. Fabricate though-wall flashing with drip edge unless otherwise indicated. Fabricate by extending flashing 1/2" out from wall, with outer edge bent down 30 degrees.
   4. Fabricate though-wall flashing with sealant stop where indicated
   5. Fabricate metal drip edges from stainless steel.
   6. Solder metal items at corners

B. Application: Unless otherwise indicated, use the following:
   1. Where flashing in indicated to receive counterflashing, use metal flashing
   2. Where flashing is indicated to be turned down at or beyond the wall face, use metal flashing.

C. Solder and Sealants for Sheet Metal Flashings: As specified in Section 076200 "Sheet Metal Flashing and Trim"

D. Adhesives, Primers, and Seam Tapes for Flashings:
   1. Flashing manufacturer's standard products or products recommended by flashing manufacturer for bonding flashing sheets to each other and to substrates.
   2. Confirm compatibility of primers and adhesives with fluid applied waterproofing specified under Section 7 "Fluid Applied Membrane Air Barriers".

2.9 TIES AND ANCHORS

A. Materials: Provide ties and anchors specified in this article that are made from materials that comply with the following unless otherwise indicated.
   1. Stainless-Steel Wire: ASTM A 580/A 580M, **Type 304** or **Type 316**.
   2. Steel Sheet, Galvanized after Fabrication: ASTM A 1008/A 1008M, Commercial Steel, with ASTM A 153/A 153M, Class B coating.
   3. Stainless-Steel Sheet: ASTM A 666, **Type 304 or Type 316**.
   4. Stainless-Steel Bars: ASTM A 276 or ASTM A 666, Type 304.

B. Adjustable Anchors for Connecting to Structural Steel Framing: Provide anchors that allow vertical or horizontal adjustment but resist tension and compression forces perpendicular to plane of wall.
   1. Anchor Section for Welding to Steel Frame: Crimped 1/4-inch- diameter, stainless-steel wire Tie Section: Triangular-shaped wire tie, sized to extend within 1 inch of masonry face, made from 0.25-inch- diameter, stainless-steel wire

C. Adjustable Anchors for Connecting to Concrete: Provide anchors that allow vertical or horizontal adjustment but resist tension and compression forces perpendicular to plane of wall.

D. Partition Top anchors as detailed in drawings. Rigid Anchors: as detailed in drawings.
   a.

2.10 MISCELLANEOUS MASONRY ACCESSORIES

A. Compressible Filler: Premolded filler strips complying with ASTM D 1056, Grade 2A1; compressible up to 35 percent; of width and thickness indicated; formulated from neoprene urethane or PVC.

B. Preformed Control-Joint Gaskets: designed to fit standard sash block and to maintain lateral stability in masonry wall; size and configuration as indicated.

C. Bond-Breaker Strips: Asphalt-saturated, organic roofing felt complying with ASTM D 226, Type I (No. 15 asphalt felt).

D. Weeps: Stainless steel drainage strip with integrated drip edge, adhered horizontal mesh, rear water dam, and 90 percent open weave polyester vertical mesh elements.
   1. Provide weeps at exterior block walls at base of wall, floor intersections, joints and other changes in wall surfaces. Weeps are to be located every 10” max.

2.11 MORTAR AND GROUT MIXES

A. General: Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures unless otherwise indicated.

   1. Do not use calcium chloride in mortar or grout.
   2. Use portland cement-lime mortar cement mortar unless otherwise indicated.

B. Preblended, Dry Mortar Mix: Furnish dry mortar ingredients in form of a preblended mix. Measure quantities by weight to ensure accurate proportions, and thoroughly blend ingredients before delivering to Project site.

C. Mortar for Unit Masonry: Comply with ASTM C 270.Provide the following types of mortar for applications stated unless another type is indicated.

   1. For masonry below grade or in contact with earth, use Type S.
   2. For reinforced masonry, use Type N.
   3. For mortar parge coats, use Type N.
   4. For exterior, above-grade, load-bearing and non-load-bearing walls and parapet walls; for interior load-bearing walls; for interior non-load-bearing partitions; and for other applications where another type is not indicated, use Type N.
   5. For interior non-load-bearing partitions, Type N.

D. Grout for Elevator door frames and sills: Comply with ASTM C 476

E. Grout for Unit Masonry: Comply with ASTM C 476.

   1. Use grout of type indicated or, if not otherwise indicated, of type (fine or coarse) that will comply with Table 1.15.1 in ACI 530.1/ASCE 6/TMS 602 for dimensions of grout spaces and pour height.
   2. Proportion grout in accordance with ASTM C 476, paragraph 4.2.2 for specified 28-day compressive strength indicated, but not less than 2000 psi **(14 MPa)**].
   3. Provide grout with a slump of 8 to 11 inches as measured according to ASTM C 143/C 143M.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Proceed with installation only after unsatisfactory conditions have been corrected.

B. Before installation, examine rough-ins and built-in construction for piping systems to verify actual locations of piping.

3.2 TOLERANCES

A. Dimensions and Locations of Elements: per ACI 530.1

3.3 LAYING MASONRY WALLS

A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and for accurate location of openings, movement-type joints, returns, and offsets. Avoid using less-than-half-size units, particularly at corners, jambs, and, where possible, at other locations.

B. Use full-size units without cutting if possible. If cutting is required to provide continuous pattern or to fit adjoining construction, cut units with motor-driven saws; provide clean, sharp, unchipped edges. Allow units to dry before laying unless wetting of units is specified. Install cut units with cut surfaces and where possible cut edges concealed.

C. Bond Pattern for Exposed Masonry: Unless otherwise indicated, lay exposed masonry in running bond; do not use units with less than nominal 4-inch horizontal face dimensions at corners or jambs.

D. Built-in Work: As construction progresses, build in items specified in this and other Sections. Fill in solidly with masonry around built-in items.

E. Fill space between steel frames and masonry solidly with mortar unless otherwise indicated.

F. Where built-in items are to be embedded in cores of hollow masonry units, place a layer of metal lath, wire mesh, or plastic mesh in the joint below and rod mortar or grout into core.

G. Fill cores in hollow CMUs with grout 24 inches under bearing plates, beams, lintels, posts, and similar items unless otherwise indicated.

H. Build non-load-bearing interior partitions full height of story to underside of solid floor or roof structure above unless otherwise indicated.
   1. At fire-rated partitions, treat joint between top of partition and underside of structure above to comply with Section 078446 "Fire-Resistive Joint Systems."

3.4 MORTAR BEDDING AND JOINTING

A. Lay hollow CMUs as follows:

   1. With face shells fully bedded in mortar and with head joints of depth equal to bed joints.

2. With webs fully bedded in mortar in all courses of piers, columns, and pilasters.
3. With webs fully bedded in mortar in grouted masonry, including starting course on footings.
4. With entire units, including areas under cells, fully bedded in mortar at starting course on footings where cells are not grouted.

B. Lay solid masonry units with completely filled bed and head joints; butter ends with sufficient mortar to fill head joints and shove into place. Do not deeply furrow bed joints or slush head joints.

C. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness unless otherwise indicated.

D. Cut joints flush for masonry walls to receive plaster or other direct-applied finishes (other than paint) unless otherwise indicated.

3.5 MASONRY JOINT REINFORCEMENT

A. General: Install entire length of longitudinal side rods in mortar with a minimum cover of 5/8 inch on exterior side of walls, 1/2 inch elsewhere. Lap reinforcement a minimum of 6 inches.

1. Space reinforcement not more than 16 inches o.c.
2. Space reinforcement not more than 8 inches o.c. in foundation walls and parapet walls.
3. Provide reinforcement not more than 8 inches above and below wall openings and extending 12 inches beyond openings in addition to continuous reinforcement.

B. Interrupt joint reinforcement at control and expansion joints unless otherwise indicated.

C. Provide continuity at wall intersections by using prefabricated T-shaped units.

D. Provide continuity at corners by using prefabricated L-shaped units.
1. .

3.6 REINFORCED UNIT MASONRY INSTALLATION

A. Temporary Formwork and Shores: Construct formwork and shores as needed to support reinforced masonry elements during construction.

1. Construct formwork to provide shape, line, and dimensions of completed masonry as indicated. Make forms sufficiently tight to prevent leakage of mortar and grout. Brace, tie, and support forms to maintain position and shape during construction and curing of reinforced masonry.
2. Do not remove forms and shores until reinforced masonry members have hardened sufficiently to carry their own weight and other loads that may be placed on them during construction.

B. Placing Reinforcement: Comply with requirements in ACI 530.1/ASCE 6/TMS 602.

C. Grouting: Do not place grout until entire height of masonry to be grouted has attained enough strength to resist grout pressure.

1. Comply with requirements in ACI 530.1/ASCE 6/TMS 602 for cleanouts and for grout placement, including minimum grout space and maximum pour height.

3.7 ANCHORING MASONRY TO STRUCTURAL STEEL AND CONCRETE

A. Anchor masonry to concrete, where masonry abuts or faces concrete, to comply with the following:
   1. Provide an open space not less than 3/8” wide between masonry structural steel or concrete unless otherwise indicated. Keep space free of mortar and other rigid materials.
   2. Anchor masonry with anchors embedded in masonry joints and attached to structure
   3. Space anchors as indicated, but not more than 24 inches o.c. vertically and 36 o.c. horizontally.

3.8 CONTROL AND EXPANSION JOINTS

1. General: Install control-and expansion-joint material in unit masonry as masonry progresses. Do not allow materials to span control and expansion joints without provisions to allow for in-plane or partition movement.

3.9 LINTELS

1. Provide concrete or masonry lintels where shown and where openings of more than 24” for block-size units are shown without structural steel or other supporting lintels.
2. Provide minimum bearing of 8 inches at each jamb unless otherwise indicated.

3.10 FLASHING

A. General: Install embedded flashing at ledges and other obstructions to downward flow of water in wall where indicated.

B. Install reglets and nailers for flashing and other related construction where they are shown to be built into the masonry.

3.11 FIELD QUALITY CONTROL

A. Testing and Inspecting: Owner will engage special inspectors to perform tests and inspections and prepare reports. Allow inspectors access to scaffolding and work areas, as needed to perform tests and inspections. Retesting of materials that fail to meet specified requirements shall be done at Contractor's expense.

B. Inspections: Level 1special inspections according to the "International Building Code."

   1. Begin masonry construction only after inspectors have verified proportions of site-prepared mortar.
   2. Place grout only after inspectors have verified compliance of grout spaces and of grades, sizes, and locations of reinforcement.
   3. Place grout only after inspectors have verified proportions of site-prepared grout.

C. Testing Prior to Construction: One set of tests.

D. Testing Frequency: One set of tests for each 5000 sq. ft. of wall area or portion thereof.

E. Concrete Masonry Unit Test: For each type of unit provided, according to ASTM C 140 for compressive strength.

F. Mortar Aggregate Ratio Test (Proportion Specification): For each mix provided, according to ASTM C 780.

G. Mortar Test (Property Specification): For each mix provided, according to ASTM C 780. Test mortar for compressive strength.

H. Grout Test (Compressive Strength): For each mix provided, according to ASTM C 1019.

3.12 REPAIRING, POINTING, AND CLEANING

A. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.

B. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:
   1. Test cleaning methods on sample wall panel; leave one-half of panel uncleaned for comparison purposes. Obtain Architect's approval of sample cleaning before proceeding
   2. Clean concrete masonry by cleaning method indicated in NCMA TEK 8-2A applicable to type of stain on exposed surfaces.
   3. Preparation of Fluid applied waterproofing
      a. Clean surfaces for adhesion
      b. Mortar joints must have a minimum of 3-day cure time before application per manufacturer’s written instructions.

3.13 MASONRY WASTE DISPOSAL

A. Waste Disposal as Fill Material: Dispose of clean masonry waste, including excess or soil-contaminated sand, waste mortar, and broken masonry units, by crushing and mixing with fill material as fill is placed.
   1. .

B. Excess Masonry Waste: Remove excess clean masonry waste that cannot be used as fill, as described above, and other masonry waste, and legally dispose of off Owner's property.

END OF SECTION 042200

SECTION 04720 - CAST STONE MASONRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Cast stone, indicated as “Cast Stone” in the drawings, trim including the following:

    a. Cornice and Copings
    b. Window sills
    c. Window and Door Headers
    d. Surrounds
    e. Belt courses and Banding
    f. Water tables and Base

2. Cast stone accessories:

    a. Anchoring systems

B. Related Sections:

1. Division 3 Section “Pre-cast Concrete” for installing parapet coping
2. Division 4 Section "Concrete Unit Masonry" for for mortar mixes

1.3 PERFORMANCE REQUIREMENTS

A. Delegated Design: Design cast stone and anchoring systems, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated and required for project.

B. General: Design cast stone and anchoring systems according to ASTM C 1242.

C. Structural Performance: Provide cast stone and anchoring system capable of withstanding the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:

1. Wind Loads: Determine loads based on the following minimum design wind pressures:

    a. Uniform pressure of 30 lbf/sq. ft., acting inward or outward.

D. Thermal Movements: Provide cast stone and anchoring system that allows for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing displacement of cast stone, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.

E. Horizontal Building Movement (Interstory Drift): Allow for maximum horizontal building movement equal to quotient resulting from dividing floor-to-floor height at any floor by 400.

F. Shrinkage and Creep: Allow for progressive vertical shortening of building frame equal to 1/8 inch in 10 feet.

G. Design cast stone anchors to withstand loads indicated without exceeding allowable working stresses established by the following:
1. For Cold-Formed Steel: AISI's "North American Specification for the Design of Cold-Formed Steel Structural Members."
2. For Post-Installed Fasteners in Masonry: One-sixth of tested capacity when installed in masonry units indicated.

H. Limit deflection in each prefabricated assembly caused by indicated loads and thermal movements, acting singly or in combination with one another, to not more than 1/720 of assembly's clear span or the following, whichever is smaller:

1. 1/16 inch, measured in plane of wall.
2. 1/4 inch, measured perpendicular to wall.

I. Provisions for Fabrication and Erection Tolerances: Allow for fabrication and erection tolerances of building's structural system.

J. Provision for Deflection of Building Structure: Allow for the following:

1. Deflection due to Weight of Cast stone and anchoring System: Allow for 1/4-inch vertical deflection in 20-foot span of structural members supporting dimension stone system.
2. Live Load Deflection: Allow for 1/4-inch vertical deflection, in 20-foot span of structural members supporting cast stone system, due to live loads imposed on building's structural frame after stone installation.

K. Leakage Resistance, Water and Air: Provide cast stone system that complies with the following:

1. Air Infiltration: Not more than 0.004 cfm/sq. ft. of wall area, as measured by testing mockup per ASTM E 283 at a differential pressure of 1.57 lbf/sq. ft..
2. Water Penetration: No uncontrolled water penetration beyond plane of back of cast stone system that is not contained or drained back to exterior, as measured by testing mockup per ASTM E 331 at a differential pressure of 20 percent of positive design wind load, but not less than 10 lbf/sq. ft.

L. Control of Corrosion and Staining: Prevent galvanic and other forms of corrosion as well as staining by isolating metals and other materials from direct contact with incompatible materials. Use materials that do not stain exposed surfaces of stone and joint materials.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated.

1. For cast stone units, include construction details, material descriptions, dimensions of individual components and profiles, and finishes.

B. Shop Drawings: Show fabrication and installation details for cast stone units. Include dimensions, details of reinforcement and anchoring methods if any, and indication of finished faces.

1. Include building elevations showing layout of units and locations of joints and anchors.
2. Manufacturer’s shop drawings including profile, cross sections, reinforcements, exposed faces, annotation of components and their locations in project as indicated on the drawings

C. Samples for Initial Selection: For colored mortar.

D. Samples for Verification:

1. For each color and texture of cast stone required, 18” x 12” in size.
2. For colored mortar. Make Samples using same sand and mortar ingredients to be used on Project. Label Samples to indicated types and amounts of pigments used.

E. Full-Size Samples: For each color and texture of cast stone unit required.

1. Make available for Architect's review at Project site.
2. Make Samples from materials to be used for units used on Project immediately before beginning production of units for Project.
3. Approved Samples may be installed in the Work.

F. Qualification Data: For manufacturer .

1. Include copies of material test reports for completed projects, indicating compliance of cast stone with ASTM C 1364.

G. Material Test Reports: For each mix required to produce cast stone, based on testing according to ASTM C 1364, including test for resistance to freezing and thawing.

1. Provide test reports based on testing within previous two years.

H. Delegated-Design Submittal: For cast stone and anchoring systems indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1. Detail fabrication and assembly of cast stone and anchoring systems.
2. Include design calculations.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: A qualified manufacturer of cast stone units similar to those indicated for this Project, that has sufficient production capacity to manufacture required units, and is a plant certified by the Cast Stone Institute, the Architectural Precast Association or the Precast/Prestressed Concrete Institute for Group A, Category AT.

1. Plant shall have adequate capacity to furnish quality sizes and quantity of cast stone required without delaying progress of work.
2. Products previously produced by plant and exposed to weather shall exhibit satisfactory appearence.

B. Testing Agency Qualifications: Qualified according to ASTM E 329 for testing indicated.

C. Source Limitations for Cast Stone: Obtain cast stone units through single source from single manufacturer.

D. Source Limitations for Mortar Materials: Obtain mortar ingredients of a uniform quality, including color, from one manufacturer for each cementitious component and from one source or producer for each aggregate.

E. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects fit to adjacent components and set quality standards for materials repair/maintain methods (if needed) and execution.

1. Build mockup of wall/storefront head, jamb and sill area as shown on Drawings.
2. Build mockup of entrance wall area as shown on Drawings.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Coordinate delivery of cast stone with unit masonry work to avoid delaying the Work and to minimize the need for on-site storage.

B. Pack, handle, and ship cast stone units in suitable packs or pallets and protected from damage and discoloration.

1. Lift with wide-belt slings; do not use wire rope or ropes that might cause staining. Move cast stone units, if required, using dollies with wood supports.
2. Store cast stone units on wood skids or pallets with nonstaining, waterproof covers, securely tied. Arrange to distribute weight evenly and to prevent damage to units. Ventilate under covers to prevent condensation.
3. Protect corners from damage.

C. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.

D. Store mortar aggregates where grading and other required characteristics can be maintained and contamination can be avoided.

1.7 PROJECT CONDITIONS

A. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Comply with cold-weather construction requirements in ACI 530.1/ASCE 6/TMS 602.

1. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 deg F and above and will remain so until cast stone has dried, but no fewer than seven days after completing cleaning.

B. Hot-Weather Requirements: Comply with hot-weather construction requirements in ACI 530.1/ASCE 6/TMS 602.

PART 2 - PRODUCTS

2.1 CAST STONE MATERIALS

A. Permissible Variation in Color:

1. Total Color Difference: ASTM C 1364, 6 units
2. Hue Difference: ASTM C 1364, 2 units

B. General: Comply with ASTM C 1364 and the following:

C. Portland Cement: ASTM C 150, Type I, containing not more than 0.60 percent total alkali when tested according to ASTM C 114. Provide natural color or white cement as required to produce cast stone color indicated.

D. Coarse Aggregates: Granite, quartz, or limestone complying with ASTM C 33; gradation and colors as needed to produce required cast stone textures and colors.

E. Fine Aggregates: Natural sand or crushed stone complying with ASTM C 33, gradation and colors as needed to produce required cast stone textures and colors.

F. Color Pigment: ASTM C 979, synthetic mineral-oxide pigments or colored water-reducing admixtures; color stable, free of carbon black, nonfading, and resistant to lime and other alkalis.

G. Admixtures: Use only admixtures specified or approved in writing by Architect.

1. Do not use admixtures that contain more than 0.1 percent water-soluble chloride ions by mass of cementitious materials. Do not use admixtures containing calcium chloride.
2. Use only admixtures that are certified by manufacturer to be compatible with cement and other admixtures used.
3. Air-Entraining Admixture: ASTM C 260.[Add to mixes for units exposed to the exterior at manufacturer's prescribed rate to result in an air content of 4 to 6 percent, except do not add to zero-slump concrete mixes.]
4. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.
5. Water-Reducing, Retarding Admixture: ASTM C 494/C 494M, Type D.
6. Water-Reducing, Accelerating Admixture: ASTM C 494/C 494M, Type E.

H. Water: Potable

I. Reinforcement: Deformed steel bars complying with ASTM A 615/A 615M, Grade 60. Use galvanized or epoxy-coated reinforcement when covered with less than 1-1/2 inches of cast stone material. Panels, soffits and similar stones greater than 24 in. (600mm) in one direction shall be reinforced in that direction. Units less than 24 in. (600 mm) in both their length and width dimensions shall be non-reinforced unless otherwise specified. Welded wire fabric reinforcing shall not be used in dry cast products.

1. Epoxy Coating: ASTM A 775/A 775M.
2. Galvanized Coating: ASTM A 767/A 767M.

J. Embedded Anchors and Other Inserts: Fabricated from stainless steel complying with ASTM A 240/A 240M, ASTM A 276, or ASTM A 666, Type 304.

2.2 CAST STONE UNITS

A. Basis of Design: Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Continental Cast Stone, Grand Prairie, Texas.

2. Cast Stone Systems, Warrenton, NC

3. Heritage Cast Stone, Kansas City, Missouri

4. Stone Legends, Dallas, Texas

5. Stone Castle Industries, Houston, Texas

B. Provide cast stone units complying with ASTM C 1364 using either the vibrant dry tamp or wet-cast method.

1. Provide units that are resistant to freezing and thawing as determined by laboratory testing according to ASTM C 666/C 666M, Procedure A, as modified by ASTM C 1364.

C. Fabricate units with sharp arris and accurately reproduced details, with indicated texture on all exposed surfaces unless otherwise indicated.

1. Slope exposed horizontal surfaces 1:12 to drain unless otherwise indicated.
2. Provide raised fillets at backs of sills and at ends indicated to be built into jambs.
3. Provide drips on projecting elements unless otherwise indicated.

D. Fabrication Tolerances:

1. Variation in Cross Section: Do not vary from indicated dimensions by more than 1/8 inch.
2. Variation in Length: Do not vary from indicated dimensions by more than 1/360 of the length of unit or 1/8 inch, whichever is greater, but in no case by more than 1/4 inch.
3. Warp, Bow, and Twist: Not to exceed 1/360 of the length of unit or 1/8 inch, whichever is greater.
4. Location of Grooves, False Joints, Holes, Anchorages, and Similar Features: Do not vary from indicated position by more than 1/8 inch on formed surfaces of units and 3/8 inch on unformed surfaces.

E. Cure units as follows:

1. Cure units in enclosed moist curing room at 95 to 100 percent relative humidity and temperature of 100 deg F for 12 hours or 70 deg F for 16 hours.
2. Keep units damp and continue curing to comply with one of the following:

a. No fewer than five days at mean daily temperature of 70 deg F or above.
b. No fewer than six days at mean daily temperature of 60 deg F or above.
c. No fewer than seven days at mean daily temperature of 50 deg F or above.
d. No fewer than eight days at mean daily temperature of 45 deg F or above.

F. Acid etch units after curing to remove cement film from surfaces to be exposed to view.

G. Finishing: Remove blemishes from exposed surfaces before packaging for shipment

H. Colors and Textures: As selected by Architect from manufacturer's full range.

2.3 MORTAR MATERIALS

A. Provide mortar materials that comply with Division 4 Section "Brick Masonry Assemblies."

2.4 ACCESSORIES

A. Anchors: Type and size indicated, fabricated from Type 304 stainless steel complying with ASTM A 240/A 240M, ASTM A 276, or ASTM A 666 .
   1. Basis-of-Design Product: Subject to compliance with requirements, provide Dayton Richmond Dur-O-Wall: Stone Anchoring System (engineered specifically for this project) or comparable product by the following:
      a. Hohmann & Barnard, Inc.
      b. Heckman Building Products
      c. Halfen Anchoring Systems

B. Dowels: 1/2-inch- diameter, round bars, fabricated from Type 304 stainless steel complying with ASTM A 240/A 240M, ASTM A 276, or ASTM A 666 .

C. Proprietary Acidic Cleaner: Manufacturer's standard-strength cleaner designed for removing mortar/grout stains, efflorescence, and other new construction stains from new masonry without discoloring or damaging masonry surfaces. Use product expressly approved for intended use by cast stone manufacturer and expressly approved by cleaner manufacturer for use on cast stone and adjacent masonry materials.

   1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

      a. Diedrich Technologies, Inc.
      b. EaCo Chem, Inc.
      c. ProSoCo, Inc.

2.5 MORTAR MIXES

A. Comply with requirements in Division 4 Section "Concrete Unit Masonry" for mortar mixes.

2.6 SOURCE QUALITY CONTROL

A. Engage a qualified independent testing agency to sample and test cast stone units according to ASTM C 1364.

1. Include one test for resistance to freezing and thawing.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

C. Visual inspection:

1. Visually inspect cast stone components for fit and finish in accordance with ASTM C 1364 before installation.
2. Do not install unacceptable components

3.2 SETTING CAST STONE IN MORTAR

A. Install cast stone units to comply with requirements in Division 4 Section "Architectural Concrete Unit Masonry Assemblies".

B. Set cast stone as indicated on Drawings. Set units accurately in locations indicated with edges and faces aligned according to established relationships and indicated tolerances.

1. Install anchors, supports, fasteners, and other attachments indicated or necessary to secure units in place.
2. Coordinate installation of cast stone with installation of flashing specified in other Sections.

C. Wet joint surfaces thoroughly before applying mortar or setting in mortar.

D. Set units in full bed of mortar with full head joints unless otherwise indicated.

1. Set units with joints 1/4 to 3/8 inch wide unless otherwise indicated.
2. Build anchors and ties into mortar joints as units are set.
3. Fill dowel holes and anchor slots with mortar.
4. Fill collar joints solid as units are set.
5. Build concealed flashing into mortar joints as units are set.

6. Keep head joints in coping and other units with exposed horizontal surfaces open to receive sealant.
7. Keep joints at shelf angles open to receive sealant.

E. Rake out joints for pointing with mortar to depths of not less than 3/4 inch. Rake joints to uniform depths with square bottoms and clean sides. Scrub faces of units to remove excess mortar as joints are raked.

F. Point mortar joints by placing and compacting mortar in layers not greater than 3/8 inch. Compact each layer thoroughly and allow it to become thumbprint hard before applying next layer.

G. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness unless otherwise indicated.

H. Provide sealant joints at copings and other horizontal surfaces, at expansion, control, and pressure-relieving joints, and at locations indicated.

1. Keep joints free of mortar and other rigid materials.
2. Build in compressible foam-plastic joint fillers where indicated.
3. Form joint of width indicated, but not less than 3/8 inch .
4. Prime cast stone surfaces to receive sealant and install compressible backer rod in joints before applying sealant unless otherwise indicated.
5. Prepare and apply sealant of type and at locations indicated to comply with applicable requirements in Division 7 Section "Joint Sealants."

3.3 SETTING ANCHORED CAST STONE WITH SEALANT-FILLED JOINTS

A. Set cast stone as indicated on Drawings. Set units accurately in locations indicated with edges and faces aligned according to established relationships and indicated tolerances.

1. Install anchors, supports, fasteners, and other attachments indicated or necessary to secure units in place.
2. Shim and adjust anchors, supports, and accessories to set cast stone in locations indicated with uniform joints.

B. Keep cavities open where unfilled space is indicated between back of cast stone units and backup wall; do not fill cavities with mortar or grout.

C. Fill anchor holes with sealant.

1. Where dowel holes occur at pressure-relieving joints, provide compressible material at ends of dowels.

D. Set cast stone supported on clip or continuous angles on resilient setting shims. Use material of thickness required to maintain uniform joint widths. Hold shims back from face of cast stone a distance at least equal to width of joint.

E. Keep joints free of mortar and other rigid materials. Remove temporary shims and spacers from joints after anchors and supports are secured in place and cast stone units are anchored. Do not begin sealant installation until temporary shims and spacers are removed.

1. Form open joint of width indicated, but not less than 3/8 inch .

F. Prime cast stone surfaces to receive sealant and install compressible backer rod in joints before applying sealant unless otherwise indicated.

G. Prepare and apply sealant of type and at locations indicated to comply with applicable requirements in Division 7 Section "Joint Sealants."

3.4 INSTALLATION TOLERANCES

A. Comply with Cast Stone Institute Standard Specification

B. Variation from Plumb: Do not exceed 1/8 inch in 5 feet, 1/4 inch in 20 feet, or more.

C. Variation from Level: Do not exceed 1/8 inch in 5 feet, 1/4 inch in 20 feet, or 3/8 inch maximum.

D. Variation in Joint Width: Do not vary joint thickness more than 1/8 inch in 36 inches or one-fourth of nominal joint width, whichever is less.

E. Variation in Plane between Adjacent Surfaces (Lipping): Do not vary from flush alignment with adjacent units or adjacent surfaces indicated to be flush with units by more than 1/16 inch, except where variation is due to warpage of units within tolerances specified.

3.5 ADJUSTING AND CLEANING

A. Remove and replace stained and otherwise damaged units and units not matching approved Samples. Cast stone may be repaired if methods and results are approved by Architect.

B. Replace units in a manner that results in cast stone matching approved Samples, complying with other requirements, and showing no evidence of replacement.

C. In-Progress Cleaning: Clean cast stone as work progresses.

1. Remove mortar fins and smears before tooling joints.
2. Remove excess sealant immediately, including spills, smears, and spatter.

D. Final Cleaning: After mortar is thoroughly set and cured, clean exposed cast stone as follows:

1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
2. Test cleaning methods on sample; leave one sample uncleaned for comparison purposes. Obtain Architect's approval of sample cleaning before proceeding with cleaning of cast stone.
3. Protect adjacent surfaces from contact with cleaner by covering them with liquid strippable masking agent or polyethylene film and waterproof masking tape.
4. Wet surfaces with water before applying cleaners; remove cleaners promptly by rinsing thoroughly with clear water.
5. Clean cast stone by bucket-and-brush hand-cleaning method described in BIA Technical Notes 20.
6. Clean cast stone with proprietary acidic cleaner applied according to manufacturer's written instructions.

E. Apply manufacturer recommended cast stone water repellant for weatherproofing in accordance with manufacturer’s instructions. Apply after pointing, repair, cleaning, inspection and acceptance are completed.

1. Surface Repair:

    a. Repair chipping and other surface damage noticeable when viewed in direct daylight at 20 feet.
    b. Repair with matching touch-up material provided by manufacturer and in accordance with manufacturer’s instructions.
    c. Repair methods and results to be approved by Architect.

END OF SECTION 04720

SECTION 04813 - BRICK MASONRY ASSEMBLIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:
   1. Face brick.
   2. Mortar and grout.
   3. Ties and anchors.
   4. Embedded flashing.
   5. Miscellaneous masonry accessories.

B. Related Sections:
   1. Division 3 Section “Architectural Precast Concrete” for finishing precast trim.
   2. Division 4 Section "Cast Stone" for furnishing cast stone trim.
   3. Division 4 Section “Concrete Unit Masonry” for structural concrete masonry unit construction. Coordinated structural design requirements for masonry and reinforcement , specifically integrated reinforcement with masonry ties ,with this section.
   4. Division 5 Section "Metal Fabrications" for furnishing steel lintels and shelf angles for brick masonry.
   5. Division 7 Section "Sheet Metal Flashing and Trim" for sheet metal flashing and for furnishing manufactured reglets installed in masonry joints.
   6. Division 7 Section “ Joint Sealants” for rod and sealant at control and expansion joints
   7. Division 7 Section – Bituminous Damp proofing
   8. Division 9- “Portland Cement Plaster” for installation of stucco adjacent to brick assemblies

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: For the following:

   1. Masonry Units: Show sizes, profiles, coursing, and locations of special shapes.
   2. Fabricated Flashing: Detail corner units, end-dam units, and other special applications.

C. Samples for Initial Selection:
   1. Face Brick, two complete sets of color representing manufacturers full range of available colors and patterns
   2. Colored mortar.
   3. Weep holes/vents.

D. Samples for Verification: For each type and color of the following:
   1. Face Brick, two samples of four bricks each, representing actual product, color and texture
   2. Pigmented and colored-aggregate mortar. Make Samples using same sand and mortar ingredients to be used on Project.

E. List of Materials Used in Constructing Mockups: List generic product names together with manufacturers, manufacturers' product names, model numbers, lot numbers, batch numbers, source of supply, and other information as required to identify materials used. Include mix proportions for mortar and grout and source of aggregates.

   1. Submittal is for information only. Neither receipt of list nor approval of mockup constitutes approval of deviations from the Contract Documents unless such deviations are specifically brought to the attention of Architect and approved in writing.

F. Material Certificates: For each type and size of the following:

   1. Masonry units.

      a. Include data on material properties .
      b. For brick, include size-variation data verifying that actual range of sizes falls within specified tolerances.
      c. For exposed brick, include test report for efflorescence according to ASTM C 67.

   2. Cementitious materials. Include brand, type, and name of manufacturer.
   3. Preblended, dry mortar mixes. Include description of type and proportions of ingredients.
   4. Grout mixes. Include description of type and proportions of ingredients.
   5. Anchors, ties, and metal accessories.

G. Cold-Weather and Hot-Weather Procedures: Detailed description of methods, materials, and equipment to be used to comply with requirements.

1.4 QUALITY ASSURANCE

A. Source Limitations for Masonry Units: Obtain exposed brick of a uniform texture and color, or a uniform blend within the ranges accepted for these characteristics, from single source from single manufacturer for each product required.

B. Source Limitations for Mortar Materials: Obtain mortar ingredients of a uniform quality, including color for exposed masonry, from single manufacturer for each cementitious component and from single source or producer for each aggregate.

C. Masonry Standard: Comply with ACI 530.1/ASCE 6/TMS 602 unless modified by requirements in the Contract Documents.

D. Sample Panels: Build sample panels to verify selections made under sample submittals and to demonstrate aesthetic effects. Comply with requirements in Division 1 Section "Quality Requirements" for mockups. Build mockups to verify selections made under sample submittal and determine aesthetic effects, fit adjacent components, set quality standards for materials material repair/maintain methods

   1. Build sample panels for each type of exposed unit masonry construction in sizes approximately 48 inches long by 48 inches high by full thickness.

2. Clean one-half of exposed faces of panels with masonry cleaner indicated.
3. Protect approved sample panels from the elements with weather-resistant membrane.
4. Approval of sample panels is for color, texture, and blending of masonry units; relationship of mortar and sealant colors to masonry unit colors; tooling of joints; aesthetic qualities of workmanship; and other material and construction qualities specifically approved by Architect in writing.

    a. Approval of sample panels does not constitute approval of deviations from the Contract Documents contained in sample panels unless such deviations are specifically approved by Architect in writing.
5. Include all unit types and sizes to be used and mortar joint treatment
6. Locations: provide mock up as shown on the drawings and assembly as they would actually be constructed (materials and methods):
    a. Build mockup of the corner of the slope parapet wall area as shown on Drawings
    b. Build mockup of wall/window head/jamb/sill conditions as shown on Drawings
    c. Build mockup of wall/stucco/precast signage panel

1.5 DELIVERY, STORAGE, AND HANDLING

A. Store masonry units on elevated platforms in a dry location. If units are not stored in an enclosed location, cover tops and sides of stacks with waterproof sheeting, securely tied. If units become wet, do not install until they are dry.

B. Masonry Units shall be delivered to jobsite on banded wood pallets. Each exposed face shall be protected by a plastic protective layer. Each edge of a cube shall be protected by a pre-molded edge protector. Each cube shall be covered with a clear plastic wrap. Pallets shall be stored in single-stacks on level ground and covered with a waterproof covering (e.g. tarpaulins) to protect units from inclement weather. Units must be handled carefully to avoid breakage and damage to the finished surfaces.

C. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.

D. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.

E. Deliver preblended, dry mortar mix in moisture-resistant containers designed for use with dispensing silos. Store preblended, dry mortar mix in delivery containers on elevated platforms, under cover, and in a dry location or in covered weatherproof dispensing silos.

F. Store masonry accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.

1.6 PROJECT CONDITIONS

A. Protection of Masonry: During construction, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work. Cover partially completed masonry when construction is not in progress.

1. Extend cover a minimum of 24 inches down both sides of walls and hold cover securely in place.
2. Where one wythe of multiwythe masonry walls is completed in advance of other wythes, secure cover a minimum of 24 inches down face next to unconstructed wythe and hold cover in place.

B. Stain Prevention: Prevent grout, mortar, and soil from staining the face of masonry to be left exposed or painted. Immediately remove grout, mortar, and soil that come in contact with such masonry.

1. Protect base of walls from rain-splashed mud and from mortar splatter by spreading coverings on ground and over wall surface.
2. Protect sills, ledges, and projections from mortar droppings.
3. Protect surfaces of window and door frames, as well as similar products with painted and integral finishes, from mortar droppings.
4. Turn scaffold boards near the wall on edge at the end of each day to prevent rain from splashing mortar and dirt onto completed masonry.

C. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace unit masonry damaged by frost or by freezing conditions. Comply with cold-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.

1. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 deg F and higher and will remain so until masonry has dried, but not less than seven days after completing cleaning.

D. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.

PART 2 - PRODUCTS

2.1 MASONRY UNITS, GENERAL

A. Defective Units: Referenced masonry unit standards may allow a certain percentage of units to contain chips, cracks, or other defects exceeding limits stated in the standard. Do not use units where such defects will be exposed in the completed Work.

B. Fire-Resistance Ratings: Where indicated, provide units that comply with requirements for fire-resistance ratings indicated as determined by testing according to ASTM E 119, by equivalent masonry thickness, or by other means, as acceptable to authorities having jurisdiction.

2.2 BRICK

A. General: Provide shapes indicated and as follows, with exposed surfaces matching finish and color of exposed faces of adjacent units.

1. For ends of sills and caps and for similar applications that would otherwise expose unfinished brick surfaces, provide units without cores or frogs and with exposed surfaces finished.

2. Provide special shapes for applications where stretcher units cannot accommodate special conditions, including those at corners, movement joints, bond beams, sashes, and lintels.
3. Provide special shapes for applications requiring brick of size, form, color, and texture on exposed surfaces that cannot be produced by sawing.
4. Provide special shapes for applications where shapes produced by sawing would result in sawed surfaces being exposed to view.

B. Face Brick (brick veneer): Facing brick complying with ASTM C 216.

1. Basis-of-Design Product: Subject to compliance with requirements, provide Sioux City Brick standard modular brick or comparable product by the following:

   a. Acme Brick: Denton Texas Plant

   b. Belden Brick Company, Canton, Ohio

   c. Boral Brick, Kansas City, Missouri

2. Grade: SW .
3. Type: FBS
4. Initial Rate of Absorption: Less than 30 g/30 sq. in. per minute when tested per ASTM C 67.
5. Efflorescence: Provide brick that has been tested according to ASTM C 67 and is rated "not effloresced."
6. Size (Actual Dimensions): 2-1/4”x3-5/8’x7-5/8”.
7. Application: Use where brick is exposed unless otherwise indicated.

8. Color and Texture: As selected by Architect From manufacturers full line

2.3 MORTAR MATERIALS

A. Portland Cement: ASTM C 150, Type I or II, except Type III may be used for cold-weather construction. Provide natural color or white cement as required to produce mortar color indicated.

B. Hydrated Lime: ASTM C 207, Type S.

C. Portland Cement-Lime Mix: Packaged blend of portland cement and hydrated lime containing no other ingredients.

D. Masonry Cement: ASTM C 91.

1. Products: Subject to compliance with requirements, provide one of the following:

   a. Capital Materials Corporation; Flamingo Color Masonry Cement.
   b. Cemex S.A.B. de C.V.; Dixie Type S.
   c. Essroc, Italcementi Group; Brixment or Velvet.
   d. Holcim (US) Inc.; Mortamix Masonry Cement.

e. Lafarge North America Inc.; Magnolia Masonry Cement or Lafarge Masonry Cement.
f. Lehigh Cement Company; Lehigh Masonry Cement or Lehigh White Masonry Cement.
g. National Cement Company, Inc.; Coosa Masonry Cement.

E. Mortar Pigments: Natural and synthetic iron oxides and chromium oxides, compounded for use in mortar mixes and complying with ASTM C 979. Use only pigments with a record of satisfactory performance in masonry mortar.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Davis Colors; True Tone Mortar Colors.
b. Lanxess Corporation; Bayferrox Iron Oxide Pigments.
c. Solomon Colors, Inc.; SGS Mortar Colors.

F. Colored Cement Product: Packaged blend made from portland cement and hydrated lime, masonry cement or mortar cement and mortar pigments, all complying with specified requirements, and containing no other ingredients.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Colored Portland Cement-Lime Mix:

1) Capital Materials Corporation; Riverton Portland Cement Lime Custom Color.
2) Holcim (US) Inc.; Rainbow Mortamix Custom Color Cement/Lime.
3) Lafarge North America Inc.; Eaglebond Portland & Lime.
4) Lehigh Cement Company; Lehigh Custom Color Portland/Lime Cement.

b. Colored Masonry Cement:

1) Capital Materials Corporation; Flamingo Color Masonry Cement.
2) Cemex S.A.B. de C.V.; Richcolor Masonry Cement.
3) Essroc, Italcementi Group; Brixment-in-Color.
4) Holcim (US) Inc.; Rainbow Mortamix Custom Color Masonry Cement.
5) Lafarge North America Inc.; U.S. Cement Custom Color Masonry Cement.
6) Lehigh Cement Company; Lehigh Custom Color Masonry Cement.
7) National Cement Company, Inc.; Coosa Masonry Cement.

2. Formulate blend as required to produce color indicated or, if not indicated, as selected from manufacturer's full range of colors.
3. Pigments shall not exceed 10 percent of portland cement by weight.
4. Pigments shall not exceed 5 percent of masonry cement or mortar cement by weight.

G. Aggregate for Mortar: ASTM C 144.

1. For mortar that is exposed to view, use washed aggregate consisting of natural sand or crushed stone.
2. For joints less than 1/4 inch thick, use aggregate graded with 100 percent passing the No. 16 sieve.
3. White-Mortar Aggregates: Natural white sand or crushed white stone.
4. Colored-Mortar Aggregates: Natural sand or crushed stone of color necessary to produce required mortar color.

2.4 REINFORCEMENT

A. Masonry Joint Reinforcement, General: ASTM A 951/A 951M.

B. Masonry Joint Reinforcement for Veneers Anchored with Seismic Masonry-Veneer Anchors: Single 0.187-inch- diameter, stainless-steel continuous wire.

2.5 TIES AND ANCHORS

A. Materials: Provide ties and anchors specified in this article that are made from materials that comply with the following unless otherwise indicated:
   1. Stainless-Steel Wire: ASTM A 580/A 580M, Type 316.
   2. Stainless-Steel Sheet: ASTM A 666, Type 316.

B. Wire Ties, General: Unless otherwise indicated, size wire ties to extend at least halfway through veneer but with at least 5/8-inch cover on outside face. Outer ends of wires are bent 90 degrees and extend 2 inches parallel to face of veneer.

C. Adjustable Masonry-Veneer Anchors:

   1. General: Provide anchors that allow vertical adjustment but resist tension and compression forces perpendicular to plane of wall, for attachment over sheathing to metal studs, and as follows:

      a. Structural Performance Characteristics: Capable of withstanding a 100-lbf load in both tension and compression without deforming or developing play in excess of 0.05 inch.
   2. Screw-Attached, Masonry-Veneer Anchors: Units consisting of a wire tie and a metal anchor section.

      a. Basis-of-Design Product: Subject to compliance with requirements, provide Dayton Superior Corporation, Dur-O-Wal plate and intel anchor D/A 213 and D/A 3600/3700 ultiwythe adjustable or comparable product by one of the following products: Subject to compliance with requirements, provide one of the following :
         1) Heckmann Building Products Inc.; .
         2) Hohmann & Barnard, Inc.; .
         3) Wire-Bond; .
      b. Provide 3/16” diameter, stainless-steel wire and 12 gauge stainless steel plate.
      c. Provide manufacturer’s super heavy weight construction.

2.6 EMBEDDED FLASHING MATERIALS

A. Metal Flashing: Provide metal flashing complying with SMACNA's "Architectural Sheet Metal Manual and Division 7 Section "Sheet Metal Flashing and Trim" and as follows:

   1. Stainless Steel: ASTM A 240/A 240M, Type 304, 0.016 inch thick.
   2. Fabricate continuous flashings in sections 96 inches long minimum, but not exceeding 12 feet. Provide splice plates at joints of formed, smooth metal flashing.
   3. Fabricate through-wall metal flashing embedded in masonry from stainless steel , with ribs at 3-inch intervals along length of flashing to provide an integral mortar bond.

      a. Products: Subject to compliance with requirements, provide one of the following:

1) Cheney Flashing Company; Cheney Flashing (Dovetail) or Cheney 3-Way Flashing (Sawtooth).
2) Keystone Flashing Company, Inc.; Keystone 3-Way Interlocking Thruwall Flashing.
3) Sandell Manufacturing Co., Inc.; Mechanically Keyed Flashing.

4. Fabricate through-wall flashing with snaplock receiver on exterior face where indicated to receive counterflashing.
5. Fabricate through-wall flashing with drip edge unless otherwise indicated. Fabricate by extending flashing 1/2 inch out from wall, with outer edge bent down 30 degrees and hemmed.
6. Fabricate through-wall flashing with sealant stop unless otherwise indicated. Fabricate by bending metal back on itself 3/4 inch at exterior face of wall and down into joint 1/4 inch to form a stop for retaining sealant backer rod.
7. Metal Drip Edge: Fabricate from stainless steel. Extend at least 3 inches into wall and 1/2 inch out from wall, with outer edge bent down 30 degrees and hemmed.
8. Metal Sealant Stop: Fabricate from stainless steel. Extend at least 3 inches into wall and out to exterior face of wall. At exterior face of wall, bend metal back on itself for 3/4 inch and down into joint 1/4 inch to form a stop for retaining sealant backer rod.
9. Metal Expansion-Joint Strips: Fabricate from stainless steel to shapes indicated.

B. Flexible Flashing: Use the following unless otherwise indicated:

1. Asphalt-Coated Copper Flashing: 7-oz./sq. ft. copper sheet coated with flexible asphalt. Use only where flashing is fully concealed in masonry.

a. Products: Subject to compliance with requirements, provide one of the following :

1) Advanced Building Products Inc.; Cop-R-Cote.
2) Dayton Superior Corporation, Dur-O-Wal Division; Copper Coated Thru-Wall Flashing.
3) Hohmann & Barnard, Inc.; H & B C-Coat Flashing.
4) Phoenix Building Products; Type ACC-Asphalt Bituminous Coated.
5) Sandell Manufacturing Co., Inc.; Coated Copper Flashing.

C. Application: Unless otherwise indicated, use the following:

1. Where flashing is indicated to receive counterflashing, use metal flashing.
2. Where flashing is indicated to be turned down at or beyond the wall face, use metal flashing.
3. Where flashing is partly exposed and is indicated to terminate at the wall face, use metal flashing with a drip edge .
4. Where flashing is fully concealed, use metal flashing or flexible flashing.

D. Solder and Sealants for Sheet Metal Flashings: As specified in Division 7 Section "Sheet Metal Flashing and Trim."

E. Adhesives, Primers, and Seam Tapes for Flashings: Flashing manufacturer's standard products or products recommended by flashing manufacturer for bonding flashing sheets to each other and to substrates.

2.7 MISCELLANEOUS MASONRY ACCESSORIES

A. Compressible Filler: Premolded filler strips complying with ASTM D 1056, Grade 2A1; compressible up to 35 percent; of width and thickness indicated; formulated from neoprene urethane or PVC.

B. Bond-Breaker Strips: Asphalt-saturated, organic roofing felt complying with ASTM D 226, Type I (No. 15 asphalt felt).

C. Weep/Vent Products: Use the following unless otherwise indicated:

1. Mesh Weep/Vent: Free-draining mesh; made from polyethylene strands, full height and width of head joint and depth 1/8 inch less than depth of outer wythe; in color selected from manufacturer's full range.

a. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

1) Mortar Net USA, Ltd.; Mortar Net Weep Vents.

2. Masonry Cavity wall drainage system: Trapezoidal Free-draining mesh made from polyethylene strands, in color selected from manufacturer’s full range.

a. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

1) Mortar Net USA, Ltd.; MortarNet

2.8 MASONRY CLEANERS

A. Proprietary Acidic Cleaner (Brick veneer): Manufacturer's standard-strength cleaner designed for removing mortar/grout stains, efflorescence, and other new construction stains from new masonry without discoloring or damaging masonry surfaces. Use product expressly approved for intended use by cleaner manufacturer and manufacturer of masonry units being cleaned.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following :

a. Diedrich Technologies, Inc.
b. EaCo Chem, Inc.
c. ProSoCo, Inc.

B. Masonry Unit Cleaner: Detergent masonry cleaner shall be used following the manufacturer’s instructions and the surface shall be thoroughly rinsed with clean water. No acid or acid based solutions shall be used. Protect Masonry units from any acid cleaner used on brick veneers.

2.9 MORTAR MIXES

A. General: Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures unless otherwise indicated.

1. Do not use calcium chloride in mortar.
2. Use portland cement-lime masonry cement or mortar cement mortar unless otherwise indicated.
3. Add cold-weather admixture (if used) at same rate for all mortar that will be exposed to view, regardless of weather conditions, to ensure that mortar color is consistent.

B. Preblended, Dry Mortar Mix: Furnish dry mortar ingredients in form of a preblended mix. Measure quantities by weight to ensure accurate proportions, and thoroughly blend ingredients before delivering to Project site.

C. Mortar for Unit Masonry: Comply with ASTM C 270, Proportion Specification. Provide Type S unless another type is indicated.

D. Pigmented Mortar: Use colored cement product.
1. Mix to match Architect's sample.
2. Application: Use pigmented mortar for exposed mortar joints with the following units:
a. Face brick.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

A. Leave openings for equipment to be installed before completing masonry. After installing equipment, complete masonry to match the construction immediately adjacent to opening.

B. Use full-size units without cutting if possible. If cutting is required to provide a continuous pattern or to fit adjoining construction, cut units with motor-driven saws; provide clean, sharp, unchipped edges. Allow units to dry before laying unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.

C. Select and arrange units for exposed unit masonry to produce a uniform blend of colors and textures.

1. Mix units from several pallets or cubes as they are placed.

D. Wetting of Brick: Wet brick before laying if initial rate of absorption exceeds 30 g/30 sq. in. per minute when tested per ASTM C 67. Allow units to absorb water so they are damp but not wet at time of laying.

3.3 TOLERANCES

A. Dimensions and Locations of Elements:

1. For dimensions in cross section or elevation do not vary by more than plus 1/2 inch or minus 1/4 inch.
2. For location of elements in plan do not vary from that indicated by more than plus or minus 1/2 inch.
3. For location of elements in elevation do not vary from that indicated by more than plus or minus 1/4 inch in a story height or 1/2 inch total.

B. Lines and Levels:

1. For bed joints and top surfaces of bearing walls do not vary from level by more than 1/4 inch in 10 feet, or 1/2 inch maximum.
2. For conspicuous horizontal lines, such as lintels, sills, parapets, and reveals, do not vary from level by more than 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2 inch maximum.
3. For vertical lines and surfaces do not vary from plumb by more than 1/4 inch in 10 feet, 3/8 inch in 20 feet, or 1/2 inch maximum.
4. For conspicuous vertical lines, such as external corners, door jambs, reveals, and expansion and control joints, do not vary from plumb by more than 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2 inch maximum.
5. For lines and surfaces do not vary from straight by more than 1/4 inch in 10 feet, 3/8 inch in 20 feet, or 1/2 inch maximum.
6. For vertical alignment of exposed head joints, do not vary from plumb by more than 1/4 inch in 10 feet, or 1/2 inch maximum.
7. For faces of adjacent exposed masonry units, do not vary from flush alignment by more than 1/16 inch except due to warpage of masonry units within tolerances specified for warpage of units.

C. Joints:

1. For bed joints, do not vary from thickness indicated by more than plus or minus 1/8 inch, with a maximum thickness limited to 1/2 inch; do not vary from bed-joint thickness of adjacent courses by more than 1/8 inch.
2. For exposed head joints, do not vary from thickness indicated by more than plus or minus 1/8 inch. Do not vary from adjacent bed-joint and head-joint thicknesses by more than 1/8 inch.
3. For exposed bed joints and head joints of stacked bond, do not vary from a straight line by more than 1/16 inch from one masonry unit to the next.

3.4 LAYING MASONRY WALLS

A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and for accurate location of openings, movement-type joints, returns, and offsets. Avoid using less-than-half-size units, particularly at corners, jambs, and, where possible, at other locations.

B. Bond Pattern for Exposed Masonry: Unless otherwise indicated, lay exposed masonry in bond pattern indicated on Drawings; do not use units with less than nominal 4-inch horizontal face dimensions at corners or jambs.

C. Stopping and Resuming Work: Stop work by racking back units in each course from those in course below; do not tooth. When resuming work, clean masonry surfaces that are to receive mortar, remove loose masonry units and mortar, and wet brick if required before laying fresh masonry.

D. Built-in Work: As construction progresses, build in items specified in this and other Sections. Fill in solidly with masonry around built-in items.

E. Fill space between concrete columns and walls, steel frames and masonry solidly with mortar unless otherwise indicated.

3.5 MORTAR BEDDING AND JOINTING

A. Lay hollow brick as follows:

1. With face shells fully bedded in mortar and with head joints of depth equal to bed joints.
2. With entire units, including areas under cells, fully bedded in mortar at starting course on footings.

B. Lay solid masonry units with completely filled bed and head joints; butter ends with sufficient mortar to fill head joints and shove into place. Do not deeply furrow bed joints or slush head joints.

C. Set pre-cast trim units in full bed of mortar with full vertical joints. Fill dowel, anchor, and similar holes.

1. Clean soiled surfaces with fiber brush and soap powder and rinse thoroughly with clear water.
2. Wet joint surfaces thoroughly before applying mortar.

D. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness unless otherwise indicated.

3.6 ANCHORING MASONRY VENEERS

A. Anchor masonry veneers to wall framing and concrete backup with masonry-veneer anchors to comply with the following requirements:

1. Fasten screw-attached anchors through sheathing to wall framing with metal fasteners of type indicated. Use two fasteners unless anchor design only uses one fastener.
2. Embed tie sections connector sections and continuous wire in masonry joints. Provide not less than 1 ¾ inches of air space between back of masonry veneer and face of sheathing.
3. Locate anchor sections to allow maximum vertical differential movement of ties up and down.
4. Space anchors as indicated, but not more than 18 inches o.c. vertically and 24 inches o.c. horizontally, with not less than 1 anchor for each 2 sq. ft. of wall area. Install additional anchors within 12 inches of openings and at intervals, not exceeding 8 inches, around perimeter.
5. Space anchors as indicated, but not more than 16 inches o.c. vertically and 24 inches o.c. horizontally with not less than 1 anchor for each 2.67 sq. ft. of wall area. Install

additional anchors within 12 inches of openings and at intervals, not exceeding 36 inches, around perimeter.

3.7 EXPANSION JOINTS

A. General: Install expansion joint materials in unit masonry as masonry progresses. Do not allow materials to span expansion joints without provision to allow for in-plane wall or partition movement.

B. Form expansion joints in brick as follows:
1. Build in compressible joint fillers where indicated.
2. Form open joint full depth of brick wythe and of width indicated, but not less than 3/8 inch for installation of sealant and backer rod specified in Division 7 Section "Joint Sealants."

C. Provide horizontal, pressure-relieving joints by either leaving an air space or inserting a compressible filler of width required for installing sealant and backer rod specified in Division 7 Section "Joint Sealants," but not less than 3/8 inch .

1. Locate horizontal, pressure-relieving joints beneath shelf angles supporting masonry.

3.8 LINTELS

A. Install steel lintels where indicated.

B. Provide minimum bearing of 8 inches at each jamb unless otherwise indicated.

3.9 FLASHING, WEEP HOLES, CAVITY DRAINAGE, AND VENTS

A. General: Install embedded flashing and weep holes in masonry at shelf angles, lintels, ledges, other obstructions to downward flow of water in wall, and where indicated. Install vents at shelf angles, ledges, and other obstructions to upward flow of air in cavities, and where indicated.

B. Install flashing as follows unless otherwise indicated:

1. Prepare masonry surfaces so they are smooth and free from projections that could puncture flashing. Where flashing is within mortar joint, place through-wall flashing on sloping bed of mortar and cover with mortar. Before covering with mortar, seal penetrations in flashing with adhesive, sealant, or tape as recommended by flashing manufacturer.
2. At masonry-veneer walls, extend flashing through veneer, across air space behind veneer, and up face of sheathing at least 8 inches; with upper edge tucked under building paper or building wrap, lapping at least 4 inches.
3. At lintels and shelf angles, extend flashing a minimum of 6 inches into masonry at each end. At heads and sills, extend flashing 6 inches at ends and turn up not less than 2 inches to form end dams.
4. Interlock end joints of ribbed sheet metal flashing by overlapping ribs not less than 1-1/2 inches or as recommended by flashing manufacturer, and seal lap with elastomeric sealant complying with requirements in Division 7 Section "Joint Sealants" for application indicated.

5. Install metal drip edges with ribbed sheet metal flashing by interlocking hemmed edges to form hooked seam. Seal seam with elastomeric sealant complying with requirements in Division 7 Section "Joint Sealants" for application indicated.
6. Cut flexible flashing off flush with face of wall after masonry wall construction is completed.

C. Install reglets and nailers for flashing and other related construction where they are shown to be built into masonry.

D. Install weep holes in head joints in exterior wythes of first course of masonry immediately above embedded flashing and as follows:

1. Use specified weep/vent products to form weep holes.
2. Use wicking material to form weep holes above flashing under brick sills. Turn wicking down at lip of sill to be as inconspicuous as possible.
3. Space weep holes 24 inches o.c. unless otherwise indicated.
4. Trim wicking material flush with outside face of wall after mortar has set.

E. Place pea gravel in cavities as soon as practical to a height equal to height of first course above top of flashing, but not less than 2 inches, to maintain drainage.

F. Place cavity drainage material in cavities to comply with configuration requirements for cavity drainage material in "Miscellaneous Masonry Accessories" Article.

G. Install vents in head joints in exterior wythes at spacing indicated. Use specified weep/vent products to form vents.

1. Close cavities off vertically and horizontally with blocking in manner indicated. Install through-wall flashing and weep holes above horizontal blocking.

3.10 FIELD QUALITY CONTROL

A. Testing and Inspecting: Owner will engage special inspectors to perform tests and inspections and prepare reports. Allow inspectors access to scaffolding and work areas, as needed to perform tests and inspections. Retesting of materials that fail to meet specified requirements shall be done at Contractor's expense.

B. Inspections: Level 1 special inspections according to the "International Building Code."

1. Begin masonry construction only after inspectors have verified proportions of site-prepared mortar.

C. Mortar Aggregate Ratio Test (Proportion Specification): For each mix provided, according to ASTM C 780.

3.11 REPAIRING, POINTING, AND CLEANING

A. Remove and replace masonry units that are loose, chipped, broken, stained, or otherwise damaged or that do not match adjoining units. Install new units to match adjoining units; install in fresh mortar, pointed to eliminate evidence of replacement.

B. Pointing: During the tooling of joints, enlarge voids and holes, except weep holes, and completely fill with mortar. Point up joints, including corners, openings, and adjacent construction, to provide a neat, uniform appearance. Prepare joints for sealant application, where indicated.

C. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.

D. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:

1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
2. Test cleaning methods on sample wall panel; leave one-half of panel uncleaned for comparison purposes. Obtain Architect's approval of sample cleaning before proceeding with cleaning of masonry.
3. Protect adjacent stone and nonmasonry surfaces from contact with cleaner by covering them with liquid strippable masking agent or polyethylene film and waterproof masking tape.
4. Wet wall surfaces with water before applying cleaners; remove cleaners promptly by rinsing surfaces thoroughly with clear water.
5. Clean brick by bucket-and-brush hand-cleaning method described in "BIA Technical Notes 20."
6. Clean concrete masonry by cleaning method indicated in NCMA TEK 8-2A applicable to type of stain on exposed surfaces.
7. Clean stone and pre-cast trim to comply with stone supplier's written instructions.
8. Clean limestone units to comply with recommendations in ILI's "Indiana Limestone Handbook."

3.12 MASONRY WASTE DISPOSAL

A. Salvageable Materials: Unless otherwise indicated, excess masonry materials are Contractor's property. At completion of unit masonry work, remove from Project site.

B. Excess Masonry Waste: Remove excess clean masonry waste that cannot be used as fill, as described above, and other masonry waste, and legally dispose of off Owner's property.

END OF SECTION 04813

DIVISION 05

SECTION 05120 - STRUCTURAL STEEL

PART 1 - GENERAL

1.1 SUMMARY

A. Scope: The work included in this section of the specifications includes all labor, materials, equipment, and services necessary for furnishing and installing structural and miscellaneous steel as indicated on the drawings and as herein specified.

B. This Section includes structural steel and architecturally exposed structural steel.

1.2 PERFORMANCE REQUIREMENTS

A. Structural performance: Engineer structural steel connections required by the Contract Documents to be selected or completed by the fabricator to withstand design loadings indicated.

B. Engineering Responsibility: Engage a fabricator who utilizes a qualified professional engineer to prepare calculations, Shop Drawings, and other structural data for structural steel connections.

C. All concrete reinforcing work shall conform to standards set forth in CRSI Manual of Standard Practice

1.3 SUBMITTALS

A. Product Data for each type of product specified.

B. Shop Drawings detailing fabrication of structural steel components.

1. Include details of cuts, connections, splices, camber, holes, and other pertinent data.
2. Indicate welds by standard AWS symbols, distinguishing between shop and field welds, and show size, length, and type of each weld.
3. Indicate type, size, and length of bolts, distinguishing between shop and field bolts. Identify high-strength bolted slip-critical, direct-tension, or tensioned shear/bearing connections.
4. Include Shop Drawings signed and sealed by a qualified professional engineer responsible for their preparation.
5. Structural steel, including chemical and physical properties.
6. Bolts, nuts, and washers, including mechanical properties and chemical analysis.
7. Shop primers.
8. Non-shrink grout.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: Engage an experienced Installer who has completed structural steel work similar in material, design, and extent to that indicated for this Project and with a record of successful in-service performance.

B. Fabricator Qualifications: Engage a firm experienced in fabricating structural steel similar to that indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to fabricate structural steel without delaying the Work.

C. Comply with applicable provisions of the following specifications and documents: AISC’S “Specification for Structural Steel Buildings - Allowable Stress Design and Plastic Design.”

D. Professional Engineer Qualifications: A professional engineer who is legally authorized to practice in the State of Louisiana and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for projects with structural steel framing that are similar to that indicated for this Project in material, design, and extent.

E. Welding Standards: Comply with applicable provisions of AWS D1.1 “Structural Welding Code - Steel.”

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver structural steel to Project site in such quantities and at such times to ensure continuity of installation.

B. Store materials to permit easy access for inspection and identification. Keep steel members off ground by using pallets, platforms, or other supports. Protect steel members and packaged materials from erosion and deterioration.

1. Store fasteners in a protected place. Clean and relubricate bolts and nuts that become dry or rusty before use.
2. Do not store materials on structure in a manner that might cause distortion or damage to members or supporting structures. Repair or replace damaged materials or structures as directed.

1.6 SEQUENCING

A. Supply anchorage items to be embedded in or attached to other construction without delaying the Work. Provide setting diagrams, templates, instructions, and directions as required, for installation.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Structural Steel Angles, Plates, and Bars: Carbon Steel - ASTM A 36 (ASTM A 36M).

B. Steel channels, S, M and HP shapes: ASTM A 572, Grade 50.

C. Steel W shapes: ASTM A 572 or ASTM A 992, Grade 50.

D. Cold-Formed Structural Steel Tubing: ASTM A 500, Grade B.

E. Steel Pipe: ASTM A 53, Type E or S, Grade B.

1. Weight Class: Standard

F. Anchor Rods, Bolts, Nuts, and Washers:

1. Anchor Bolts: ASTM A 307
2. Headed Bolts: ASTM A 325 (ASTM A325M), Type 1, heavy hex steel structural bolts and heavy hex carbon-steel nuts.
3. Washers: ASTM A 36 (ASTM A 36M).

2.2 PRIMER

A. Interior unexposed structural steel that is not to receive sprayed-on fireproofing shall receive one shop coat of paint in accordance with Steel Structures Painting Council's Painting System Guide No. 7.00 utilizing SSPC Paint 13 or Paint 15, Type I.

B. All exposed or visible structural steel not designated to be galvanized shall receive one or more coats of paint after fabrication in accordance with all requirements of the Steel Structures Painting Council's requirements for Zone 1A for interior steel or Zone 1B for exterior steel. All such paints shall be compatible with the finish coat as specified in Division 9.

C. No paint shall be placed within two (2) inches of any steel surface that is to be field welded (except for joist seats and beam flanges where joist seats are to be welded) nor on the top flange of any beams that receive shear studs.

D. Members shown on the drawings to be galvanized and any other exterior lintels or members not designated to be painted that are exposed or in contact with exterior masonry shall be galvanized after fabrication in accordance with ASTM A123 "Standard Specification for Zinc (Hot Galvanized) Coatings on Products Fabricated from Rolled Steel Shapes, Plates, Bars, and Strip", latest edition.

E. Any steel that is to receive sprayed-on fireproofing shall be uncoated.

F. Any surface coating that is damaged shall be touched up to provide full coverage and protection.

2.3 GROUT

A. Nonmetallic, Shrinkage-Resistant Grout: Premixed, nonmetallic, non-corrosive, non-staining grout containing selected silica sands, Portland cement, shrinkage compensating agents, plasticizing and water-reducing agents, complying with ASTM C 1107, of consistency suitable for application, and a 30-minute working time.

2.4 FABRICATION

A. Fabricate and assemble structural steel in shop to greatest extent possible. Fabricate structural steel according to AISC specifications referenced in this Section and in Shop Drawings.

1. Mark and match-mark materials for field assembly.
2. Fabricate for delivery a sequence that will expedite erection and minimize field handling of structural steel.
3. Complete structural steel assemblies, including welding of units, before starting shop-priming operations.
4. Comply with fabrication tolerance limits of AISC’s “Code of Standard Practice for Steel Buildings and Bridges” for structural steel.

B. Fabricate architecturally exposed structural steel with exposed surfaces smooth, square, and free of surface blemishes, including pitting, rust and scale seam marks, roller marks, rolled trade names, and roughness.

1. Remove blemishes by filling, grinding, or by welding and grinding, prior to cleaning, treating, and shop priming.
2. Comply with fabrication requirements, including tolerance limits, of AISC’s “Code of Standard Practice for Steel Buildings and Bridges” for architecturally exposed structural steel.

C. Thermal Cutting: Perform thermal cutting by machine to greatest extent possible.

1. Plane thermally cut edges to be welded.

D. Finishing: Accurately mill ends of columns and other members transmitting loads in bearing.

2.5 SHOP CONNECTIONS

A. Shop install and tighten high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

1. Bolts: ASTM A 325 (ASTM A 325N) high-strength bolts, unless otherwise indicated.
2. Connection Type: Snug tightened, unless indicated as slip-critical, direct-tension, or tensioned shear/bearing connections.

B. Weld Connections: Comply with AWS D1.1 for procedures, appearance and quality of welds, and methods used in correcting welding work.

1. Verify that weld sizes, fabrication sequence, and equipment used for architecturally exposed structural steel will limit distortions to allowable tolerances. Prevent surface bleeding of back-side welding on exposed steel surfaces. Grind smooth exposed fillet welds 1/2 inch (13 mm) and larger. Grind flush butt welds. Dress exposed welds.

2.6 SHOP PRIMING

A. Surface Preparation: Clean surfaces to be painted. Remove loose rust, loose mill scale, spatter, slag or flux deposits. Prepare surfaces according to SSPC Specifications as follows:

1. SSPC-SP3 "Power Tool Cleaning".

2.7 GALVANIZING

A. Items shown on the plans to be galvanized and bolts for same shall be hot-dipped zinc coated after fabrications. Galvanizing shall be done in accordance with ASTM Serial Designation A123. Any zinc coating that is damaged shall be touched up with Galvacon as manufactured by Southern Coatings in accordance with the manufacturer's recommendations.

2.8 SOURCE QUALITY CONTROL

A. Owner will engage an independent testing and inspecting agency to perform shop inspections and tests and to prepare test reports.

1. Testing agency will conduct and interpret tests and state in each report whether test specimens comply with or deviate from requirements.

B. Correct deficiencies in or remove and replace structural steel that inspections and test reports indicate do not comply with specified requirements.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Before erection proceeds, and with the steel erector present, verify elevations of concrete and masonry bearing surfaces and locations of anchorages for compliance with requirements.

B. Do not proceed with erection until unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Provide temporary shores, guys, braces, and other supports during erection to keep structural steel secure, plumb, and in alignment against temporary construction loads and loads equal in intensity to design loads. Remove temporary supports when permanent structural steel, connections, and bracing are in place, unless otherwise indicated.

1. Do not remove temporary shoring supporting composite deck construction until cast-in-place concrete has attained its design compressive strength.

3.3 ERECTION

A. Set structural steel accurately in locations and to elevations indicated and according to AISC specifications referenced in this Section.

1. Set base and bearing plates for structural members on wedges, shims, or setting nuts as required.
2. Tighten anchor bolts after supported members have been positioned and plumbed. Do not remove wedges or shims but, if protruding, cut off flush with edge of base or bearing plate prior to packing with grout.
3. Pack grout solidly between bearing surfaces and plates so no voids remain. Finish exposed surfaces, protect installed materials, and allow to cure.

B. Align and adjust various members forming part of complete frame or structure before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that will be in permanent contact. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.

1. Level and plumb individual members of structure.

C. Splice members only where indicated.

3.4 FIELD CONNECTIONS

A. Install and tighten high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

B. Weld Connections: Comply with AWS D1.1 for procedures, appearance and quality of welds, and methods used in correcting welding work.

3.5 QUALITY CONTROL

A. If applicable, the Contractor will engage an independent testing and inspection agency to inspect high-strength bolted connections and welded connections and to perform tests and prepare test reports.

1. Testing agency shall conduct and interpret tests, state in each report whether test specimens comply with requirements, and specifically state any deviations therefrom.
2. Provide access for testing agency to places where structural steel work is being fabricated or produced so that required inspection and testing can be accomplished.
3. Testing agency may inspect structural steel at plant before shipment.

B. Correct deficiencies in structural steel work that inspections and laboratory test reports have indicated to be not in compliance with requirements. Perform additional tests, at Contractor's expense, as necessary to reconfirm any noncompliance of original work and to show compliance of corrected work.

C. Shop-Bolted Connections: Inspect or test in accordance with AISC specifications.

1. Verify that gaps of installed Direct Tension Indicators are less than gaps specified in ASTM F 959, Table 2.

D. Shop Welding: Inspect and test during fabrication of structural steel assemblies, as follows:

1. Certify welders and conduct inspections and tests as required. Record types and locations of defects found in work. Record work required and performed to correct deficiencies.
2. Perform visual inspection of all welds.
3. Perform tests of welds as follows.

a. Ultrasonic Inspection: ASTM E 164.

E. Field-Bolted Connections: Inspect in accordance with AISC specifications.

F. Field Welding: Inspect and test during erection of structural steel as follows:

1. Certify welders and conduct inspections and tests as required. Record types and locations of defects found in work. Record work required and performed to correct deficiencies.
2. Perform visual inspection of all welds.

3. Perform tests of welds as follows:

a. Ultrasonic Inspection: ASTM E 164.

3.6 CLEANING

A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint. Apply paint to exposed areas using same material as used for shop painting.

1. Apply by brush or spray to provide a minimum dry film thickness of 1.5 mils.

END OF SECTION 05 12 00

SECTION 05210- STEEL JOIST FRAMING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. K-series steel joists.
2. K-series steel joist substitutes.
3. Joist accessories.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of joist, accessory, and product.

B. LEED Submittals:

1. Product Data for Credit MR 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.
2. Laboratory Test Reports for Credit EQ 4: For primers, documentation indicating that products comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

C. Shop Drawings:

1. Include layout, designation, number, type, location, and spacing of joists.
2. Include joining and anchorage details, bracing, bridging, and joist accessories; splice and connection locations and details; and attachments to other construction.

1.3 INFORMATIONAL SUBMITTALS

A. Welding certificates.

B. Manufacturer certificates.

C. Mill Certificates: For each type of bolt.

1.4 QUALITY ASSURANCE

A. Manufacturer Qualifications: A manufacturer certified by SJI to manufacture joists complying with applicable standard specifications and load tables in SJI's "Specifications."

1. Manufacturer's responsibilities include providing professional engineering services for designing special joists to comply with performance requirements.

B. Welding Qualifications: Qualify field-welding procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle joists as recommended in SJI's "Specifications."

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of pre-consumer recycled content not less than 25 percent.

2.2 K-SERIES STEEL JOISTS

A. Manufacture steel joists of type indicated according to "Standard Specifications for Open Web Steel Joists, K-Series" in SJI's "Specifications," with steel-angle top- and bottom-chord members, underslung ends, and parallel top chord.

B. Steel Joist Substitutes: Manufacture according to "Standard Specifications for Open Web Steel Joists, K-Series" in SJI's "Specifications," with steel-angle or -channel members.

2.3 LONG-SPAN STEEL JOISTS

A. Manufacture steel joists according to "Standard Specifications for Longspan Steel Joists, LH-Series and Deep Longspan Steel Joists, DLH-Series" in SJI's "Specifications," with steel-angle top- and bottom-chord members; of joist type and end and top-chord arrangements as indicated.

2.4 JOIST GIRDERS

A. Manufacture joist girders according to "Standard Specifications for Joist Girders" in SJI's "Specifications," with steel-angle top- and bottom-chord members; with end and top-chord arrangements as indicated.

2.5 PRIMERS

A. Low-Emitting Materials: Paints and coatings shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

B. Primer: SSPC-Paint 15, or manufacturer's standard shop primer complying with performance requirements in SSPC-Paint 15.

C. Primer: Provide shop primer that complies with Division 09 painting Sections.

2.6 JOIST ACCESSORIES

A. Bridging: Provide bridging anchors and number of rows of horizontal or diagonal bridging of material, size, and type required by SJI's "Specifications" for type of joist, chord size, spacing, and span. Furnish additional erection bridging if required for stability.

B. Bridging: Schematically indicated. Detail and fabricate according to SJI's "Specifications." Furnish additional erection bridging if required for stability.

C. Furnish ceiling extensions, either extended bottom-chord elements or a separate extension unit of enough strength to support ceiling construction. Extend ends to within 1/2 inch (13 mm) of finished wall surface unless otherwise indicated.

D. Carbon-Steel Bolts and Threaded Fasteners: ASTM A 307, Grade A (ASTM F 568M, Property Class 4.6), carbon-steel, hex-head bolts and threaded fasteners; carbon-steel nuts; and flat, unhardened steel washers.

1. Finish: Hot-dip zinc coating, ASTM A 153/A 153M, Class C.

E. High-Strength Bolts, Nuts, and Washers: ASTM A 325 (ASTM A 325M), Type 1, heavy hex steel structural bolts; ASTM A 563 (ASTM A 563M) heavy hex carbon-steel nuts; and ASTM F 436 (ASTM F 436M) hardened carbon-steel washers.

1. Finish: Hot-dip zinc coating, ASTM A 153/A 153M, Class C.

F. Furnish miscellaneous accessories including splice plates and bolts required by joist manufacturer to complete joist assembly.

2.7 CLEANING AND SHOP PAINTING

A. Clean and remove loose scale, heavy rust, and other foreign materials from fabricated joists and accessories.

B. Apply one coat of shop primer.

C. Shop priming of joists and joist accessories is specified in Division 09 painting Sections.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Do not install joists until supporting construction is in place and secured.

B. Install joists and accessories plumb, square, and true to line; securely fasten to supporting construction according to SJI's "Specifications," joist manufacturer's written recommendations, and requirements in this Section.

1. Before installation, splice joists delivered to Project site in more than one piece.
2. Space, adjust, and align joists accurately in location before permanently fastening.
3. Install temporary bracing and erection bridging, connections, and anchors to ensure that joists are stabilized during construction.

C. Field weld joists to supporting steel bearing plates and framework. Coordinate welding sequence and procedure with placement of joists. Comply with AWS requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.

D. Bolt joists to supporting steel framework using carbon-steel bolts.

E. Bolt joists to supporting steel framework using high-strength structural bolts. Comply with Research Council on Structural Connection's "Specification for Structural Joints Using ASTM A 325 or ASTM A 490 Bolts" for high-strength structural bolt installation and tightening requirements.

F. Install and connect bridging concurrently with joist erection, before construction loads are applied. Anchor ends of bridging lines at top and bottom chords if terminating at walls or beams.

3.2 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to inspect field welds and bolted connections and to perform field tests and inspections and prepare test and inspection reports.

END OF SECTION 05 21 0

SECTION 05400- COLD FORMED METAL FRAMING

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

A. This Section includes all materials, labor, equipment and other items required to provide cold formed structural metal framing elements listed below as shown on the Drawings. Types of elements include:

1. Load bearing studs.
2. All accessories needed for the above.

B. Related Requirements:
1. Division 9 " Non-Loading Bearing Steel Framing" for Z channels at exterior walls

1. 2 REFERENCES

A. AISI - Specifications for the Design of Cold-Formed Steel Structural Members.

1.3 QUALIFICATIONS

A. Installer: Company specializing in performing the work of this Section with minimum three years documented experience.

PART 2 - PRODUCTS

2.1 FRAMING MATERIALS

A. Steel: For 18 gage and lighter comply with ASTM A653, Grade 33, 33,000 psi minimum yield point. For 16 gage and heavier comply with ASTM A653, Grade 50, 50,000 psi minimum yield point.

2.2 FASTENERS

A. Self-drilling, Self-tapping screws in accordance with ASTM A90 or AISI 1019 galvanized.

B. Welding shall be in accordance with AWS D1.3.

2.3 ACCESSORIES

A. Bracing, Furring, Bridging: Formed sheet steel thickness determined for conditions encountered, manufacturer's standard shapes and same finish as framing members.

2.4 FABRICATION

A. Fabricate assemblies of framed sections to sizes and profiles required with framing members fitted, reinforced, and braced to suit design requirements.
B. All members shall be fabricated to within + or - 1/8" of the required length.

2.5 FINISHES

A. All studs, tracks, bridging and accessories shall be galvanized to G90 coating class meeting ASTM A525 and ASTM C955.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that conditions are ready to receive work.

B. Verify that rough-in utilities are in proper location.

3.2 ERECTION

A. Align and secure top and bottom tracks with a minimum of one #10 screw in each flange of every stud. The maximum gap between either end of any stud and the top or bottom track shall be 1/16".

B. At track joints, pieces of track shall be securely anchored to a common structural element, or fully spliced together.

C. Where multiple studs are required at window jambs, door jambs, or the sides of other openings they shall be attached to each other sufficiently to work as a unit to resist all loads from the opening.

D. All headers, sills, etc. shall be properly connected and supported at their ends to allow all vertical and lateral loads to be transferred to the supporting elements.

E. Jack studs or cripples shall be installed below window sills, above window and door heads, and elsewhere at the same spacing as wall studs. They shall be securely attached to supporting members.

F. Fit track under and above openings.

G. Stud splicing is not permissible

H. Bridging for studs shall be attached in a manner to prevent stud rotation. Bridging rows shall be spaced as recommended by the manufacturer of the system.

I. Unless shown otherwise on the drawings bridging for joists or rafters shall be manufacturer's standard placed as follows:

Span	Number of Rows
Up to 14 ft.	1
14 to 20 ft.	2
20 to 26 ft.	3

J. Coordinate erection of studs with requirements of door and window frames; install supports and attachments.

K. Construct corners using a minimum of three studs.

L. Coordinate installation of wood bucks, anchors, and wood blocking with electrical and mechanical work to be placed within or behind stud framing.

M. Where galvanized surfaces or components are damaged, repair in accordance with ASTM A780.

N. All bearing wall studs shall be adequately braced at all times during construction to prevent lateral buckling prior to placement of wall board, sheetrock, sheathing, plywood or other permanent finish material.

3.3 ERECTION TOLERANCES

A. Maximum Variation From True Position: 1/8 inch.

B. Maximum Variation of any Member from Plane: 1/8 inch.

C. Maximum Variation from Plumb: 1/8 inch.

END OF SECTION 05 40 0

SECTION 05501 – ARCHITECTURAL METAL FABRICATIONS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Miscellaneous steel framing and supports.
2. Shelf angles.
3. Metal ladders.
4. Structural-steel door frames.
5. Miscellaneous steel trim including steel angle corner guards, steel edgings and chair railsMetal bollards.
6. Steel Framing and supports for mechanical and electrical equipment
7. Steel Framing and supports for countertops
8. Steel Framing and supports for overhead doors
9. Steel Framing and supports for applications where framing and supports are not specified in other sections
10. Elevator pit sump covers
11. Elevator machine room beams, hoist beams, and divider beams
12. Steel shapes for supporting elevator door sills
13. Steel Framing for low partitions
14. Downspout guards.
15.
16. Steel pipe columns supporting wood frame construction and leveling plates

B. Loose bearing and leveling platesProducts furnished, but not installed, under this Section:

1. Loose steel lintels.
2. Anchor bolts, steel pipe sleeves, slotted-channel inserts, and wedge-type inserts indicated to be cast into concrete or built into unit masonry.
3. Steel weld plates and angles for casting into concrete specified in other Sections

1.2 PERFORMANCE REQUIREMENTS

A. Delegated Design: Design ladders, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

B. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes acting on exterior metal fabrications by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects.

1.3 SUBMITTALS

A. Product Data: For the following:
1. Paint products.
2. Grout.

B. Shop Drawings: Show fabrication and installation details for metal fabrications.

1. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items.

C. Delegated-Design Submittal: For installed products indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

PART 2 - PRODUCTS

2.1 METALS, GENERAL

A. Metal Surfaces, General: Provide materials with smooth, flat surfaces without blemishes.

2.2 FERROUS METALS

A. Recycled Content of Steel Products: Provide products with average recycled content of steel products so postconsumer recycled content plus one-half of preconsumer recycled content is not less than 25 percent.

B. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.

C. Stainless-Steel Bars and Shapes: ASTM A 276, Type 316L.

D. Rolled-Steel Floor Plate: ASTM A 786/A 786M, rolled from plate complying with ASTM A 36/A 36M or ASTM A 283/A 283M, Grade C or D.

E. Rolled-Stainless-Steel Floor Plate: ASTM A 793.

F. Steel Tubing: ASTM A 500, cold-formed steel tubing.

G. Steel Pipe: ASTM A 53/A 53M, standard weight (Schedule 40) unless otherwise indicated.

H. Cast Iron: Either gray iron, ASTM A 48/A 48M, or malleable iron, ASTM A 47/A 47M.

2.3 FASTENERS

A. General: Unless otherwise indicated, provide Type 304 Type 316 stainless-steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B 633 or ASTM F 1941, Class Fe/Zn 5, at exterior walls.

B. Cast-in-Place Anchors in Concrete: Either threaded type or wedge type unless otherwise indicated; galvanized ferrous castings, either ASTM A 47/A 47M malleable iron or ASTM A 27/A 27M cast steel. Provide bolts, washers, and shims as needed, all hot-dip galvanized per ASTM F 2329.

C. Post-Installed Anchors: Torque-controlled expansion anchors .

1. Material for Interior Locations: Carbon-steel components zinc plated to comply with ASTM B 633 or ASTM F 1941, Class Fe/Zn 5, unless otherwise indicated.
2. Material for Exterior Locations and Where Stainless Steel is Indicated: Alloy Group 1 stainless-steel bolts, ASTM F 593, and nuts, ASTM F 594.

2.4 MISCELLANEOUS MATERIALS

A. Shop Primers: Provide primers that comply with Division 9 Section "High-Performance Coatings."

B. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.

C. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.

D. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107. Provide grout specifically recommended by manufacturer for interior and exterior applications.

E. Concrete: Comply with requirements in Division 3 Section "Cast-in-Place Concrete" for normal-weight, air-entrained, concrete with a minimum 28-day compressive strength of 3000 psi.

2.5 FABRICATION, GENERAL

A. Shop Assembly: Preassemble items in the shop to greatest extent possible. Use connections that maintain structural value of joined pieces.

B. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges. Remove sharp or rough areas on exposed surfaces.

C. Weld corners and seams continuously to comply with the following:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. At exposed connections, finish exposed welds and surfaces smooth and blended.

D. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners or welds where possible. Locate joints where least conspicuous.

E. Fabricate seams and other connections that will be exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.

F. Where units are indicated to be cast into concrete or built into masonry, equip with integrally welded steel strap anchors not less than 24 inches o.c.

G. Cut, reinforce, drill and tap metal fabrications as indicated to receive finish hardware, screws and similar items

2.6 MISCELLANEOUS FRAMING AND SUPPORTS

A. General: Provide steel framing and supports not specified in other Sections as needed to complete the Work.

B. Fabricate units from steel shapes, plates, and bars of welded construction unless otherwise indicated. Fabricate to sizes, shapes, and profiles indicated and as necessary to receive adjacent construction.

2.7 SHELF ANGLES

A. Fabricate shelf angles from steel angles of sizes indicated and for attachment to concrete framing. Provide horizontally slotted holes to receive 3/4-inch (19-mm) bolts, spaced not more than 6 inches (150 mm) from ends and 24 inches (600 mm) o.c., unless otherwise indicated.

B. For cavity walls, provide vertical channel brackets to support angles from backup masonry and concrete.

C. Galvanize shelf angles located in exterior walls.

D. Prime shelf angles located in exterior walls with [zinc-rich primer.] [primer specified in Division 9 Section "High-Performance Coatings."]

E. Furnish wedge-type concrete inserts, complete with fasteners, to attach shelf angles to cast-in-place concrete.

2.8 METAL LADDERS

A. General:

1. Comply with ANSI A14.3 unless otherwise indicated.
2. For equipment platforms & elevator pit ladders, comply with ASME A17.1.

B. Steel Ladders:

1. Space siderails as indicated apart unless otherwise indicated.
2. Siderails: Continuous, steel flat bars, with eased edges. Sizes as indicated.
3. Rungs: steel bars. Sizes as indicated.
4. Fit rungs in centerline of siderails; plug-weld and grind smooth on outer rail faces.
5. Provide nonslip abrasive surfaces on top of each rung.
6. Galvanize ladders, including brackets and fasteners.
7. Prime ladders, including brackets and fasteners, with primer specified in Division 9 Section "High-Performance Coatings."

2.9 STRUCTURAL-STEEL DOOR FRAMES

A. Fabricate structural-steel door frames from steel shapes fully welded together, with 5/8-by-1-1/2-inch (16-by-38-mm) steel channel stops. Plug-weld built-up members and continuously weld exposed joints. Reinforce frames and drill and tap as necessary to accept finish hardware.

1. Provide with integrally welded steel strap anchors for securing door frames into adjoining concrete or masonry.

B. Galvanize steel frames.

C. Prime steel frames with primer specified in Division 9 Section "High-Performance Coatings."

2.10 MISCELLANEOUS STEEL TRIM

A. Unless otherwise indicated, fabricate units from steel shapes, plates, and bars of profiles shown with continuously welded joints and smooth exposed edges. Miter corners and use concealed field splices where possible.

B. Provide cutouts, fittings, and anchorages as needed to coordinate assembly and installation with other work.

C. Galvanize miscellaneous steel trim.

D. Prime miscellaneous steel trim with primer specified in Division 9 Section "High-Performance Coatings."

2.11 PIPE BOLLARDS

A. Products: Subject to compliance with requirements, provide the following

B. Basis-of-Design Product: Subject to compliance with requirements, provide Blue Ember Technologies, LLC MaxiForce Bollards line of products Model MFRN-RS2-N5, Sykesville, MD 21784, Tel 410-552-9888, Fax 410-552-9939, Website: http://www.maxiforcebollards.com or comparable product by one of the following:

1. BRP Enterprises, Inc.
2. Canterbury International.
3. Creative Pipe, Inc.
4. Dero Bike Rack Co.
5. DuMor Inc.
6. FairWeather Site Furnishings; Division of Leader Manufacturing, Inc.
7. Huntco Supply, LLC.
8. Keystone Ridge Designs, Inc.
9. L. A. Steelcraft.

C. Bollard Construction:

1. Pipe OD: Not less than 5 inches. Free from surface blemishes and defects where exposed to view in the finished installation:

   a. Steel Plate: A36, ASTM A36/A36M
   b. Steel Tube: A500, ASTM A500
   c. Fasteners: Series 300 Stainless Steel

2. Round
3. Style: Dome top with removable head
4. Overall Height: As indicated on the drawings

5. Overall Width: 5 inches
6. Overall Depth: As indicated .
7. Base: none
8. Accessories: Bolt on style head (non welded)
9. Installation Method: direct ground mount, concrete filled

D. Finish: Factory applied after surface imperfections removed and exposed faces of welded joints dressed smooth

1. Color: Yellow

2. Galvanized and Powder Coat Finish: Hot Dipped galvanized and powder coated

E. Metal Components: Form to required shapes and sizes with true, consistent curves, lines, and angles. Separate metals from dissimilar materials to prevent electrolytic action.

F. Exposed Surfaces: Polished, sanded, or otherwise finished; all surfaces smooth, free of burrs, barbs, splinters, and sharpness; all edges and ends rolled, rounded, or capped.

G. Factory Assembly: Assemble components in the factory to greatest extent possible to minimize field assembly. Clearly mark units for assembly in the field.

2.12 ELEVATOR PIT SUMP COVERS

A. Fabricate from 3/16-inch abrasive-surface floor plate with four 1-inch diameter holes for water drainage

B. Provide steel angle supports as needed

2.13 DOWNSPOUT GUARDS

A. Fabricate downspout guards from 3/8-inch- (9.5-mm-) thick by 12-inch- (300-mm-) wide steel plate, bent to fit flat against the wall or column at both ends and to fit around downspout with 2-inch (50-mm) clearance between downspout and guard. Drill each end for two 3/4-inch (19-mm) anchor bolts.

B. Lead coated copper downspout guards.

C. Prime downspout guards with primer specified in Section 09960 "High-Performance Coatings."

2.14 METAL DOWNSPOUT BOOTS

A. Provide downspout boots made from cast iron in heights indicated with inlets of size and shape to suit downspouts. Provide units with flanges and holes for countersunk anchor bolts.

1. Outlet: Vertical, to discharge into pipe and to subsurface drainage

B. Prime cast iron downspout boots with primer specified in Section 09960 "High-Performance Coatings."

C. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   1. J.R. Hoe & Sons, Inc.
   2. Neenah Foundry Company

2.15 STEEL WELD PLATES & ANGLES

A. Provide steel weld plates and angles not specified in other sections for items supported from concrete construction as needed to complete the work. Provide each unit with no fewer than two integrally welded steel strap anchors for embedding in concrete.

2.16 ABRASIVE METAL NOSINGS, TREADS, AND THRESHOLDS

A. Cast-Metal Units: nickel silver (leaded nickel bronze), with an integral-abrasive, as-cast finish.

   1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

      a. American Safety Tread Co., Inc.
      b. Balco Inc.
      c. Wooster Products Inc.

B. Extruded Units: Aluminumwith abrasive filler in an epoxy-resin binder.

   1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

      a. ACL Industries, Inc.
      b. American Safety Tread Co., Inc.
      c. Balco Inc.
      d. Wooster Products Inc.

   2. Provide ribbed units, with abrasive filler strips projecting 1/16 inch (1.5 mm) above aluminum extrusion.
   3. Provide solid-abrasive-type units without ribs.

C. Provide anchors for embedding units in concrete, either integral or applied to units, as standard with manufacturer.

D. Drill for mechanical anchors and countersink. Locate holes not more than 4 inches (100 mm) from ends and not more than 12 inches (300 mm) o.c.

E. Apply bituminous paint to concealed surfaces of cast-metal units.

F. Apply clear lacquer to concealed surfaces of extruded units.

2.17 LOOSE BEARING AND LEVELING PLATES

A. Provide loose bearing and leveling plates for steel items bearing on masonry or concrete construction. Drill plates to receive anchor bolts and for grouting.

2.18 LOOSE STEEL LINTELS

A. Fabricate loose steel lintels from steel angles and shapes of size indicated for openings and recesses in masonry walls and partitions at locations indicated.

B. Galvanize loose steel lintels located in exterior walls.

C. Prime loose steel lintels located in exterior walls with [zinc-rich primer.] [primer specified in Division 9 Section "High-Performance Coatings."]

2.19 STEEL WELD PLATES AND ANGLES

A. Provide steel weld plates and angles not specified in other Sections, for items supported from concrete construction as needed to complete the Work. Provide each unit with no fewer than two integrally welded steel strap anchors for embedding in concrete.

2.20 FINISHES, GENERAL

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Finish metal fabrications after assembly.

2.21 INSTALLING MISCELLANEOUS FRAMING AND SUPPORTS

A. General: Install framing and supports to comply with requirements of items being supported, including manufacturer’s written instructions and requirements indicated on shop drawings

B. Install pipe columns on concrete footings with grouted baseplates. Position and grout column baseplates as specified in “Installing Bearing and Leveling Plates” article.

2.22 STEEL AND IRON FINISHES

A. Galvanizing: Hot-dip galvanize items as indicated to comply with ASTM A 153/A 153M for steel and iron hardware and with ASTM A 123/A 123M for other steel and iron products.

B. Shop prime iron and steel items unless they are to be embedded in concrete, sprayed-on fireproofing, or masonry, or unless otherwise indicated.

1. Shop prime with universal shop primer unless primers specified in Division 9 Section "High-Performance Coatings" are indicated.

C. Preparation for Shop Priming: Prepare surfaces to comply with SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal fabrications. Set metal fabrications accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.

B. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.

C. Field Welding: Comply with the following requirements:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. At exposed connections, finish exposed welds and surfaces smooth and blended.

D. Fastening to In-Place Construction: Provide anchorage devices and fasteners where metal fabrications are required to be fastened to in-place construction.

E. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.

3.2 INSTALLING NOSING, TREADS, AND THRESHOLDS

A. Center nosings on tread widths unless otherwise indicated

B. For nosings embedded in concrete steps or curbs, align nosings flush with riser faces and level with tread surfaces

C. Seal thresholds exposed to exterior wall with elastomeric sealant complying with Section 07920 “Joint Sealants” to provide watertight installation

3.3 INSTALLING METAL BOLLARDS

A. Anchor bollards in concrete with pipe sleeves preset and anchored into concrete . Fill annular space around bollard solidly with nonshrink, nonmetallic grout.

B. Fill bollards solidly with concrete, mounding top surface to shed water.

3.4 INSTALLING BEARING AND LEVELING PLATES

A. Clean concrete and masonry bearing surfaces of bond-reducing materials, and roughen to improve bond to surfaces. Clean bottom surface of plates.

B. Set bearing and leveling plates on wedges, shims, or leveling nuts. After bearing members have been positioned and plumbed, tighten anchor bolts. Do not remove wedges or shims but, if protruding, cut off flush with edge of bearing plate before packing with grout.

C. Pack grout solidly between bearing surfaces and plates to ensure that no voids remain.

3.5 ADJUSTING AND CLEANING

A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas. Paint uncoated and abraded areas with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.

B. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780.

END OF SECTION 05500

SECTION 05511 - METAL STAIRS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Preassembled galvanized steel stairs with concrete-filled treads (Stair 2).
2. Monumental Stairs (Stair 1).
3. Steel tube railings attached to metal stairs.
4. Steel tube handrails attached to walls adjacent to metal stairs.

B. Related Sections:

1. Division 3 Section "Cast-in-Place Concrete" for concrete fill for stair treads and platforms.
2. Division 5 Section "Pipe and Tube Railings" for pipe and tube railings.
3. Division 9 Section "High Performance Coatings" for final finish of galvanized metal stairs.

1.3 PERFORMANCE REQUIREMENTS

A. Delegated Design: Design metal stairs, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

B. Structural Performance of Stairs: Metal stairs shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated.

1. Uniform Load: 100 lbf/sq. ft..
2. Concentrated Load: 300 lbf applied on an area of 4 sq. in..
3. Uniform and concentrated loads need not be assumed to act concurrently.
4. Stair Framing: Capable of withstanding stresses resulting from railing loads in addition to loads specified above.
5. Limit deflection of treads, platforms, and framing members to L/240 or 1/4 inch, whichever is less

C. Monumental Stairs:

1. General: In engineering monumental stair case to withstand structural loads indicated, determine allowable design stresses of materials based on the following:
   a. Hot formed structural steel: AISI “Specification for design of hot-formed steel structural members”
2. Structural performance of stairs: Design, engineer, fabricate and install monumental staircase to comply with NAAMM recommended live load of 100 pounds per square foot or alternatively 300 pound minimum concentrated load.
3. Structural performance of building: Provide engineering calculations of top and bottom moment connections to enable “Builder Engineer to properly design structural reinforcement for building to carry loads of monumental staircase structure.

D. Structural Performance of Railings: Railings shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated.

1. Handrails and Top Rails of Guards:

   a. Uniform load of 50 lbf/ ft. applied in any direction.
   b. Concentrated load of 200 lbf applied in any direction.
   c. Uniform and concentrated loads need not be assumed to act concurrently.

2. Infill of Guards:

   a. Concentrated load of 50 lbf applied horizontally on an area of 1 sq. ft..
   b. Infill load and other loads need not be assumed to act concurrently.

1.4 SUBMITTALS

A. Product Data: For metal stairs and the following:

1. Prefilled metal-pan stair treads.
2. Nonslip aggregates and nonslip-aggregate finishes.
3. Abrasive nosings.
4. Grout.

B. Shop Drawings (General): Include plans, elevations, sections, details, and attachments to other work.
   1. Monumental Stairs:
      a. Include setting drawings and directions for installation of anchor bolts and other anchorages to be installed to support stair structure.
      b. Include structural analysis data sealed and signed by the qualified professional engineer who was responsible for their preparation.

C. Samples for Initial Selection: For products involving selection of color, texture, or design.

D. Monumental Stairs: Samples for verification of each profile and pattern of fabricated metal and each type of metal finish required, prepared on metal of same thickness and alloy indicated for final unit of work.

E. Delegated-Design Submittal: For installed products indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

F. Qualification Data: For qualified professional engineer .

G. Welding certificates.

H. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers certifying that shop primers are compatible with topcoats.

I. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for stairs and railings.

1. Test railings according ASTM E 894 and ASTM E 935.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Fabricator of products.

B. NAAMM Stair Standard: Comply with "Recommended Voluntary Minimum Standards for Fixed Metal Stairs" in NAAMM AMP 510, "Metal Stairs Manual," for class of stair designated, unless more stringent requirements are indicated.

1. Preassembled Stairs: Commercial class.

C. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

D. Welding Qualifications: Qualify procedures and personnel according to the following:

1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
2. AWS D1.2 “Structural Welding Code – Aluminum”

E. Pre-installation Conference: Conduct conference at job site.
1. AWS D1.3, "Structural Welding Code - Sheet Steel."

1.6 COORDINATION

A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.

B. Coordinate installation of anchorages for metal stairs. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

C. Coordinate locations of hanger rods and struts with other work so that they will not encroach on required stair width and will be within the fire-resistance-rated stair enclosure.

1.7 PROJECT CONDITIONS

A. Field measurements: Where monumental staircase is indicated to fit other construction, check actual dimensions of other construction by accurate field measurement before fabrication; show recorded measurements on final shop drawings. Coordinate fabrication schedule with construction progress to avoid delaying the work

PART 2 - PRODUCTS

2.1 METALS, GENERAL

A. Metal Surfaces, General: Provide materials with smooth, flat surfaces unless otherwise indicated. For components exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.

2.2 FERROUS METALS

A. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.

B. Steel Tubing: ASTM A 500 (cold formed) or ASTM A 513.

C. Rolled-Steel Floor Plate: ASTM A 786/A 786M, rolled from plate complying with ASTM A 36/A 36M or ASTM A 283/A 283M, Grade C or D.

D. Galvanized-Steel Sheet: ASTM A 653/A 653M, G90 coating, structural steel, Grade 33, unless another grade is required by design loads.

2.3 NONFERROUS METALS

A. Aluminum Extrusions: ASTM B 221, Alloy 6063-T6.

B. Aluminum Castings: ASTM B 26/B 26M, Alloy 443.0-F.

2.4 ABRASIVE NOSINGS

A. Cast-Metal Units: Cast nickel silver, with an integral abrasive, as-cast finish consisting of aluminum oxide, silicon carbide, or a combination of both. Fabricate units in lengths necessary to accurately fit openings or conditions.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. American Safety Tread Co., Inc.
b. Balco Inc.
c. Barry Pattern & Foundry Co., Inc.
d. Granite State Casting Co.
e. Safe-T-Metal Company, Inc.
f. Wooster Products Inc.

2. Configuration: Cross-hatched units, 3 inches wide without lip.

B. Provide anchors for embedding units in concrete, either integral or applied to units, as standard with manufacturer.

C. Apply bituminous paint to concealed surfaces of cast-metal units set into concrete.

2.5 FASTENERS

A. General: Provide zinc-plated fasteners with coating complying with ASTM B 633 or ASTM F 1941, Class Fe/Zn 12 for exterior use, and Class Fe/Zn 5 where built into exterior walls. Select fasteners for type, grade, and class required.

B. Bolts and Nuts: Regular hexagon-head bolts, ASTM A 307, Grade A; with hex nuts, ASTM A 563; and, where indicated, flat washers.

C. Anchor Bolts: ASTM F 1554, Grade 36, of dimensions indicated; with nuts, ASTM A 563; and, where indicated, flat washers.

1. Provide mechanically deposited or hot-dip, zinc-coated anchor bolts.

D. Machine Screws: ASME B18.6.3.

E. Lag Screws: ASME B18.2.1.

F. Plain Washers: Round, ASME B18.22.1.

G. Lock Washers: Helical, spring type, ASME B18.21.1.

H. Post-Installed Anchors: Torque-controlled expansion anchors or chemical anchors capable of sustaining, without failure, a load equal to six times the load imposed when

installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing according to ASTM E 488, conducted by a qualified independent testing agency.

1. Material : Alloy Group 2 stainless-steel bolts, ASTM F 593, and nuts, ASTM F 594.

2.6 MISCELLANEOUS MATERIALS

A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.

B. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.

C. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107. Provide grout specifically recommended by manufacturer for interior and exterior applications.

D. Concrete Materials and Properties: Comply with requirements in Division 3 Section "Cast-in-Place Concrete" for normal-weight, air-entrained, ready-mix concrete with a minimum 28-day compressive strength of 3000 psi unless otherwise indicated.

E. Nonslip-Aggregate Concrete Finish: Factory-packaged abrasive aggregate made from fused, aluminum-oxide grits or crushed emery; rustproof and nonglazing; unaffected by freezing, moisture, or cleaning materials.

F. Welded Wire Fabric: ASTM A 185/A 185M, 6 by 6 inches, W1.4 by W1.4, unless otherwise indicated.

2.7 FABRICATION, GENERAL

A. Provide complete stair assemblies, including metal framing, hangers, struts, railings, clips, brackets, bearing plates, and other components necessary to support and anchor stairs and platforms on supporting structure.

1. Join components by welding unless otherwise indicated.
2. Use connections that maintain structural value of joined pieces.
3. Fabricate treads and platforms of exterior stairs so finished walking surfaces slope to drain.

B. Preassembled Stairs: Assemble stairs in shop to greatest extent possible. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation.

C. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.

D. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.

E. Form exposed work with accurate angles and surfaces and straight edges.

F. Weld connections to comply with the following:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. Weld exposed corners and seams continuously unless otherwise indicated.
5. At exposed connections, finish exposed welds to comply with NOMMA's "Voluntary Joint Finish Standards" for Type 2 welds: completely sanded joint, some undercutting and pinholes okay .

G. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners where possible. Where exposed fasteners are required, use Phillips flat-head (countersunk) screws or bolts unless otherwise indicated. Locate joints where least conspicuous.

H. Fabricate joints that will be exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.

I. Monumental Stairs
   a. Form structural members and stair pans to require shapes and size, with true curves, lines, and angles. Provide components in sizes and profiles indicated, but not less than required to comply with requirements indicated for structural performance.
   b. Provide necessary lugs and brackets to assemble units and to attach to other work.
   c. Comply with AWS for recommended practices in shop and field welding.
   d. Assemble items in shop to the greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for assembly and coordinate installation. Use connections and connecting welds that maintain structural value of joined pieces.

2.8 STEEL-FRAMED STAIRS (Stair 2)

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Lapeyre Stair.
2. Alfab, Inc.
3. American Stair, Inc.
4. Sharon Companies Ltd. (The).

B. Stair Framing:

1. Fabricate stringers of steel plates or channels .

   a. Provide closures for exposed ends of channel stringers.

2. Construct platforms of steel plate or channel headers and miscellaneous framing members as needed to comply with performance requirements .
3. Weld stringers to headers; weld framing members to stringers and headers.
4. Where stairs are enclosed by gypsum board shaft-wall assemblies, provide hanger rods or struts to support landings from floor construction above or below. Locate hanger rods and struts where they will not encroach on required stair width and will be within the fire-resistance-rated stair enclosure.
5. Where masonry walls support metal stairs, provide temporary supporting struts designed for erecting steel stair components before installing masonry.

C. Metal-Pan Stairs: Form risers, subtread pans, and subplatforms to configurations shown from steel sheet of thickness needed to comply with performance requirements but not less than 0.067 inch .
1. Steel Sheet: Galvanized-steel sheet.
2. Directly weld metal pans to stringers; locate welds on top of subtreads where they will be concealed by concrete fill. Do not weld risers to stringers.
3. Attach risers and subtreads to stringers with brackets made of steel angles or bars. Weld brackets to stringers and attach metal pans to brackets by welding, riveting, or bolting.
4. Shape metal pans to include nosing integral with riser.
5. Attach abrasive nosings to risers.
6. At Contractor's option, provide stair assemblies with metal-pan subtreads filled with reinforced concrete during fabrication.

   Smooth Soffit Construction: Construct subplatforms with flat metal under surfaces to produce smooth soffits.

2.9 MONUMENTAL STAIRS (Stair 1)

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the work include, but are not limited to the following:
1. Big D Metalworks of Texas
2. Couturier Iron Craft

2.10 STAIR RAILINGS

A. Comply with applicable requirements in Division 5 Section "Pipe and Tube Railings ."

1. Fabricate newels of square steel tubing and provide newel caps of pressed steel , as shown.

2. Rails may be bent at corners, rail returns, and wall returns, instead of using prefabricated fittings.
3. Connect posts to stair framing by direct welding unless otherwise indicated.

B. Welded Connections: Fabricate railings with welded connections. Cope components at connections to provide close fit, or use fittings designed for this purpose. Weld all around at connections, including at fittings.

1. Finish welds to comply with NOMMA's "Voluntary Joint Finish Standards" for Type 2 welds: completely sanded joint, some undercutting and pinholes okay .

C. Form changes in direction of railings as follows:
1. By radius bends of radius indicated.

D. Form simple and compound curves by bending members in jigs to produce uniform curvature for each repetitive configuration required; maintain cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of components.

E. Close exposed ends of railing members with prefabricated end fittings.

F. Provide wall returns at ends of wall-mounted handrails unless otherwise indicated. Close ends of returns unless clearance between end of rail and wall is 1/4 inch or less.

G. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, end closures, flanges, miscellaneous fittings, and anchors for interconnecting components and for attaching to other work. Furnish inserts and other anchorage devices for connecting to concrete or masonry work.

1. Connect posts to stair framing by direct welding unless otherwise indicated.
2. For galvanized railings, provide galvanized fittings, brackets, fasteners, sleeves, and other ferrous-metal components.

H. Fillers: Provide fillers made from steel plate, or other suitably crush-resistant material, where needed to transfer wall bracket loads through wall finishes to structural supports. Size fillers to suit wall finish thicknesses and to produce adequate bearing area to prevent bracket rotation and overstressing of substrate.

2.11 FINISHES

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Finish metal stairs after assembly.

C. Galvanizing: Hot-dip galvanize to comply with ASTM A 153/A 153M for steel and iron hardware and with ASTM A 123/A 123M for other steel and iron products.

1. Do not quench or apply post galvanizing treatments that might interfere with paint adhesion.
2. Fill vent and drain holes that will be exposed in finished Work, unless indicated to remain as weep holes, by plugging with zinc solder and filing off smooth.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing metal stairs to in-place construction. Include threaded fasteners for concrete and masonry inserts, through-bolts, lag bolts, and other connectors.

B. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal stairs. Set units accurately in location, alignment, and elevation, measured from established lines and levels and free of rack.

C. Install metal stairs by welding stair framing to steel structure or to weld plates cast into concrete unless otherwise indicated.

D. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.

E. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.

F. Field Welding: Comply with requirements for welding in "Fabrication, General" Article.

G. Place and finish concrete fill for treads and platforms to comply with Division 3 Section "Cast-in-Place Concrete."

1. Install abrasive nosings with anchors fully embedded in concrete. Center nosings on tread width.

H. Install precast concrete treads with adhesive supplied by manufacturer.

3.2 INSTALLING METAL STAIRS WITH GROUTED BASEPLATES

A. Clean concrete and masonry bearing surfaces of bond-reducing materials, and roughen to improve bond to surfaces. Clean bottom surface of baseplates.

B. Set steel stair baseplates on wedges, shims, or leveling nuts. After stairs have been positioned and aligned, tighten anchor bolts. Do not remove wedges or shims but, if protruding, cut off flush with edge of bearing plate before packing with grout.

1. Use nonmetallic, nonshrink grout unless otherwise indicated.
2. Pack grout solidly between bearing surfaces and plates to ensure that no voids remain.

3.3 INSTALLING RAILINGS

A. Adjust railing systems before anchoring to ensure matching alignment at abutting joints. Space posts at spacing indicated or, if not indicated, as required by design loads. Plumb posts in each direction. Secure posts and rail ends to building construction as follows:

1. Anchor posts to steel by welding directly to steel supporting members.
2. Anchor handrail ends to concrete and masonry with steel round flanges welded to rail ends and anchored with postinstalled anchors and bolts.

B. Attach handrails to wall with wall brackets. Use type of bracket with flange tapped for concealed anchorage to threaded hanger bolt . Provide bracket with 1-1/2-inch clearance from inside face of handrail and finished wall surface. Locate brackets as indicated or, if not indicated, at spacing required to support structural loads. Secure wall brackets to building construction as required to comply with performance requirements.

3.4 ADJUSTING AND CLEANING

A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.

1. Apply by brush or spray to provide a minimum 2.0-mil dry film thickness.

B. Touchup Painting: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint are specified in Division 9 painting Sections and Division 9 Section "High-Performance Coatings."

C. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780.

END OF SECTION 05511

SECTION 05521 - PIPE AND TUBE RAILINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Steel pipe and tube railings.
2. Aluminum pipe and tube railings at exterior stairs and ramps
3. Stainless-steel pipe and tube railings at Stair 1

1.3 PERFORMANCE REQUIREMENTS

A. General: In engineering railings to withstand structural loads indicated, determine allowable design working stresses of railing materials based on the following:

1. Steel: 72 percent of minimum yield strength.

B. Structural Performance: Railings shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:

1. Handrails and Top Rails of Guards:

a. Uniform load of 50 lbf/ ft. (0.73 kN/m) applied in any direction.
b. Concentrated load of 200 lbf (0.89 kN) applied in any direction.
c. Uniform and concentrated loads need not be assumed to act concurrently.

2. Infill of Guards:

a. Concentrated load of 50 lbf (0.22 kN) applied horizontally on an area of 1 sq. ft. (0.093 sq. m).
b. Infill load and other loads need not be assumed to act concurrently.

C. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes acting on exterior metal fabrications by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects.

1. Temperature Change: 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

D. Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.

1.4 ACTION SUBMITTALS

A. Product Data: For the following:

1. Manufacturer's product lines of mechanically connected railings.
2. Railing brackets.
3. Grout, anchoring cement, and paint products.

B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.

C. Samples for Initial Selection: For products involving selection of color, texture, or design**,** .

D. Samples for Verification: For each type of exposed finish required.

1. Sections of each distinctly different linear railing member, including handrails, top rails, posts, and balusters.
2. Fittings and brackets.
3. Architectural mesh section.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified professional engineer.

B. Welding certificates.

C. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers certifying that shop primers are compatible with topcoats.

D. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, according to ASTM E 894 and ASTM E 935.

1.6 QUALITY ASSURANCE

A. Source Limitations: Obtain each type of railing from single source from single manufacturer.

B. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

C. Welding Qualifications: Qualify procedures and personnel according to the following:

1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
2. AWS D1.2/D1.2M, "Structural Welding Code - Aluminum."
3. AWS D1.6, "Structural Welding Code - Stainless Steel."

1.7 PROJECT CONDITIONS

A. Field Measurements: Verify actual locations of walls and other construction contiguous with metal fabrications by field measurements before fabrication.

1.8 COORDINATION AND SCHEDULING

A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.

B. Coordinate installation of anchorages for railings. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

C. Schedule installation so wall attachments are made only to completed walls. Do not support railings temporarily by any means that do not satisfy structural performance requirements.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Steel Pipe and Tube Railings:

   a. Pisor Industries, Inc.
   b. Wagner, R & B, Inc.; a division of the Wagner Companies.
   c. HDI.

2. Aluminum Pipe and Tube Railings:

   a. ATR Technologies, Inc.
   b. Hollaender Manufacturing Company.
   c. Tri Tech, Inc.

3. Aluminum Mesh:
   a. McNichols Co.
   b. Viva Railing Systems

4. Stainless-Steel Pipe and Tube Railings:

   a. Blum, Julius & Co., Inc.
   b. HDI

c. Stainless Fabricators, Inc.
d. Wagner, R & B, Inc.; a division of the Wagner Companies.
e. Tri Tech, Inc.

2.2 METALS, GENERAL

A. Metal Surfaces, General: Provide materials with smooth surfaces, without seam marks, roller marks, rolled trade names, stains, discolorations, or blemishes.

B. Brackets, Flanges, and Anchors: Cast or formed metal of same type of material and finish as supported rails unless otherwise indicated.

2.3 STEEL AND IRON

A. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.

B. Tubing: ASTM A 500 (cold formed) .

C. Pipe: ASTM A 53/A 53M, Type F or Type S, Grade A, Standard Weight (Schedule 40), unless another grade and weight are required by structural loads.

D. Plates, Shapes, and Bars: ASTM A 36/A 36M.

E. Expanded Metal: ASTM F 1267, Type II (expanded and flattened), Class 1 (uncoated).

1. Style Designation: 3/4 number 13 .

2.4 ALUMINUM

A. Aluminum, General: Provide alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated, and with not less than the strength and durability properties of alloy and temper designated below for each aluminum form required.

B. Extruded Bars and Tubing: ASTM B 221 (ASTM B 221M), Alloy 6063-T5/T52.

C. Plate and Sheet: ASTM B 209 (ASTM B 209M), Alloy 6061-T6.

D. Die and Hand Forgings: ASTM B 247 (ASTM B 247M), Alloy 6061-T6.

E. Castings: ASTM B 26/B 26M, Alloy A356.0-T6.

F. Woven-Wire Mesh: Intermediate-crimp, square pattern, 2-inch (50-mm) woven-wire mesh, made from 0.162-inch (4.1-mm) nominal diameter wire complying with ASTM B 211 (ASTM B 211M), Alloy 6061-T94.

2.5 STAINLESS STEEL

A. Tubing: ASTM A 554, **Grade MT 316L**

B. Pipe: ASTM A 312/A 312M, **Grade TP 316L**.

C. Castings: ASTM A 743/A 743M, [**Grade CF 8 or CF 20**] [**Grade CF 8M or CF 3M**].

D. Plate and Sheet: ASTM A 240/A 240M or ASTM A 666, **Type 316L**.

2.6 FASTENERS

A. General: Provide the following:

1. Ungalvanized-Steel Railings: Plated steel fasteners complying with ASTM B 633 or ASTM F 1941 (ASTM F 1941M), Class Fe/Zn 5 for zinc coating.
2. Hot-Dip Galvanized Railings: Type 304 stainless-steel or hot-dip zinc-coated steel fasteners complying with ASTM A 153/A 153M or ASTM F 2329 for zinc coating.
3. Aluminum Railings: Type 316 stainless-steel fasteners.
4. Stainless-Steel Railings: Type 316 stainless-steel fasteners.

B. Fasteners for Anchoring Railings to Other Construction: Select fasteners of type, grade, and class required to produce connections suitable for anchoring railings to other types of construction indicated and capable of withstanding design loads.

C. Fasteners for Interconnecting Railing Components:

1. Provide concealed fasteners for interconnecting railing components and for attaching them to other work, unless otherwise indicated.
2. Provide tamper-resistant flat-head machine screws for exposed fasteners unless otherwise indicated.

D. Post-Installed Anchors: Torque-controlled expansion anchors capable of sustaining, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing according to ASTM E 488, conducted by a qualified independent testing agency.
1. Material for Exterior Locations and Where Stainless Steel is Indicated: Alloy Group 1 (A1) stainless-steel bolts, ASTM F 593 (ASTM F 738M), and nuts, ASTM F 594 (ASTM F 836M).

2.7 MISCELLANEOUS MATERIALS

A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.

1. For aluminum and stainless-steel railings, provide type and alloy as recommended by producer of metal to be welded and as required for color match, strength, and compatibility in fabricated items.

B.

C. Universal Shop Primer: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI#79 and compatible with topcoat.

1. Use primer containing pigments that make it easily distinguishable from zinc-rich primer.

D. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107. Provide grout specifically recommended by manufacturer for interior and exterior applications.

E. Anchoring Cement: Factory-packaged, nonshrink, nonstaining, hydraulic-controlled expansion cement formulation for mixing with water at Project site to create pourable anchoring, patching, and grouting compound.

1. Water-Resistant Product: At exterior locations provide formulation that is resistant to erosion from water exposure without needing protection by a sealer or waterproof coating and that is recommended by manufacturer for exterior use.

2.8 FABRICATION

A. General: Fabricate railings to comply with requirements indicated for design, dimensions, member sizes and spacing, details, finish, and anchorage, but not less than that required to support structural loads.

B. Assemble railings in the shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation. Use connections that maintain structural value of joined pieces.

C. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch (1 mm) unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.

D. Form work true to line and level with accurate angles and surfaces.

E. Fabricate connections that will be exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.

F. Cut, reinforce, drill, and tap as indicated to receive finish hardware, screws, and similar items.

G. Connections: Fabricate railings with welded connections unless otherwise indicated.

H. Welded Connections: Cope components at connections to provide close fit, or use fittings designed for this purpose. Weld all around at connections, including at fittings.

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove flux immediately.
4. At exposed connections, finish exposed surfaces smooth and blended so no roughness shows after finishing and welded surface matches contours of adjoining surfaces.

I. Welded Connections for Aluminum Pipe: Fabricate railings to interconnect members with concealed internal welds that eliminate surface grinding, using manufacturer's standard system of sleeve and socket fittings.

J. Nonwelded Connections: Connect members with concealed mechanical fasteners and fittings. Fabricate members and fittings to produce flush, smooth, rigid, hairline joints.

1. Fabricate splice joints for field connection using an epoxy structural adhesive if this is manufacturer's standard splicing method.

K. Form changes in direction as follows:

1. As detailed.

L. Bend members in jigs to produce uniform curvature for each configuration required; maintain cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of components.

M. Close exposed ends of railing members with prefabricated end fittings.

N. Provide wall returns at ends of wall-mounted handrails unless otherwise indicated. Close ends of returns unless clearance between end of rail and wall is 1/4 inch (6 mm) or less.

O. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, flanges, miscellaneous fittings, and anchors to interconnect railing members to other work unless otherwise indicated.

1. At brackets and fittings fastened to plaster or gypsum board partitions, provide crush-resistant fillers, or other means to transfer loads through wall finishes to structural supports and prevent bracket or fitting rotation and crushing of substrate.

P. Provide inserts and other anchorage devices for connecting railings to concrete or masonry work. Fabricate anchorage devices capable of withstanding loads imposed by railings. Coordinate anchorage devices with supporting structure.

Q. For railing posts set in concrete, provide steel sleeves not less than 6 inches (150 mm) long with inside dimensions not less than 1/2 inch (13 mm) greater than outside dimensions of post, with metal plate forming bottom closure.

R. Woven-Wire Mesh Infill Panels: Fabricate infill panels from woven-wire mesh crimped into 1-by-1/2-by-1/8-inch (25-by-13-by-3-mm) metal channel frames. Make wire mesh and frames from same metal as railings in which they are installed.

1. Orient wire mesh with wires perpendicular and parallel to top rail.

2.9 FINISHES, GENERAL

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

C. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

D. Provide exposed fasteners with finish matching appearance, including color and texture, of railings.

2.10 STEEL AND IRON FINISHES

A. Galvanized Railings:

1. Hot-dip galvanize exterior steel and iron railings, including hardware, after fabrication.
2. Hot-dip galvanize indicated steel and iron railings, including hardware, after fabrication.
3. Comply with ASTM A 123/A 123M for hot-dip galvanized railings.
4. Comply with ASTM A 153/A 153M for hot-dip galvanized hardware.
5. Do not quench or apply post galvanizing treatments that might interfere with paint adhesion.
6. Fill vent and drain holes that will be exposed in the finished Work, unless indicated to remain as weep holes, by plugging with zinc solder and filing off smooth.

B. For galvanized railings, provide hot-dip galvanized fittings, brackets, fasteners, sleeves, and other ferrous components.

C. Preparing Galvanized Railings for Shop Priming: After galvanizing, thoroughly clean railings of grease, dirt, oil, flux, and other foreign matter, and treat with etching cleaner.

D. Primer Application: Apply shop primer to prepared surfaces of railings unless otherwise indicated. Comply with requirements in SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting. Primer need not be applied to surfaces to be embedded in concrete or masonry.

1. Shop prime uncoated railings with universal shop primer unless indicated.
2. Do not apply primer to galvanized surfaces.

E. Shop-Painted Finish: Comply with Section 09911 "Exterior Painting." Section 09960 "High-Performance Coatings."

1. Color: As selected by Architect from manufacturer's full range.

2.11 ALUMINUM FINISHES

A. Mechanical Finish: AA-M12 (Mechanical Finish: nonspecular as fabricated).

B. Clear Anodic Finish: AAMA 611, AA-M12C22A41, Class I, 0.018 mm or thicker.

2.12 STAINLESS-STEEL FINISHES

A. Remove tool and die marks and stretch lines, or blend into finish.

B. Grind and polish surfaces to produce uniform, directionally textured, polished finish indicated, free of cross scratches. Run grain with long dimension of each piece.

C. 180-Grit Polished Finish: Oil-ground, uniform, directionally textured finish.

D. 320-Grit Polished Finish: Oil-ground, uniform, fine, directionally textured finish.

E. Polished and Buffed Finish: Oil-ground, 180-grit finish followed by buffing.

F. Directional Satin Finish: No. 4.

G. Dull Satin Finish: No. 6.

H. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine plaster and gypsum board assemblies, where reinforced to receive anchors, to verify that locations of concealed reinforcements have been clearly marked for Installer. Locate reinforcements and mark locations if not already done.

3.2 INSTALLATION, GENERAL

A. Fit exposed connections together to form tight, hairline joints.

B. Perform cutting, drilling, and fitting required for installing railings. Set railings accurately in location, alignment, and elevation; measured from established lines and levels and free of rack.

1. Do not weld, cut, or abrade surfaces of railing components that have been coated or finished after fabrication and that are intended for field connection by mechanical or other means without further cutting or fitting.
2. Set posts plumb within a tolerance of 1/16 inch in 3 feet (2 mm in 1 m).
3. Align rails so variations from level for horizontal members and variations from parallel with rake of steps and ramps for sloping members do not exceed 1/4 inch in 12 feet (5 mm in 3 m).

C. Corrosion Protection: Coat concealed surfaces of aluminum that will be in contact with grout, concrete, masonry, wood, or dissimilar metals, with a heavy coat of bituminous paint.

D. Adjust railings before anchoring to ensure matching alignment at abutting joints.

E. Fastening to In-Place Construction: Use anchorage devices and fasteners where necessary for securing railings and for properly transferring loads to in-place construction.

3.3 RAILING CONNECTIONS

A. Welded Connections: Use fully welded joints for permanently connecting railing components. Comply with requirements for welded connections in "Fabrication" Article whether welding is performed in the shop or in the field.

3.4 ANCHORING POSTS

A. Use metal sleeves preset and anchored into concrete for installing posts. After posts have been inserted into sleeves, fill annular space between post and sleeve with nonshrink, nonmetallic grout or anchoring cement, mixed and placed to comply with anchoring material manufacturer's written instructions.

B. Cover anchorage joint with flange of same metal as post, welded to post after placing anchoring material.

C. Anchor posts to metal surfaces with oval flanges, angle type, or floor type as required by conditions, connected to posts and to metal supporting members as follows:

1. For aluminum pipe railings, attach posts using fittings designed and engineered for this purpose.
2. For stainless-steel pipe railings, weld flanges to post and bolt to supporting surfaces.

3.5 ATTACHING RAILINGS

A. Attach railings to wall with wall brackets. Provide brackets with clearance from inside face of handrail and finished wall surface. Distance from wall to handrail to be determined by architect. Locate brackets as indicated or, if not indicated, at spacing required to support structural loads.

1. Use type of bracket with flange tapped for concealed anchorage to threaded hanger bolt.

2. For concrete and solid masonry anchorage, use drilled-in expansion shields and hanger or lag bolts.
3. For hollow masonry anchorage, use toggle bolts.

3.6 ADJUSTING AND CLEANING

A. Clean aluminum and stainless steel by washing thoroughly with clean water and soap and rinsing with clean water.

B. Touchup Painting: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint are specified in Section 09911 "Exterior Painting" and Section 09912 "Interior Painting."

3.7 PROTECTION

A. Protect finishes of railings from damage during construction period with temporary protective coverings approved by railing manufacturer. Remove protective coverings at time of Substantial Completion.

END OF SECTION 05521

SECTION 05530 - METAL GRATINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Metal bar gratings at Roof Equipment Platforms
2. Metal frames and supports for gratings.

B. Related Sections:

1. Section 051200 "Structural Steel Framing" for structural-steel framing system components.
2. Section 05511 "Metal Stairs" for grating treads and landings of steel-framed stairs.
3. Section 05521 "Pipe and Tube Railings" for metal pipe and tube handrails and railings.

1.3 PERFORMANCE REQUIREMENTS

A. Delegated Design: Design gratings, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

B. Structural Performance: Gratings shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated.

1. Walkways and Elevated Platforms Other Than Exits: Uniform load of 60 lbf/sq. ft. (2.87 kN/sq. m).
   a. Limit deflection to L/240 or 1/4 inch (6.4 mm), whichever is less.
2. Walkways and Elevated Platforms Used as Exits: Uniform load of 100 lbf/sq. ft. (4.79 kN/sq. m).
   a. Limit deflection to L/360 or 1/4 inch (6.4 mm), whichever is less.

1.4 ACTION SUBMITTALS

A. Product Data: For the following:

1. Formed-metal plank gratings.
2. Clips and anchorage devices for gratings.
3. Paint products.

B. Shop Drawings: Include plans, sections, details, and attachments to other work.

C. Delegated-Design Submittal: For installed products indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified professional engineer.

B. Mill Certificates: Signed by manufacturers of stainless-steel sheet certifying that products furnished comply with requirements.

C. Welding certificates.

D. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers certifying that shop primers are compatible with topcoats.

1.6 QUALITY ASSURANCE

A. Metal Bar Grating Standards: Comply with NAAMM MBG 531, "Metal Bar Grating Manual ."

B. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

C. Welding Qualifications: Qualify procedures and personnel according to the following:

1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
2. AWS D1.3, "Structural Welding Code - Sheet Steel."

1.7 PROJECT CONDITIONS

A. Field Measurements: Verify actual locations of walls and other construction contiguous with gratings by field measurements before fabrication.

1.8 COORDINATION

A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.

B. Coordinate installation of anchorages for gratings, grating frames, and supports. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

PART 2 - PRODUCTS

2.1 FERROUS METALS

A. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.

B. Steel Bars for Bar Gratings: ASTM A 36/A 36M or steel strip, ASTM A 1011/A 1011M or ASTM A 1018/A 1018M.

C. Wire Rod for Bar Grating Crossbars: ASTM A 510 (ASTM A 510M).

D. Galvanized-Steel Sheet: ASTM A 653/A 653M, structural quality, Grade 33 (Grade 230), with G90 (Z275) coating.

2.2 FASTENERS

A. General: Select fasteners for type, grade, and class required.

B. Steel Bolts and Nuts: Regular hexagon-head bolts, ASTM A 307, Grade A (ASTM F 568M, Property Class 4.6); with hex nuts, ASTM A 563 (ASTM A 563M); and, where indicated, flat washers.

C. Anchor Bolts: ASTM F 1554, Grade 36, of dimensions indicated; with nuts, ASTM A 563 (ASTM A 563M); and, where indicated, flat washers.

1. Hot-dip galvanize or provide mechanically deposited, zinc coating where item being fastened is indicated to be galvanized.

D. Plain Washers: Round, ASME B18.22.1 (ASME B18.22M).

E. Lock Washers: Helical, spring type, ASME B18.21.1 (ASME B18.21.2M).

F. Post-Installed Anchors: Torque-controlled expansion anchors or chemical anchors capable of sustaining, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing according to ASTM E 488, conducted by a qualified independent testing agency.

1. Material for Exterior Locations and Where Stainless Steel is Indicated: Alloy Group 2 (A4) stainless-steel bolts, ASTM F 593 (ASTM F 738M), and nuts, ASTM F 594 (ASTM F 836M).

2.3 MISCELLANEOUS MATERIALS

A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy that is welded.

B. Shop Primers: Provide primers that comply with Section 099113 "Exterior Painting" and Section 099123 "Interior Painting," and Section 099600 "High-Performance Coatings."

C. Universal Shop Primer: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI#79 and compatible with topcoat.

1. Use primer containing pigments that make it easily distinguishable from zinc-rich primer.

D. Epoxy Zinc-Rich Primer: Complying with MPI#20 and compatible with topcoat.

E. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.

F. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.

2.4 FABRICATION

A. Shop Assembly: Fabricate grating sections in shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.

B. Cut, drill, and punch material cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch (1 mm) unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.

C. Form from materials of size, thickness, and shapes indicated, but not less than that needed to support indicated loads.

D. Fit exposed connections accurately together to form hairline joints.

E. Welding: Comply with AWS recommendations and the following:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.

F. Provide for anchorage of type indicated; coordinate with supporting structure. Fabricate and space the anchoring devices to secure gratings, frames, and supports rigidly in place and to support indicated loads.

1. Fabricate toeplates to fit grating units and weld to units in shop unless otherwise indicated.
2. Fabricate toeplates for attaching in the field.
3. Toeplate Height: 4 inches (100 mm) unless otherwise indicated.

2.5 METAL BAR GRATINGS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Alabama Metal Industries Corporation; a Gibraltar Industries company.
2. All American Grating.
3. IKG Industries; a division of Harsco Corporation.

B. Welded Steel Grating :

1. Bearing Bar Spacing: 15/16 inch (24 mm) o.c.
2. Bearing Bar Depth: As required to comply with structural performance requirements.
3. Bearing Bar Thickness: 3/16 inch (4.8 mm) minimum and as required to comply with structural performance requirements.
4. Crossbar Spacing: 4 inches (102 mm) o.c.
5. Traffic Surface: Plain .
6. Steel Finish: Hot-dip galvanized with a coating weight of not less than 1.8 oz./sq. ft. (550 g/sq. m) of coated surface.

C. Do not notch bearing bars at supports to maintain elevation.

2.6 GRATING FRAMES AND SUPPORTS

A. Frames and Supports for Metal Gratings: Fabricate from metal shapes, plates, and bars of welded construction to sizes, shapes, and profiles indicated and as necessary to receive gratings. Miter and weld connections for perimeter angle frames. Cut, drill, and tap units to receive hardware and similar items.

1. Unless otherwise indicated, fabricate from same basic metal as gratings.
2. Equip units indicated to be cast into concrete or built into masonry with integrally welded anchors. Unless otherwise indicated, space anchors 24 inches (600 mm) o.c. and provide minimum anchor units in the form of steel straps 1-1/4 inches (32 mm) wide by 1/4 inch (6 mm) thick by 8 inches (200 mm) long.

B. Galvanize steel frames and supports in the following locations:

1. Exterior.

2.7 STEEL FINISHES

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Finish gratings, frames, and supports after assembly.

C. Galvanizing: Hot-dip galvanize items as indicated to comply with ASTM A 153/A 153M for steel and iron hardware and with ASTM A 123/A 123M for other steel and iron products.

1. Do not quench or apply post galvanizing treatments that might interfere with paint adhesion.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing gratings to in-place construction. Include threaded fasteners for concrete and masonry inserts, through-bolts, lag bolts, and other connectors.

B. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing gratings. Set units accurately in location, alignment, and elevation; measured from established lines and levels and free of rack.

C. Provide temporary bracing or anchors in formwork for items that are to be built into concrete or masonry.

D. Fit exposed connections accurately together to form hairline joints.

1. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade the surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.

E. Attach toeplates to gratings by welding at locations indicated.

F. Field Welding: Comply with the following requirements:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.

G. Corrosion Protection: Coat concealed surfaces of aluminum that will come into contact with grout, concrete, masonry, wood, or dissimilar metals, with a heavy coat of bituminous paint.

3.2 INSTALLING METAL BAR GRATINGS

A. General: Install gratings to comply with recommendations of referenced metal bar grating standards that apply to grating types and bar sizes indicated, including installation clearances and standard anchoring details.

B. Attach removable units to supporting members with type and size of clips and fasteners indicated or, if not indicated, as recommended by grating manufacturer for type of installation conditions shown.

C. Attach nonremovable units to supporting members by welding where both materials are same; otherwise, fasten by bolting as indicated above.

3.3 ADJUSTING AND CLEANING

A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with same material as used for shop painting to comply with SSPC-PA 1 requirements for touching up shop-painted surfaces.

1. Apply by brush or spray to provide a minimum 2.0-mil (0.05-mm) dry film thickness.

B. Touchup Painting: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint are specified in Section 09911 "Exterior Painting"

C. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780.

END OF SECTION 05530

DIVISION 06

SECTION 06105 - MISCELLANEOUS CARPENTRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Framing with dimension lumber.
2. Rooftop equipment bases and support curbs.
3. Wood blocking, cants, and nailers.
4. Wood sleepers.
5. Plywood backing panels.
6. Utility Shelving

B. Related Requirements:

1. Section 02361 "Termite Control" for site application of borate treatment to wood framing.

2. Section 06402 “Interior Architectural Wood”
3. Section 06160 "Sheathing” for cladding of Storage Building.
4. Section 06441 “Ornamental Woodwork” for Pergola construction of exposed woodwork
5. Section 07460 “Siding” for cladding of Storage Building

1.3 DEFINITIONS

A. Dimension Lumber: Lumber of 2 inches nominal (38 mm actual) or greater but less than 5 inches nominal (114 mm actual) in least dimension.

B. Lumber grading agencies, and the abbreviations used to reference them, include the following:

1. NeLMA: Northeastern Lumber Manufacturers' Association.
2. NHLA: National Hardwood Lumber Association.
3. NLGA: National Lumber Grades Authority.
4. SPIB: The Southern Pine Inspection Bureau.
5. WCLIB: West Coast Lumber Inspection Bureau.
6. WWPA: Western Wood Products Association.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.

1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Indicate type of preservative used and net amount of preservative retained.
2. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Include physical properties of treated materials based on testing by a qualified independent testing agency.
3. For fire-retardant treatments, include physical properties of treated lumber both before and after exposure to elevated temperatures, based on testing by a qualified independent testing agency according to ASTM D 5664.
4. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.
5. Include copies of warranties from chemical treatment manufacturers for each type of treatment.

1.5 INFORMATIONAL SUBMITTALS

A. Evaluation Reports: For the following, from ICC-ES:

1. Preservative-treated wood.
2. Fire-retardant-treated wood.
3. Power-driven fasteners.
4. Powder-actuated fasteners.
5. Expansion anchors.
6. Metal framing anchors.

1.6 QUALITY ASSURANCE

A. Testing Agency Qualifications: For testing agency providing classification marking for fire-retardant treated material, an inspection agency acceptable to authorities having jurisdiction that periodically performs inspections to verify that the material bearing the classification marking is representative of the material tested.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Stack lumber flat with spacers beneath and between each bundle to provide air circulation. Protect lumber from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.

PART 2 - PRODUCTS

2.1 WOOD PRODUCTS, GENERAL

A. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, provide lumber that complies with the applicable rules of any rules-writing agency certified by the ALSC Board of Review. Provide lumber graded by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.

1. Factory mark each piece of lumber with grade stamp of grading agency.

2. For exposed lumber indicated to receive a stained or natural finish, mark grade stamp on end or back of each piece .
3. Where nominal sizes are indicated, provide actual sizes required by DOC PS 20 for moisture content specified. Where actual sizes are indicated, they are minimum dressed sizes for dry lumber.
4. Provide dressed lumber, S4S, unless otherwise indicated.

B. Maximum Moisture Content of Lumber: 15 percent for 2-inch nominal (38-mm actual) thinckness or less, 19 percent for more than 2-inch nominal (38-mm actual) thickness unless otherwise indicated.

2.2 WOOD-PRESERVATIVE-TREATED MATERIALS

A. Preservative Treatment by Pressure Process: AWPA U1; Use Category UC2 for interior construction not in contact with the ground, Use Category UC3b for exterior construction not in contact with the ground, and Use Category UC4a for items in contact with the ground.

1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium.
2. For exposed items indicated to receive a stained or natural finish, use chemical formulations that do not require incising, contain colorants, bleed through, or otherwise adversely affect finishes.

B. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Do not use material that is warped or does not comply with requirements for untreated material.

C. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.

1. For exposed lumber indicated to receive a stained or natural finish, mark end or back of each piece .

D. Application: Treat all miscellaneous carpentry unless otherwise indicated. items indicated on Drawings, and the following:

1. Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.
2. Wood sills,, Blocking, furring, and similar concealed members in contact with masonry or concrete.
3. Wood floor plates that are installed over concrete slabs-on-grade.

2.3 FIRE-RETARDANT-TREATED MATERIALS

A. General: Where fire-retardant-treated materials are indicated, use materials complying with requirements in this article, that are acceptable to authorities having jurisdiction, and with fire-test-response characteristics specified as determined by testing identical products per test method indicated by a qualified testing agency.

B. Fire-Retardant-Treated Lumber and Plywood by Pressure Process: Products with a flame spread index of 25 or less when tested according to ASTM E 84, and with no evidence of significant progressive combustion when the test is extended an additional 20 minutes, and with

the flame front not extending more than 10.5 feet (3.2 m) beyond the centerline of the burners at any time during the test.

1. Use treatment that does not promote corrosion of metal fasteners.
2. Interior Type A: Treated materials shall have a moisture content of 28 percent or less when tested according to ASTM D 3201 at 92 percent relative humidity. Use where exterior type is not indicated.

C. Kiln-dry lumber after treatment to a maximum moisture content of of 15 percent**.**

D. Identify fire-retardant-treated wood with appropriate classification marking of testing and inspecting agency acceptable to authorities having jurisdiction.

2.4 DIMENSION LUMBER FRAMING

2.5 Non-Load-Bearing Interior Partitions: No. 2 **Southern Yellow Pine** MISCELLANEOUS LUMBER

A. General: Provide miscellaneous lumber indicated and lumber for support or attachment of other construction, including the following:

1. Blocking.
2. Nailers.
3. Rooftop equipment bases and support curbs.
4. Cants.
5. Furring.
6. Grounds.
7.

B. For items of dimension lumber size, provide Construction or No. 2 Southern Yellow Pine For concealed boards, provide lumber with 19 percent maximum moisture content and any of the following species and grades:

1. Mixed southern pine, No. 2grade; SPIB.
2. Spruce-pine-fir (south) or spruce-pine-fir, Construction or No. 2 Common grade; NeLMA, NLGA, WCLIB, or WWPA.

C. For blocking not used for attachment of other construction, Utility, Stud, or No. 3 grade lumber of any species may be used provided that it is cut and selected to eliminate defects that will interfere with its attachment and purpose.

D. For blocking and nailers used for attachment of other construction, select and cut lumber to eliminate knots and other defects that will interfere with attachment of other work.

E. For furring strips for installing plywood or hardboard paneling, select boards with no knots capable of producing bent-over nails and damage to paneling.

2.6 PLYWOOD BACKING PANELS

A. Equipment Backing Panels: DOC PS 1, Exposure 1, C-D Plugged fire-retardant treated, in thickness indicated or, if not indicated, not less than 1/2-inch (13-mm) nominal thickness.

2.7 FASTENERS

A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.

B. Nails, Brads, and Staples: ASTM F 1667.

C. Power-Driven Fasteners: NES NER-272.

D. Wood Screws: ASME B18.6.1.

E. Screws for Fastening to Metal Framing: ASTM C 1002 , length as recommended by screw manufacturer for material being fastened.

F. Lag Bolts: ASME B18.2.1 (ASME B18.2.3.8M).

G. Bolts: Steel bolts complying with ASTM A 307, Grade A (ASTM F 568M, Property Class 4.6); with ASTM A 563 (ASTM A 563M) hex nuts and, where indicated, flat washers.

H. Expansion Anchors: Anchor bolt and sleeve assembly of material indicated below with capability to sustain, without failure, a load equal to 6 times the load imposed when installed in unit masonry assemblies and equal to 4 times the load imposed when installed in concrete as determined by testing per ASTM E 488 conducted by a qualified independent testing and inspecting agency.

1. Material: Carbon-steel components, zinc plated to comply with ASTM B 633, Class Fe/Zn 5.
2. Material: Stainless steel with bolts and nuts complying with ASTM F 593 and ASTM F 594, Alloy Group 1 or 2 (ASTM F 738M and ASTM F 836M, Grade A1 or A4).

2.8 METAL FRAMING ANCHORS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Cleveland Steel Specialty Co.
2. KC Metals Products, Inc.
3. Phoenix Metal Products, Inc.
4. Simpson Strong-Tie Co., Inc.
5. USP Structural Connectors.

B. Galvanized-Steel Sheet: Hot-dip, zinc-coated steel sheet complying with ASTM A 653/A 653M, G60 (Z180) coating designation.

1. Use for interior locations unless otherwise indicated.

C. Hot-Dip Heavy-Galvanized Steel Sheet: ASTM A 653/A 653M; Structural Steel (SS), high-strength low-alloy steel Type A (HSLAS Type A), or high-strength low-alloy steel Type B (HSLAS Type B); G185 (Z550) coating designation; and not less than 0.036 inch (0.9 mm) thick.

1. Use for wood-preservative-treated lumber and where indicated.

D. Stainless-Steel Sheet: ASTM A 666, Type 316.

1. Use for exterior locations and where indicated.

2.9 MISCELLANEOUS MATERIALS

A. Flexible Flashing: Composite, self-adhesive, flashing product consisting of a pliable, butyl rubber or rubberized-asphalt compound, bonded to a high-density polyethylene film, aluminum foil, or spunbonded polyolefin to produce an overall thickness of not less than 0.025 inch (0.6 mm).

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Set carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit carpentry to other construction; scribe and cope as needed for accurate fit. Locate furring, nailers, blocking, grounds, and similar supports to comply with requirements for attaching other construction.

B. Where wood-preservative-treated lumber is installed adjacent to metal decking, install continuous flexible flashing separator between wood and metal decking.

C. Framing Standard: Comply with AF&PA's WCD 1, "Details for Conventional Wood Frame Construction," unless otherwise indicated.

D. Install plywood backing panels by fastening to studs; coordinate locations with utilities requiring backing panels. Install fire-retardant treated plywood backing panels with classification marking of testing agency exposed to view.

E. Metal Framing Anchors: Install metal framing anchors to comply with manufacturer's written instructions. Install fasteners through each fastener hole.

F. Do not splice structural members between supports unless otherwise indicated.

G. Provide blocking and framing as indicated and as required to support facing materials, fixtures, specialty items, and trim.

1. Provide metal clips for fastening gypsum board or lath at corners and intersections where framing or blocking does not provide a surface for fastening edges of panels. Space clips not more than 16 inches (406 mm) o.c.

H. Provide fire blocking in furred spaces, stud spaces, and other concealed cavities as indicated and as follows:

1. Fire block furred spaces of walls, at each floor level, at ceiling, and at not more than 96 inches (2438 mm) o.c. with solid wood blocking or noncombustible materials accurately fitted to close furred spaces.
2. Fire block concealed spaces of wood-framed walls and partitions at each floor level, at ceiling line of top story, and at not more than 96 inches (2438 mm) o.c. Where fire blocking is not inherent in framing system used, provide closely fitted solid wood blocks of same width as framing members and 2-inch nominal (38-mm actual) thickness.

3. Fire block concealed spaces between floor sleepers with same material as sleepers to limit concealed spaces to not more than 100 sq. ft. (9.3 sq. m) and to solidly fill space below partitions.
4. Fire block concealed spaces behind combustible cornices and exterior trim at not more than 20 feet (6 m) o.c.

I. Sort and select lumber so that natural characteristics will not interfere with installation or with fastening other materials to lumber. Do not use materials with defects that interfere with function of member or pieces that are too small to use with minimum number of joints or optimum joint arrangement.

J. Comply with AWPA M4 for applying field treatment to cut surfaces of preservative-treated lumber.

1. Use inorganic boron for items that are continuously protected from liquid water.
2. Use copper naphthenate for items not continuously protected from liquid water.

K. Securely attach carpentry work to substrate by anchoring and fastening as indicated, complying with the following:
1. Table 2304.9.1, "Fastening Schedule," in ICC's International Building Code.
2. Table R602.3(1), "Fastener Schedule for Structural Members," and Table R602.3(2), "Alternate Attachments," in ICC's International Residential Code for One- and Two-Family Dwellings.

L. Use steel common nails unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting wood. Drive nails snug but do not countersink nail heads unless otherwise indicated.

3.2 WOOD GROUND, SLEEPER, BLOCKING, AND NAILER INSTALLATION

A. Install where indicated and where required for attaching other work. Form to shapes indicated and cut as required for true line and level of attached work. Coordinate locations with other work involved.

B. Attach items to substrates to support applied loading. Recess bolts and nuts flush with surfaces unless otherwise indicated.

C. Provide permanent grounds of dressed, pressure-preservative-treated, key-beveled lumber not less than 1-1/2 inches (38 mm) wide and of thickness required to bring face of ground to exact thickness of finish material. Remove temporary grounds when no longer required.

3.3 WOOD FURRING INSTALLATION

A. Install level and plumb with closure strips at edges and openings. Shim with wood as required for tolerance of finish work.

B. Furring to Receive Gypsum Board: Install 1-by-2-inch nominal-size (19-by-38-mm actual-size) furring vertically at 16 inches (406 mm) o.c.

3.4 PROTECTION

A. Protect wood that has been treated with inorganic boron (SBX) from weather. If, despite protection, inorganic boron-treated wood becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

B. Protect miscellaneous rough carpentry from weather. If, despite protection, miscellaneous rough carpentry becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

END OF SECTION 06105

SECTION 06160 - SHEATHING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Wall sheathing.
2. Roof sheathing.
3. Sheathing joint and penetration treatment.
4. Building Paper
5. Flexible flashing at openings in sheathing

B. Related Requirements:

1. Section 06105 "Miscellaneous Carpentry" for plywood backing panels.
2. Section 07250 "Weather Barriers" for water-resistive barrier applied over wall sheathing.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.

1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated plywood complies with requirements. Indicate type of preservative used and net amount of preservative retained.
2. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated plywood complies with requirements. Include physical properties of treated materials.
3. For fire-retardant treatments, include physical properties of treated plywood both before and after exposure to elevated temperatures, based on testing by a qualified independent testing agency according to ASTM D 5516.
4. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.

5. Include copies of warranties from chemical treatment manufacturers for each type of treatment.
6. For building paper, include data on air/moisture-infiltration protection based on testing according to referenced standards

1.4 INFORMATIONAL SUBMITTALS

A. Evaluation Reports: For following products, from ICC-ES:

1. Preservative-treated plywood.
2. Foam-plastic sheathing.
3. Glass-mat gypsum wall sheathing

1.5 QUALITY ASSURANCE

A. Testing Agency Qualifications: For testing agency providing classification marking for fire-retardant-treated material, an inspection agency acceptable to authorities having jurisdiction that periodically performs inspections to verify that the material bearing the classification marking is representative of the material tested.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Stack panels flat with spacers beneath and between each bundle to provide air circulation. Protect sheathing from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Test-Response Characteristics: For assemblies with fire-resistance ratings, provide materials and construction identical to those of assemblies tested for fire resistance per ASTM E 119 by a testing and inspecting agency acceptable to authorities having jurisdiction.

2.2 WOOD PANEL PRODUCTS

A. Plywood: Either DOC PS 1 or DOC PS 2 unless otherwise indicated.

B. Thickness: As needed to comply with requirements specified, but not less than thickness indicated.

C. Factory mark panels to indicate compliance with applicable standard.

2.3 PRESERVATIVE-TREATED PLYWOOD

A. Preservative Treatment by Pressure Process: AWPA U1; Use Category UC2 for interior construction not in contact with the ground, Use Category UC3b for exterior construction not in contact with the ground, and Use Category UC4a for items in contact with the ground.

1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium.

B. Mark plywood with appropriate classification marking of an inspection agency acceptable to authorities having jurisdiction.

C. Application: Treat all plywood unless otherwise indicated .

2.4 FIRE-RETARDANT-TREATED PLYWOOD

A. General: Where fire-retardant-treated materials are indicated, use materials complying with requirements in this article that are acceptable to authorities having jurisdiction and with fire-test-response characteristics specified as determined by testing identical products per test method indicated by a qualified testing agency.
1. Exterior Type: Treated materials shall comply with requirements specified above for fire-retardant-treated plywood by pressure process after being subjected to accelerated weathering according to ASTM D 2898. Use for exterior locations and where indicated.
2. Interior Type A: Treated materials shall have a moisture content of 28 percent or less when tested according to ASTM D 3201 at 92 percent relative humidity. Use where exterior type is not indicated.

B. Kiln-dry material after treatment to a maximum moisture content of 15 percent. Do not use material that is warped or does not comply with requirements for untreated material.

C. Identify fire-retardant-treated plywood with appropriate classification marking of qualified testing agency.

2.5 WALL SHEATHING

A. Plywood Wall Sheathing: Exterior, Structural I sheathing.

1. Span Rating: Not less than 16/0 .
2. Nominal Thickness: Not less than 1/2 inch (13 mm) unless otherwise indicated. Provide ¾” sheathing on walls scheduled to receive fiber cement siding.

B. Glass-mat Gypsum Wall Sheathing: ASTMC 1177/1177M

1. Product: Subject to compliance with requirements, one of the following:

a. CertainTeed Corporation; GlasRoc.
b. G-P Gypsum Corporation; Dens-Glass Gold.
c. National Gypsum Company; Gold Bond e(2)XP.
d. Temple-Inland Inc.; GreenGlass
e. United States Gypsum Co.; Securock.

2. Type and Thickness: Type X, 5/8" inch thick

3. Size: 48 by 96 inches for vertical installation

C. Cementitious Backer Units: ASTM C 1325, Type A.

1. Products: Subject to compliance with requirements, provide one of the following :

a. C-Cure; C-Cure Board 990.
b. Custom Building Products; Wonderboard.
c. FinPan, Inc.; Util-A-Crete Concrete Backer Board.
d. USG Corporation; DUROCK Cement Board.

2.6 Thickness: 5/8 inch ROOF SHEATHING

A. Glass-Mat Faced Gypsum Roof Boards: ASTM C 1177/1177M.

1. Products: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
a. G-P Gypsum Corporation; Dens-Deck Duraguard.
b. United States Gypsum Co.; Securock. Glass Mat Roof Board

2. Type and Thickness: 5/8 inch (15.9 mm) thick.
3. Size: 48 by 96 inches (1219 by 2438 mm) for horizontal installation.

B. Plywood Roof Sheathing: Exterior Structural I Sheathing

1. Span rating: Not less than 16/0

2. Nominal Thickness: Not less than 15/32 inch

2.7 FASTENERS

A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.

1. For roof and wall sheathing, provide fasteners of Type 304 stainless steel.

B. Nails, Brads, and Staples: ASTM F 1667.

C. Power-Driven Fasteners: NES NER-272.

D. Wood Screws: ASME B18.6.1.

E. Screws for Fastening Wood Structural Panels to Cold-Formed Metal Framing: ASTM C 954, except with wafer heads and reamer wings, length as recommended by screw manufacturer for material being fastened.

1. For wall and roof sheathing panels, provide screws with organic-polymer or other corrosion-protective coating having a salt-spray resistance of more than 800 hours according to ASTM B 117.

F. Screws for Fastening Gypsum Sheathing to Cold-Formed Metal Decking: Steel drill screws, in length recommended by sheathing manufacturer for thickness of sheathing to be attached, with organic-polymer or other corrosion-protective coating having a salt-spray resistance of more than 800 hours according to ASTM C1177.

2.8 WEATHER RESISTANT SHEATHING PAPER

A. Building Paper: ASTM 226, Type I (No. 15 asphalt – saturated organic felt) unperforated

2.9 MISCELLANEOUS MATERIALS

A. Flexible Flashing: Composite, self-adhesive, flashing product consisting of a pliable, rubberized-asphalt compound, bonded to a high-density, cross-laminated polyethylene film to produce an overall thickness of not less than 0.040 inch.

1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:

a. Carlisle Coatings & Waterproofing; CCW-705-TWF Thru-Wall Flashing.
b. Grace Construction Products, a unit of W. R. Grace & Co. - Conn.; Vycor Plus Self-Adhered Flashing.

B. Primer for Flexible Flashing: Product recommended by manufacturer of flexible flashing for substrate.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Do not use materials with defects that impair quality of sheathing or pieces that are too small to use with minimum number of joints or optimum joint arrangement. Arrange joints so that pieces do not span between fewer than three support members.

B. Cut panels at penetrations, edges, and other obstructions of work; fit tightly against abutting construction unless otherwise indicated.

C. Securely attach to substrate by fastening as indicated, complying with the following:

1. NES NER-272 for power-driven fasteners.
2. Table 2304.9.1, "Fastening Schedule," in ICC's "International Building Code."
3. Table R602.3(1), "Fastener Schedule for Structural Members," and Table R602.3(2), "Alternate Attachments," in ICC's "International Residential Code for One- and Two-Family Dwellings."

D. Coordinate wall and roof sheathing installation with flashing and joint-sealant installation so these materials are installed in sequence and manner that prevent exterior moisture from passing through completed assembly.

E. Do not bridge building expansion joints; cut and space edges of panels to match spacing of structural support elements.

F. Coordinate sheathing installation with installation of materials installed over sheathing so sheathing is not exposed to precipitation or left exposed at end of the workday when rain is forecast.

3.2 WOOD STRUCTURAL PANEL INSTALLATION

A. General: Comply with applicable recommendations in APA Form No. E30, "Engineered Wood Construction Guide," for types of structural-use panels and applications indicated.

B. Fastening Methods: Fasten panels as indicated below:

1. Wall Sheathing & Roof Sheathing:
   a. Screw to cold-formed metal framing.
   b. Space panels 1/8 inch (3 mm) apart at edges and ends.

3.3 GYPSUM SHEATHING INSTALLATION

A. Comply with GA-253 and with manufacturer's written instructions.

B. Apply fasteners so heads bear tightly against face of sheathing, but do not cut into facing.

C. Horizontal Installation: Install sheathing with V-grooved edge down and tongue edge up. Interlock tongue with groove to bring long edges in contact with edges of adjacent panels without forcing. Abut ends over centers of studs, and stagger end joints of adjacent panels not less than one stud spacing. Attach at perimeter and within field of panel to each stud.

D. Vertical Installation: Install vertical edges centered over studs. Abut ends and edges with those of adjacent panels. Attach at perimeter and within field of panel to each stud.

E. Seal sheathing joints according to sheathing manufacturer's written instructions

3.4 CEMENTITIOUS BACKER UNIT INSTALLATION

A. Install panels and treat joints according to ANSI A108.11 and manufacturer's written instructions for type of application indicated.

3.5 WEATHER-RESISTANT SHEATHING – Paper Installation

A. General: Cover Sheathing with weather-resistant sheathing paper as follows:
1. Cut back barrier ½ inch on each side of the break in supporting members at expansion – or control-joint locations
2. Apply barrier to cover vertical flashing with a minimum 4-inch overlap, unless otherwise indicated.

B. Building Paper: Apply horizontally with 2 inch overlap and a 6 inch end lap; fasten to sheathing with galvanized staples or roofing nails.

3.6 FLEXIBLE FLASHING INSTALLATION

A. Apply flexible flashing where indicated to comply with manufacturers written instructions.

1. Prime substrates as recommended by flashing manufacturer.
2. Lap seams and junctures with other materials at least 4 inches, except that at flashing flanges of other construction, laps need not exceed flange width.
3. Lap flashing over weather-resistant building paper at bottom and sides of openings.
4. Lap weather-resistant building paper over flashing at heads of openings.
5. After flashing has been applied, roll surfaces with a hard rubber or metal roller to ensure that flashing is completely adhered to substrates.

3.7 FIELD QUALITY CONTROL

A. ABAA Quality Assurance Program: Perform examinations, preparation, installation, testing, and inspections under ABAA's Quality Assurance Program.

B. Testing and Inspecting Agency: Engage a qualified testing agency to perform tests and inspections.

C. Inspections: Air-barrier and water-resistant glass-mat gypsum sheathing, accessories, and installation are subject to inspection for compliance with requirements. Inspections may include the following:]

1. Continuity of air-barrier system has been achieved throughout the building envelope with no gaps or holes.
2. Laps in strips and transition strips have complied with minimum requirements and have been shingled in the correct direction (or mastic has been applied on exposed edges), with no fishmouths.
3. Termination mastic has been applied on cut edges.
4. Strips and transition strips have been firmly adhered to substrate.
5. Compatible materials have been used.
6. Transitions at changes in direction and structural support at gaps have been provided.
7. Connections between assemblies (sheathing and sealants) have complied with requirements for cleanliness, surface preparation and priming, structural support, integrity, and continuity of seal.
8. All penetrations have been sealed.

D. Tests: As determined by testing agency from among the following tests:

1. Air-Leakage-Location Testing: Air-barrier sheathing assemblies will be tested for evidence of air leakage according to [**ASTM E1186, chamber pressurization or depressurization with smoke tracers**] [**ASTM E1186, chamber depressurization using detection liquids**] <**Insert requirement**>.
2. Air-Leakage-Volume Testing: Air-barrier assemblies will be tested for air-leakage rate according to [**ASTM E783**] [**or**] [**ASTM E2357**].

E. Air barriers will be considered defective if they do not pass tests and inspections.

F. Repair damage to air barriers caused by testing; follow manufacturer's written instructions.

G. Prepare test and inspection reports.

3.8 PROTECTION

A. Paper-Surfaced Gypsum Sheathing: Protect sheathing by covering exposed exterior surface of sheathing with weather-resistant sheathing paper securely fastened to framing. Apply covering immediately after sheathing is installed.

END OF SECTION 06160

SECTION 06402 - INTERIOR ARCHITECTURAL WOODWORK

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Interior standing and running trim.
2. Wood cabinets at Administrative offices
3. Solid-surfacing-material countertops.
4. Closet and utility shelving.
5. Shop finishing of interior woodwork.

B. Related Sections include the following:
1. Division 6 Section "Miscellaneous Carpentry" for wood furring, blocking, shims, and hanging strips required for installing woodwork and concealed within other construction before woodwork installation.
2. Division 6 Section “Plastic Laminate Faced Architectural Cabinets” for installing cabinets.
3. Division 10 Section “ Storage Shelving” for wire shelving locations

1.3 DEFINITIONS

A. Interior architectural woodwork includes wood furring, blocking, shims, and hanging strips for installing woodwork items unless concealed within other construction before woodwork installation.

1.4 SUBMITTALS

A. Product Data: For solid-surfacing material and cabinet hardware and accessories.

B. Shop Drawings: Show location of each item, dimensioned plans and elevations, large-scale details, attachment devices, and other components including adjacent wall construction.

1. Show details full size.
2. Show locations and sizes of furring, blocking, and hanging strips, including concealed blocking and reinforcement specified in other Sections.

3. Show locations and sizes of cutouts and holes for plumbing fixtures and other items installed in architectural woodwork.
4. Show veneer leaves with dimensions, grain direction, exposed face, and identification numbers indicating the flitch and sequence within the flitch for each leaf.

C. Samples for Initial Selection:
1. Thermoset decorative panels.
2. Solid-surfacing materials.

D. Samples for Verification:

1. Lumber with or for transparent finish, not less than 50 sq. in.or 5 inches wide by 24 inches long base on condition where the lumber is scheduled to be used, for each species and cut, finished on 1 side and 1 edge.
2. Veneer leaves representative of and selected from flitches to be used for transparent-finished woodwork.
3. Veneer-faced panel products with or for transparent finish, 8 by 10 inches for each species and cut. Include at least one face-veneer seam and finish as specified.
4. Thermoset decorative-panels, 8 by 10 inches, for each type, color, pattern, and surface finish, with edge banding on 1 edge.

5. Exposed cabinet hardware and accessories, one unit for each type and finish.

E. Product Certificates: For each type of product, signed by product manufacturer.

F. Woodwork Quality Standard Compliance Certificates: AWI Quality Certification Program certificates.

G. Qualification Data: For Installer and fabricator.

1.5 QUALITY ASSURANCE

A. Fabricator Qualifications: Shop that employs skilled workers who custom-fabricate products similar to those required for this Project and whose products have a record of successful in-service performance. Shop is a certified participant in AWI's Quality Certification Program.

B. Installer Qualifications: Certified participant in AWI's Quality Certification Program.

C. Source Limitations: Engage a qualified woodworking firm to assume undivided responsibility for production of interior architectural woodwork with sequence-matched wood veneers.

D. Quality Standard: Unless otherwise indicated, comply with AWI's "Architectural Woodwork Quality Standards" for grades of interior architectural woodwork indicated for construction, finishes, installation, and other requirements.

1. Provide AWI Quality Certification Program labels and certificates indicating that woodwork complies with requirements of grades specified.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Do not deliver woodwork until painting and similar operations that could damage woodwork have been completed in installation areas. If woodwork must be stored in other than installation areas, store only in areas where environmental conditions comply with requirements specified in "Project Conditions" Article.

1.7 PROJECT CONDITIONS

A. Environmental Limitations: Do not deliver or install woodwork until building is enclosed, wet work is complete, and HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period.

B. Environmental Limitations: Do not deliver or install woodwork until building is enclosed, wet work is complete, and HVAC system is operating and maintaining temperature between 60 and 90 deg F (16 and 32 deg C) and relative humidity between 43 and 70 percent during the remainder of the construction period.

C. Field Measurements: Where woodwork is indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication, and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

1. Locate concealed framing, blocking, and reinforcements that support woodwork by field measurements before being enclosed, and indicate measurements on Shop Drawings.

1.8 COORDINATION

A. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of Work specified in other Sections to ensure that interior architectural woodwork can be supported and installed as indicated.

B. Hardware Coordination: Distribute copies of approved hardware schedule specified in Division 8 Section " Door Hardware (Scheduled by Describing Products)" to fabricator of architectural woodwork; coordinate Shop Drawings and fabrication with hardware requirements.

PART 2 - PRODUCTS

2.1 WOODWORK FABRICATORS

A. Available Fabricators: Subject to compliance with requirements, fabricators offering interior architectural woodwork that may be incorporated into the Work include, but are not limited to, the following:

2.2 MATERIALS

A. General: Provide materials that comply with requirements of AWI's quality standard for each type of woodwork and quality grade specified, unless otherwise indicated.

B. Wood Species and Cut for Transparent Finish: White oak, rift sawn or cut.

C. Wood Species for Opaque Finish: Poplar or any closed-grain hardwood..

D. Wood Products: Comply with the following:

1. Hardboard: AHA A135.4.
2. Medium-Density Fiberboard: ANSI A208.2, Grade MD.
3. Softwood Plywood: DOC PS 1.
4. Veneer-Faced Panel Products (Hardwood Plywood): HPVA HP-1.
5. =

2.3 CABINET HARDWARE AND ACCESSORIES

A. General: Provide cabinet hardware and accessory materials associated with architectural cabinets, except for items specified in Division 8 Section " Door Hardware (Scheduled by Describing Products)."

B. Frameless Concealed Hinges (European Type): BHMA A156.9, B01602, 170 degrees of opening.

C. Back-Mounted Pulls: BHMA A156.9, B02011.

D. Catches: Magnetic catches, BHMA A156.9, B03141.

E. -Shelf Rests: BHMA A156.9, B04013; metal, two-pin type with shelf hold-down clip.

F. Drawer Slides: BHMA A156.9, B05091.
1. Heavy Duty (Grade 1HD-100 and Grade 1HD-200): Side mounted; full-extension type; zinc-plated steel ball-bearing slides.

G. Door Locks: BHMA A156.11, E07121.

H. Drawer Locks: BHMA A156.11, E07041.

I. Grommets for Cable Passage through Countertops: 1-1/4-inch OD, color to be selected by architect, molded-plastic grommets and matching plastic caps with slot for wire passage.

J. Exposed Hardware Finishes: For exposed hardware, provide finish that complies with BHMA A156.18 for BHMA finish number indicated.
   1. Satin Chromium Plated: BHMA 626 for brass or bronze base; BHMA 652 for steel base.

K. For concealed hardware, provide manufacturer's standard finish that complies with product class requirements in BHMA A156.9.

2.4 MISCELLANEOUS MATERIALS

A. Furring, Blocking, Shims, and Hanging Strips: Softwood or hardwood lumber, kiln dried to less than 15 percent moisture content.

B. Anchors: Select material, type, size, and finish required for each substrate for secure anchorage. Provide nonferrous-metal or hot-dip galvanized anchors and inserts on inside face of exterior walls and elsewhere as required for corrosion resistance. Provide toothed-steel or lead expansion sleeves for drilled-in-place anchors.

2.5 FABRICATION, GENERAL

A. Interior Woodwork Grade: Unless otherwise indicated, provide Premium or Custom-grade as indicated interior woodwork complying with referenced quality standard.

B. Wood Moisture Content: Comply with requirements of referenced quality standard for wood moisture content in relation to ambient relative humidity during fabrication and in installation areas.

C. Fabricate woodwork to dimensions, profiles, and details indicated. Ease edges to radius indicated for the following:

   1. Corners of Cabinets and Edges of Solid-Wood (Lumber) Members 3/4 Inch Thick or Less: 1/16 inch.
   2. Edges of Rails and Similar Members More Than 3/4 InchThick: 1/8 inch

D. Complete fabrication, including assembly, finishing, and hardware application, to maximum extent possible before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.
   1. Trial fit assemblies at fabrication shop that cannot be shipped completely assembled. Install dowels, screws, bolted connectors, and other fastening devices that can be removed after trial fitting. Verify that various parts fit as intended and check measurements of assemblies against field measurements indicated on Shop Drawings before disassembling for shipment.

E. Shop-cut openings to maximum extent possible to receive hardware, appliances, plumbing fixtures, electrical work, and similar items. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Sand edges of cutouts to remove splinters and burrs.

1. Seal edges of openings in countertops with a coat of varnish.

2.6 INTERIOR STANDING AND RUNNING TRIM FOR TRANSPARENT FINISH

A. Grade: Premium.

B. Wood Species and Cut: Match species and cut indicated for other types of transparent-finished architectural woodwork located in same area of building, unless otherwise indicated.

C. For trim items wider than available lumber, use veneered construction. Do not glue for width.

D. For rails wider or thicker than available lumber, use veneered construction. Do not glue for width or thickness.

E. Backout or groove backs of flat trim members and kerf backs of other wide, flat members, except for members with ends exposed in finished work.

F. Assemble casings in plant except where limitations of access to place of installation require field assembly.

G. Assemble moldings in plant to maximum extent possible. Miter corners in plant and prepare for field assembly with bolted fittings designed to pull connections together.

2.7 INTERIOR STANDING AND RUNNING TRIM FOR OPAQUE FINISH

A. Grade: Custom.

B. Wood Species: poplar or any closed-grain hardwood.

C. Backout or groove backs of flat trim members and kerf backs of other wide, flat members, except for members with ends exposed in finished work.

D. Assemble casings in plant except where limitations of access to place of installation require field assembly.

E. Assemble moldings in plant to maximum extent possible. Miter corners in plant and prepare for field assembly with bolted fittings designed to pull connections together.

2.8 WOOD CABINETS FOR TRANSPARENT FINISH

A. Grade: Premium.

B. AWI Type of Cabinet Construction: Flush overlay.

C. Wood Species and Cut for Exposed Surfaces: White oaksimilar to flush wood doors.

1. Grain Direction: Vertically for drawer fronts, doors, and fixed panels.
2. Matching of Veneer Leaves: Book match.
3. Vertical Matching of Veneer Leaves: End match.
4. Veneer Matching within Panel Face: Running match.
5. Veneer Matching within Room: Provide cabinet veneers in each room or other space from a single flitch with doors, drawer fronts, and other surfaces matched in a sequenced set with continuous match where veneers are interrupted perpendicular to the grain.

D. Semiexposed Surfaces: Provide surface materials indicated below:

1. Cabinet interiors or similar surfaces Other Than Drawer Bodies: Thermoset decorative panels.
2. Drawer Sides and Backs: Solid-hardwood lumber.
3. Drawer Bottoms: Hardwood plywood.

E. Provide dust panels of 1/4-inch plywood or tempered hardboard above compartments and drawers, unless located directly under tops.

2.9 SOLID-SURFACING-MATERIAL COUNTERTOPS

A. Grade: Custom.

B. Solid-Surfacing-Material Thickness: 3/4 inch

C. Colors, Patterns, and Finishes: Provide materials and products that result in colors of solid-surfacing material complying with the following requirements:

D. Fabricate tops in one piece, unless otherwise indicated. Comply with solid-surfacing-material manufacturer's written recommendations for adhesives, sealers, fabrication, and finishing.

1. Fabricate tops with shop-applied edges of materials and configuration indicated.
2. Fabricate tops with loose backsplashes and side spashes for field application.

E. Install integral sink bowls in countertops in shop.

F. Drill holes in countertops for plumbing fittings and soap dispensers in shop.

2.10 CLOSET AND UTILITY SHELVING

A. Shelf Material: 3/4-inch medium-density fiberboard with solid-lumber edge.

B. Cleats: 3/4-inch solid lumber.

C. Wood Species: Any closed-grain hardwood.

2.11 SHOP FINISHING

A. Grade: Provide finishes of same grades as items to be finished.

B. General: Finish architectural woodwork at fabrication shop as specified in this Section. Defer only final touchup, cleaning, and polishing until after installation.

C. General: Shop finish transparent-finished interior architectural woodwork at fabrication shop as specified in this Section. Refer to Division 9 painting Sections for finishing opaque-finished architectural woodwork.

D. Shop Priming: Shop apply the prime coat including backpriming, if any, for items specified to be field finished. Refer to Division 9 painting Sections for material and application requirements.

E. Preparation for Finishing: Comply with referenced quality standard for sanding, filling countersunk fasteners, sealing concealed surfaces, and similar preparations for finishing architectural woodwork, as applicable to each unit of work.

1. Backpriming: Apply one coat of sealer or primer, compatible with finish coats, to concealed surfaces of woodwork. Apply two coats to back of paneling and to end-grain surfaces. Concealed surfaces of plastic-laminate-clad woodwork do not require backpriming when surfaced with plastic laminate, backing paper, or thermoset decorative panels.

F. Transparent Finish:

1. Grade: Premium.
2. AWI Finish System: Conversion varnish.
3. WI Finish System 1a.: Nitrocellulose lacquer.
4. Staining: Match Architect's sample.
5. Wash Coat for Stained Finish: Apply wash-coat sealer to woodwork made from closed-grain wood before staining and finishing.
6. Filled Finish for Open-Grain Woods: After staining (if any), apply paste wood filler to open-grain woods and wipe off excess. Tint filler to match stained wood.

    a. Apply wash-coat sealer after staining and before filling.

7. Sheen: Satin, 31-45 gloss units measured on 60-degree gloss meter per ASTM D 523.

PART 3 - EXECUTION

3.1 PREPARATION

A. Before installation, condition woodwork to average prevailing humidity conditions in installation areas.

B. Before installing architectural woodwork, examine shop-fabricated work for completion and complete work as required, including removal of packing and backpriming.

3.2 INSTALLATION

A. Grade: Install woodwork to comply with requirements for the same grade specified in Part 2 for fabrication of type of woodwork involved.

B. Assemble woodwork and complete fabrication at Project site to comply with requirements for fabrication in Part 2, to extent that it was not completed in the shop.

C. Install woodwork level, plumb, true, and straight. Shim as required with concealed shims. Install level and plumb (including tops) to a tolerance of 1/8 inch in 96 inches.

D. Scribe and cut woodwork to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.

E. Anchor woodwork to anchors or blocking built in or directly attached to substrates. Secure with countersunk, concealed fasteners and blind nailing as required for complete installation. Use fine finishing nails for exposed fastening at interior of cabinets only, countersunk fasteners and filled flush with woodwork and matching final finish if transparent finish is indicated.

F. Standing and Running Trim: Install with minimum number of joints possible, using full-length pieces (from maximum length of lumber available) to greatest extent possible. Do not use pieces less than 96 inches long, except where shorter single-length pieces are necessary.

1. Fill gaps, if any, between top of base and wall with plastic wood filler, sand smooth, and finish same as wood base if finished.
2. Install standing and running trim with no more variation from a straight line than 1/8 inch in 96 inches.

G. Cabinets: Install without distortion so doors and drawers fit openings properly and are accurately aligned. Adjust hardware to center doors and drawers in openings and to provide unencumbered operation. Complete installation of hardware and accessory items as indicated.

1. Install cabinets with no more than 1/8 inch in 96-inch sag, bow, or other variation from a straight line.
2. Maintain veneer sequence matching of cabinets with transparent finish.

3. Fasten wall cabinets through back, near top and bottom, at ends and not more than 16 inches o.c. with No. 10 wafer-head sheet metal screws through metal backing or metal framing behind wall finish.

H. Countertops: Anchor securely by screwing through corner blocks of base cabinets or other supports into underside of countertop.

1. Align adjacent solid-surfacing-material countertops and form seams to comply with manufacturer's written recommendations using adhesive in color to match countertop. Carefully dress joints smooth, remove surface scratches, and clean entire surface.
2. Install countertops with no more than 1/8 inch in 96-inch sag, bow, or other variation from a straight line.
3. Secure backsplashes and side splashes to walls with adhesive.
4. Caulk space between backsplash or side splashes and wall with sealant specified in Division 7 Section "Joint Sealants."

I. Touch up finishing work specified in this Section after installation of woodwork. Fill nail holes with matching filler where exposed.

J. Refer to Division 9 Sections for final finishing of installed architectural woodwork not indicated to be shop finished].

3.3 ADJUSTING AND CLEANING

A. Repair damaged and defective woodwork, where possible, to eliminate functional and visual defects; where not possible to repair, replace woodwork. Adjust joinery for uniform appearance.

B. Clean, lubricate, and adjust hardware.

C. Clean woodwork on exposed and semiexposed surfaces. Touch up shop-applied finishes to restore damaged or soiled areas.

END OF SECTION 06402

SECTION 06411 - PLASTIC-LAMINATE-FACED ARCHITECTURAL CABINETS

TIPS:

To view non-printing **Editor's Notes** that provide guidance for editing, click on MasterWorks/Single-File Formatting/Toggle/Editor's Notes.

To read **detailed research, technical information about products and materials, and coordination checklists**, click on MasterWorks/Supporting Information.

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Plastic-laminate-faced architectural cabinets.
2. Wood furring, blocking, shims, and hanging strips for installing plastic-laminate-faced architectural cabinets that are not concealed within other construction.

B. Related Requirements:

1. Section 06105 "Miscellaneous Rough Carpentry" for wood furring, blocking, shims, and hanging strips required for installing cabinets that are concealed within other construction before cabinet installation.
2. Division 06 “Interior Architectural Woodwork” for countertop installation at wood and plastic laminate cabinets.
3. Section 09111 "Non-Load Bearing Steel Framing" for for installing cabinets that are concealed within other construction before cabinet installation

1.3 COORDINATION

A. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of Work specified in other Sections to support loads imposed by installed and fully loaded cabinets.

B. Hardware Coordination: Distribute copies of approved hardware schedule specified in Section 08710 "Door Hardware” to fabricator of architectural cabinets; coordinate Shop Drawings and fabrication with hardware requirements.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at **Project site**

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include data for fire-retardant treatment from chemical-treatment manufacturer and certification by treating plant that treated materials comply with requirements.

B. Shop Drawings: For plastic-laminate-faced architectural cabinets.

1. Include plans, elevations, sections, and attachment details.
2. Show full-size details.
3. Show locations and sizes of furring, blocking, and hanging strips, including concealed blocking and reinforcement specified in other Sections.
4. Show locations and sizes of cutouts and holes for items installed in plastic-laminate architectural cabinets.

C. Samples: For each exposed product and for each color and texture specified, in manufacturer's or fabricator's standard size.

D. Samples for Initial Selection:
1. Plastic laminates
2. PVC edge material
3. Thermoset decorative panel

E. Samples for Verification: For the following:

1. Plastic Laminates: 8 by 10 inches for each type, color, pattern, and surface finish required.

2. Thermoset Decorative Panels: 8 by 10 inches for each color, pattern, and surface finish.

3. Exposed Cabinet Hardware and Accessories: One full-size unit for each type and finish.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For fabricator.

B. Product Certificates: For **each type of product.**

C. Quality Standard Compliance Certificates: AWI Quality Certification Program

D. Evaluation Reports: For fire-retardant-treated materials, from ICC-ES.

1.7 QUALITY ASSURANCE

A. Fabricator Qualifications: Shop that employs skilled workers who custom fabricate products similar to those required for this Project and whose products have a record of successful in-service performance.

1. Shop Certification: AWI's Quality Certification Program accredited

B. Installer Qualifications: Fabricator of products. AWI's Quality Certification Program accredited participant

C. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.

1. Build mockups of typical architectural cabinets as shown on Drawings
2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Do not deliver cabinets until painting and similar finish operations that might damage architectural cabinets have been completed in installation areas. Store cabinets in installation areas or in areas where environmental conditions comply with requirements specified in "Field Conditions" Article.

1.9 FIELD CONDITIONS

A. Environmental Limitations: Do not deliver or install cabinets until building is enclosed, wet-work is complete, and HVAC system is operating and maintaining temperature between 60 and 90 deg F and relative humidity between 43 and 70 percent during the remainder of the construction period.

B. Field Measurements: Where cabinets are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication, and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

1. Locate concealed framing, blocking, and reinforcements that support cabinets by field measurements before being enclosed/concealed by construction, and indicate measurements on Shop Drawings.

C. Established Dimensions: Where cabinets are indicated to fit to other construction, establish dimensions for areas where cabinets are to fit. Provide allowance for trimming at site, and coordinate construction to ensure that actual dimensions correspond to established dimensions.

PART 2 - PRODUCTS

2.1 PLASTIC-LAMINATE-FACED ARCHITECTURAL CABINETS

A. Quality Standard: Unless otherwise indicated, comply with the "Architectural Woodwork Standards" for grades of cabinets indicated for construction, finishes, installation, and other requirements.

1. Provide inspections of fabrication and installation together with labels and certificates from AWI certification program indicating that woodwork complies with requirements of grades specified.
2. The Contract Documents contain requirements that are more stringent than the referenced quality standard. Comply with requirements of Contract Documents in addition to those of the referenced quality standard.

B. Grade: Premium

C. Type of Construction: Frameless

D. Door and Drawer-Front Style: Flush overlay.

E. High-Pressure Decorative Laminate: NEMA LD 3, grades as indicated or if not indicated, as required by quality standard.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. A. Formica Corporation
   b. Panolam Industries International Inc.
   c. Wisonart International; Div of Premark International, Inc.

F. Core Materials:
1. Cabinet Core Material: plywood
2. Shelves: ¾ inch thick plywood
3. Front, back, and intermediate rails: ¾ inch plywood
4. Backs of cabinets: ½ inch thick particle board
5. Door Fronts: ¾ inch thick plywood
6. Drawer Sides and Backs: ½ inch solid hardwood plywood with glued dovetail or multiple-dowel joints
7. Drawer Bottoms: ¾ inch plywood glued dadoed into front, back and sides of drawer
8. Doors: ¾ inch thick, plywood and solid wood stiles and rails

G. Laminate Cladding for Exposed Surfaces:

1. Horizontal Surfaces: Grade HGS.
2. Postformed Surfaces: Grade HGP.
3. Vertical Surfaces: Grade HGS.
4. Edges: PVC edge banding, 0.12 inch thick, matching laminate in color, pattern, and finish.
5. Pattern Direction: Vertically for drawer fronts, doors, and fixed panels

H. Materials for Semiexposed Surfaces:

1. Surfaces Other Than Drawer Bodies: High-pressure decorative laminate, NEMA LD 3, Grade VGS.

a. Edges of Plastic-Laminate Shelves: PVC edge banding, 0.12 inch thick, matching laminate in color, pattern, and finish.

b. For semiexposed backs of panels with exposed plastic-laminate surfaces, provide surface of high-pressure decorative laminate, NEMA LD 3, Grade VGS

2. Drawer Sides and Backs: Thermoset decorative panels with PVC or polyester edge banding.
3. Drawer Bottoms: Thermoset decorative panels.
4. Cabinet Bases: Exterior grade softwood plywood

I. Drawer Construction: Fabricate with exposed fronts fastened to subfront with mounting screws from interior of body.

1. Join subfronts, backs, and sides with glued rabbeted joints supplemented by mechanical fasteners

J. Colors, Patterns, and Finishes: Provide materials and products that result in colors and textures of exposed laminate surfaces complying with the following requirements:
1. As selected by Architect from laminate manufacturer's full range in the following categories:

a. Solid colors, **matte** finish.

2.2 WOOD MATERIALS

A. Wood Products: Provide materials that comply with requirements of referenced quality standard for each type of architectural cabinet and quality grade specified unless otherwise indicated.

1. Wood Moisture Content: 8 to 13 percent.

B. Composite Wood and Agrifiber Products: Provide materials that comply with requirements of referenced quality standard for each type of architectural cabinet and quality grade specified unless otherwise indicated.

1. Softwood Plywood: DOC PS 1
2. Thermoset Decorative Panels: Particleboard or MDF finished with thermally fused, melamine-impregnated decorative paper and complying with requirements of NEMA LD 3, Grade VGL, for Test Methods 3.3, 3.4, 3.6, 3.8, and 3.10.

2.3 CABINET HARDWARE AND ACCESSORIES

A. General: Provide cabinet hardware and accessory materials associated with architectural cabinets except for items specified in Section 08710 "Door Hardware."

B. Butt Hinges: 2-3/4-inch five-knuckle steel hinges made from 0.095-inch- thick metal, and as follows:
1. Semiconcealed Hinges for Overlay Doors: BHMA A156.9, B01521.

C. Wire Pulls: Back mounted, solid metal [4 inches (100 mm) long, 5/16 inch

D. Catches: Magnetic catches, BHMA A156.9, B03141

E. Shelf Rests: BHMA A156.9, B04013; metal, two-pin type with shelf hold-down clip.

F. Drawer Slides: BHMA A156.9.

1. Grade 1 and Grade 2: Side mounted and extending under bottom edge of drawer;full extension type; epoxy coated steel with polymer rollers

2. Grade 1HD-100 and Grade 1HD-200: Side mounted; full-overtravel-extension type; zinc-plated-steel ball-bearing slides.
3. For drawers not more than 3 inches high and not more than 24 inches wide, provide Grade 1.
4. For drawers more than 3 inches high, but not more than 6 high and not more than 24 inches wide, provide Grade 1HD-100.
5. For drawers more than 6 inches high or more than 24 inches wide, provide Grade 1HD-200.
6. For computer keyboard shelves, provide Grade 1HD-100.

G. Door Locks: BHMA A156.11, E07121.

H. Drawer Locks: BHMA A156.11, E07041.

I. Door and Drawer Silencers: BHMA A156.16, L03011.

J. Grommets for Cable Passage: **2-inch** OD, molded-plastic grommets and matching plastic caps with slot for wire passage.

1. Color: to match cabinet color

K. Exposed Hardware Finishes: For exposed hardware, provide finish that complies with BHMA A156.18 for BHMA finish number indicated.

1. Dark, Oxidized, Satin Bronze, Oil Rubbed: BHMA 613 for bronze base; BHMA 640 for steel base; match Architect's sample.
2. Bright Brass, Clear Coated: BHMA 605 for brass base; BHMA 632 for steel base.
3. Satin Chromium Plated: BHMA 626 for brass or bronze base; BHMA 652 for steel base.
4. Bright Chromium Plated: BHMA 625 for brass or bronze base; BHMA 651 for steel base.
5. Satin Stainless Steel: BHMA 630.

L. For concealed hardware, provide manufacturer's standard finish that complies with product class requirements in BHMA A156.9.

2.4 MISCELLANEOUS MATERIALS

A. Furring, Blocking, Shims, and Hanging Strips: Softwood or hardwood lumber kiln-dried to less than 15 percent moisture content.

B. Anchors: Select material, type, size, and finish required for each substrate for secure anchorage. Provide metal expansion sleeves or expansion bolts for post-installed anchors. Use nonferrous-metal or hot-dip galvanized anchors and inserts at inside face of exterior walls and at floors.

C. Adhesive for Bonding Plastic Laminate: Contact cement

1. Adhesive for Bonding Edges: Hot-melt adhesive

2.5 FABRICATION

A. Fabricate architectural cabinets to dimensions, profiles, and details indicated.

B. Complete fabrication, including assembly and hardware application, to maximum extent possible before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.

1. Notify Architect seven days in advance of the dates and times architectural cabinet fabrication will be complete.
2. Trial fit assemblies at fabrication shop that cannot be shipped completely assembled. Install dowels, screws, bolted connectors, and other fastening devices that can be removed after trial fitting. Verify that various parts fit as intended and check measurements of assemblies against field measurements before disassembling for shipment.

C. Shop-cut openings to maximum extent possible to receive hardware, appliances, electrical work, and similar items. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Sand edges of cutouts to remove splinters and burrs.

PART 3 - EXECUTION

3.1 PREPARATION

A. Before installation, condition cabinets to humidity conditions in installation areas for not less than 72 hours.

3.2 INSTALLATION

A. Grade: Install cabinets to comply with quality standard grade of item to be installed.

B. Assemble cabinets and complete fabrication at Project site to extent that it was not completed in the shop.

C. Anchor cabinets to anchors or blocking built in or directly attached to substrates. Secure with wafer-head cabinet installation screws.

D. Install cabinets level, plumb, and true in line to a tolerance of 1/8 inch in 96 inches (3 mm in 2400 mm)using concealed shims.

1. Scribe and cut cabinets to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.
2. Install cabinets without distortion so doors and drawers fit openings and are accurately aligned. Adjust hardware to center doors and drawers in openings and to provide

unencumbered operation. Complete installation of hardware and accessory items as indicated.

a. Install cabinets with o more than 1/8inch in96-inch sag, bow, or other variation from a straight line.
b. Fasten wall cabinets through back, near top and bottom, and at ends not more than 16 inches o.c. with No. 10 wafer-head sheet metal screws through metal backing or metal framing behind wall finish.

3.3 ADJUSTING AND CLEANING

A. Repair damaged and defective cabinets, where possible, to eliminate functional and visual defects. Where not possible to repair, replace architectural cabinets. Adjust joinery for uniform appearance.

B. Clean, lubricate, and adjust hardware.

C. Clean cabinets on exposed and semiexposed surfaces.

END OF SECTION 06411

SECTION 06441 - ORNAMENTAL WOODWORK

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Exterior ornamental woodwork for Arbor
2. Wood furring, blocking, shims, and hanging strips for installing ornamental work items unless concealed within other construction before woodwork installation.
3. Shop finishing of exterior ornamental woodwork.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product, including panel products finishing materials and processes.

B. Shop Drawings: Show location of each item, dimensioned plans and elevations, large-scale details, attachment devices, and other components.

C. Samples:
1. Lumber for transparent finish, for each species and cut, finished on one side and one edge.
2. Lumber and panel products with shop-applied opaque finish, for each finish system and color, with exposed surface finished.

1.3 INFORMATIONAL SUBMITTALS

A. Woodwork Quality Standard Compliance Certificates: [**AWI Quality Certification Program certificates**] [**WI Certified Compliance Program certificates**].

1.4 QUALITY ASSURANCE

A. Fabricator Qualifications: [**Certified participant in AWI's Quality Certification Program**] [**Licensee of WI's Certified Compliance Program**].

B. Installer Qualifications: [**Fabricator of products**] [**Certified participant in AWI's Quality Certification Program**] [**Licensee of WI's Certified Compliance Program**].

1.5 FIELD CONDITIONS

A. Weather Limitations for Exterior Work: Proceed with installation of exterior ornamental woodwork only when existing and forecasted weather conditions permit work to be performed and at least one coat of specified finish to be applied without exposure to rain, snow, or dampness.

B. Environmental Limitations for Interior Work: Do not deliver or install interior ornamental woodwork until building is enclosed, wet work is complete, and HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period.

PART 2 - PRODUCTS

2.1 ORNAMENTAL WOODWORK FABRICATORS

A. Fabricators: Subject to compliance with requirements, [**provide products by the following**] [**provide products by one of the following**] [**available fabricators offering products that may be incorporated into the Work include, but are not limited to, the following**]:

1. <**Insert, in separate subparagraphs, names and possibly contact information for preapproved woodworking firms**>.

2.2 ORNAMENTAL WOODWORK, GENERAL

A. Quality Standard: Unless otherwise indicated, comply with the "Architectural Woodwork Standards" for grades of ornamental woodwork indicated for construction, finishes, installation, and other requirements.

1. Provide labels and certificates from AWI certification program indicating that woodwork, including installation, complies with requirements of grades specified.

2.3 EXTERIOR ORNAMENTAL WORK FOR OPAQUE FINISH

A. Exterior ornamental work for opaque finish includes the following:

1. Arbor

B. Grade: Premium.

C. Regional Materials: Exterior ornamental work for opaque finish shall be manufactured within 500 miles of Project site from materials that have been extracted, harvested, or recovered, as well as manufactured, within 500 miles (800 km) of Project site.

D. Certified Wood: Wood and composite wood components of exterior ornamental work for opaque finish shall be certified as "FSC Pure"according to FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship," and FSC STD-40-004, "FSC Standard for Chain of Custody Certification."

E. Wood Species: Spanish Cedar

2.4 WOOD MATERIALS

A. Wood Products: Provide materials that comply with requirements of referenced quality standard for each type of ornamental woodwork and quality grade specified unless otherwise indicated.

1. Wood Moisture Content for Exterior Materials: 8 to 13 percent.

B. Composite Wood and Agrifiber Products: Provide materials that comply with requirements of referenced quality standard for each type of ornamental woodwork and quality grade specified unless otherwise indicated.

1. Recycled Content of Medium-Density Fiberboard and Particleboard: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 20 percent.
2. Composite Wood and Agrifiber Products: Products shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
3. Medium-Density Fiberboard: ANSI A208.2, Grade 130 , made with binder containing no urea formaldehyde].
4. Softwood Plywood: DOC PS 1, exterior,medium-density overlay.
5. Veneer-Faced Panel Products (Hardwood Plywood): HPVA HP-1made with adhesive containing no urea formaldehyde.

C. Water-Repellent Preservative Treated Materials: Comply with AWPA N1 (dip, spray, flood, or vacuum-pressure treatment) for exterior ornamental woodwork items indicated to receive water-repellent preservative treatment.

1. Preservative Chemicals: 3-iodo-2-propynyl butyl carbamate (IPBC)[**, combined with an insecticide containing chloropyrifos (CPF)**].
2. Extent of Water-Repellent Preservative Treatment: Treat [**exterior ornamental woodwork indicated**] [**all exterior ornamental woodwork unless otherwise indicated**].

2.5 MISCELLANEOUS MATERIALS

A. Exterior Blocking, Shims, and Nailers: Softwood or hardwood lumber, pressure-preservative treated, kiln dried to less than 15 percent moisture content.

1. Preservative Treatment by Pressure Process: AWPA U1; Use Category UC3b.

a. Kiln dry lumber after treatment to a maximum moisture content of 19 percent.
b. Mark lumber with treatment quality mark of an inspection agency approved by the American Lumber Standards Committee's (ALSC) Board of Review.

B. Nails for Exterior Use: hot-dip galvanized.

C. Screws for Exterior Use: hot-dip galvanized.

D. Provide self-drilling screws for metal-framing supports.

E. Anchors: Select material, type, size, and finish required for each substrate for secure anchorage. Provide metal expansion sleeves or expansion bolts for post-installed anchors. Use nonferrous-metal or hot-dip galvanized anchors and inserts at inside face of exterior walls and at floors.

F. Adhesives: Do not use adhesives that contain urea formaldehyde.

G. Adhesives: Use adhesives that meet the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

H. VOC Limits for Installation Adhesives and Sealants: Use products that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):

1. Wood Glues: 30 g/L.
2. Multipurpose Construction Adhesives: 70 g/L.
3. Structural Wood Member Adhesive: 140 g/L.
4. Architectural Sealants: 250 g/L.

2.6 FABRICATION

A. Fabricate ornamental woodwork to dimensions, profiles, and details indicated. Ease edges to radius indicated for the following:

1. Edges of Solid-Wood (Lumber) Members: 1/16 inch (1.5 mm) unless otherwise indicated.
2. Edges of Rails and Similar Members More Than 3/4 Inch (19 mm) Thick: 1/8 inch (3 mm).

B. Complete fabrication, including assembly and finishing, to maximum extent possible before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.

2.7 SHOP PRIMING

A. Exterior Ornamental Woodwork for Opaque Finish: Shop prime with one coat of wood primer specified in Section 09911 "Exterior Painting."

B. Preparations for Finishing: Comply with referenced quality standard for sanding, filling countersunk fasteners, sealing concealed surfaces, and similar preparations for finishing ornamental woodwork, as applicable to each unit of work.

1. Backpriming: Apply one coat of sealer or primer, compatible with finish coats, to concealed surfaces of woodwork. Apply two coats to surfaces installed in contact with concrete or masonry and to end-grain surfaces.

PART 3 - EXECUTION

3.1 PREPARATION

A. Before installation, condition ornamental woodwork to average prevailing humidity conditions in installation areas.

3.2 INSTALLATION

A. Grade: Install ornamental woodwork to comply with same grade as item to be installed.

B. Install ornamental woodwork level, plumb, true, and straight. Shim as required with concealed shims. Install level and plumb to a tolerance of 1/8 inch in 96 inches (3 mm in 2400 mm).

C. Scribe and cut ornamental woodwork to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.

D. Preservative-Treated Wood: Where cut or drilled in field, treat cut ends and drilled holes according to AWPA M4.

E. Anchor ornamental woodwork to anchors or blocking built in or directly attached to substrates. Secure with countersunk, concealed fasteners and blind nailing. Use fine finishing nails or finishing screws for exposed fastening, countersunk and filled flush with ornamental woodwork.

END OF SECTION 064400

SECTION 06640 - PLASTIC PANELING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes glass-fiber reinforced plastic (FRP) wall paneling and trim accessories.

1.2 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Samples: For plastic paneling and trim accessories.

1.3 QUALITY ASSURANCE

A. Surface-Burning Characteristics: As determined by testing identical products according to ASTM E 84 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Flame-Spread Index: 25or less.
2. Smoke-Developed Index: 450 or less.

PART 2 - PRODUCTS

2.1 PLASTIC SHEET PANELING

A. Gelcoat-finished, glass-fiber reinforced plastic panels complying with ASTM D 5319.
1. Basis-of-Design Product: Subject to compliance with requirements, provide Marlite gelcoated-finished, glass fiber reinforced plastic panel or comparable product by one of the following:

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a. Kemlite Company Inc
b. Nudo Products, Inc.

2. Nominal Thickness: Not less than 0.09 inch.
3. Surface Finish: Molded Pebble Texture.
4. Color: As selected by Architect from manufacturer's full range.
5. Panel Size: 48” x 120”

2.2 ACCESSORIES

A. Trim Accessories: Manufacturer's standard one-piece vinyl extrusions designed to retain and cover edges of panels. Provide division bars, inside corners, outside corners, and caps as needed to conceal edges.

1. Color: As selected by Architect from manufacturer's full range.

B. Adhesive: As recommended by plastic paneling manufacturer.

C. Sealant: silicone waterproof sealant provided by plastic paneling manufacturer..

PART 3 - EXECUTION

3.1 PREPARATION

A. Clean substrates of substances that could impair bond of adhesive, including oil, grease, dirt, and dust.

B. Condition panels by unpacking and placing in installation space before installation according to manufacturer's written recommendations.

C. Lay out paneling before installing. Locate panel joints to provide equal panels at ends of walls not less than half the width of full panels.

3.2 INSTALLATION

A. Install plastic paneling according to manufacturer's written instructions.

B. Panels to be opened and allowed to acclimate for 48 hours prior to installation.

C. Install panels in a full spread of adhesive.

D. Install trim accessories with nails or staples or per manufacturer’s written instructions. Do not fasten through panels.

E. Fill grooves in trim accessories with sealant before installing panels and bed inside corner trim in a bead of sealant.

F. Install base trim to substrate with continuous adhesive per manufacturer’s instructions prior to installing panels.

G. Maintain uniform space between panels and wall fixtures. Provide a minimum 1/8” expansion space to insure proper installation. Fill space with sealant.

H. Remove excess sealant and smears as paneling is installed. Clean with solvent recommended by sealant manufacturer and then wipe with clean dry cloths until no residue remains. Do not use abrasive cleaners.

END OF SECTION 06640

DIVISION 07

SECTION 07161 - CRYSTALLINE WATERPROOFING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes crystalline waterproofing for negative-side application to concrete concealed exterior cast in place walls and columns and elevator walls and pit.

B. Related Sections:

1. Section 033000 "Cast-in-Place Concrete" for waterstops, and finishing concrete walls and slabs to receive waterproofing.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated. Include material descriptions and installation instructions for crystalline waterproofing.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Applicator.

B. Product Certificates: For waterproofing, patching, and plugging materials, from manufacturer.

C. Product Test Reports: Based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified testing agency, for crystalline waterproofing.

D. Field quality-control reports.

1.5 QUALITY ASSURANCE

A. Applicator Qualifications: A firm experienced in applying crystalline waterproofing similar in material, design, and extent to that indicated for this Project, whose work has resulted in applications with a record of successful in-service performance, and that employs workers trained and approved by manufacturer.

B. Mockups: Provide mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Build mockup of typical vertical surfaces10 sq. ft. (0.9 sq. m) in size.

2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
3. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

C. Preinstallation Conference: Conduct conference at Project site.

1.6 PROJECT CONDITIONS

A. Weather Limitations: Proceed with application only when existing and forecasted weather conditions permit crystalline waterproofing to be performed according to manufacturer's written instructions.

B. Proceed with waterproofing work only after pipe sleeves, vents, curbs, inserts, drains, and other projections through the substrate to be waterproofed have been completed. Proceed only after substrate defects, including honeycombs, voids, and cracks, have been repaired to provide a sound substrate free of forming materials, including reveal inserts.

C. Ambient Conditions: Proceed with waterproofing work only if temperature is maintained at 40 deg F (4.4 deg C) or above during work and cure period, and space is well ventilated and kept free of water.

PART 2 - PRODUCTS

2.1 WATERPROOFING MATERIALS

A. Crystalline Waterproofing: Prepackaged, gray-colored proprietary blend of portland cement, specially treated sand, and active chemicals that, when mixed with water and applied, penetrates into concrete and concrete unit masonry and reacts chemically with the byproducts of cement hydration in the presence of water to develop crystalline growth within substrate capillaries to produce an impervious, dense, waterproof substrate; that has VOC content complying with limits of authorities having jurisdiction; with properties meeting or exceeding the criteria specified below.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

   a. American PERMAQUIK Inc.; Super 200.
   b. Anti-Hydro International, Inc.; A-H Hydrocap.
   c. AQUAFIN, Inc.; AQUAFIN-1C.
   d. BASF Building Systems; Tegraproof.
   e. Conproco Corporation; Conpro Super Seal.
   f. Euclid Tamms; [**HEY'DI K-11**] [**HEY'DI POWER X SYSTEM**].
   g. Gemite Products Inc.; Cem-Kote CW Plus.
   h. ICS Penetron International Ltd.; Penetron.
   i. International Chem-Crete, Inc.; Chem-Cretex Cem 600.
   j. IPA Systems, Inc.; Drycon.
   k. Kryton Group of Companies (The); Krystol T1 & T2 Waterproofing System.
   l. Vandex USA LLC; Vandex Super/Super White.
   m. Xypex Chemical Corporation; Xypex.

2. Water Permeability: Maximum zero for water at 30 feet (9 m) when tested according to CE CRD-C 48.
3. Compressive Strength: Minimum 4000 psi (27.6 MPa) at 28 days when tested according to ASTM C 109/C 109M.

2.2 ACCESSORY MATERIALS

A. Patching Compound: Factory-premixed cementitious repair mortar, crack filler, or sealant recommended by waterproofing manufacturer for filling and patching tie holes, honeycombs, reveals, and other imperfections; compatible with substrate and other materials indicated; and VOC content complying with limits of authorities having jurisdiction.

B. Plugging Compound: Factory-premixed cementitious compound with hydrophobic properties and recommended by waterproofing manufacturer; resistant to water and moisture but vapor permeable for all standard applications (vertical, overhead, and horizontal surfaces not exposed to vehicular traffic); compatible with substrate and other materials indicated; and VOC content complying with limits of authorities having jurisdiction.

C. Portland Cement: ASTM C 150, Type I.

D. Sand: ASTM C 144.

E. Polymer Admixture for Protective Topping: Polymer bonding agent and admixture designed to improve adhesion to prepared substrates and not to create a vapor barrier.

F. Water: Potable.

2.3 MIXES

A. Crystalline Waterproofing: Add prepackaged dry ingredients to water according to manufacturer's written instructions. Mix together with mechanical mixer or by hand to required consistency.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Applicator present, for suitable conditions where waterproofing is to be applied.

B. Proceed with application only after unsatisfactory conditions have been corrected.

C. Notify Architect in writing of active leaks or defects that would affect system performance.

3.2 PREPARATION

A. Protect other work from damage caused by cleaning, preparation, and application of waterproofing. Provide temporary enclosure to confine spraying operation and to ensure adequate ambient temperatures and ventilation conditions for application.

B. Do not allow waterproofing, patching, and plugging materials to enter reveals or annular spaces intended for resilient sealants or gaskets, such as joint spaces between pipes and pipe sleeves.

C. Stop active water leaks with plugging compound according to waterproofing manufacturer's written instructions.

D. Repair damaged or unsatisfactory substrate with patching compound according to manufacturer's written instructions.

E. Surface Preparation: Comply with waterproofing manufacturer's written instructions to remove efflorescence, chalk, dust, dirt, mortar spatter, grease, oils, paint, curing compounds, and form-release agents to ensure that waterproofing bonds to surfaces.

1. Clean concrete surfaces according to ASTM D 4258.

    a. Scratch- and Float-Finished Concrete: Etch with 10 percent muriatic (hydrochloric) acid solution according to ASTM D 4260.
    b. Prepare smooth-formed and trowel-finished concrete by mechanical abrading or abrasive-blast cleaning according to ASTM D 4259.

2. Clean concrete unit masonry surfaces according to ASTM D 4261.

    a. Lightweight Concrete Unit Masonry: Etch with 10 percent muriatic (hydrochloric) acid solution or abrade surface by wire brushing. Remove acid residue until pH readings of water after rinse are not more than 1.0 pH lower or 2.0 pH higher than pH of water before rinse.
    b. Medium- and Normal-Weight Concrete Unit Masonry: Sandblast or bushhammer to a depth of 1/16 inch (1.6 mm).

3. Concrete Joints: Clean reveals according to waterproofing manufacturer's written instructions.

3.3 APPLICATION

A. General: Comply with waterproofing manufacturer's written instructions for application and curing.

1. Saturate surface with water for several hours prior to application and maintain damp condition until applying waterproofing. Remove standing water.
2. Apply waterproofing to surfaces indicated on Drawings.
3. Number of Coats: Number required for specified water permeability.
4. Application Method: Spray. Apply to ensure that each coat fills voids and is in full contact with substrate or previous coat.
5. Dampen surface between coats.

B. Final Coat Finish: Smooth.

C. Curing: Moist-cure waterproofing for three days immediately after final coat has set, followed by air drying, unless otherwise recommended in writing by manufacturer.

D. Waterproofing Treatment Extensions: Extend waterproofing treatment as follows:

1. Onto columns integral with treated walls.

2. Onto interior nontreated walls intersecting exterior treated walls, for a distance of 24 inches (600 mm) for cast-in-place concrete.
3. Onto every substrate in areas indicated for treatment, including pipe trenches pipe chases pits sumps and similar offsets and features.

3.4 FIELD QUALITY CONTROL

A. Inspection: Engage manufacturer's representative to inspect completed application and provide a written report that application complies with manufacturer's written instructions.

END OF SECTION 071616

SECTION 07210 - BUILDING INSULATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:
   1. Mineral-wool board insulation.
   2. Glass-fiber blanket insulation.
   3. Spray polyurethane foam insulation.
   4. Foam-plastic board insulation

B. Related Sections:
   1. Division 7 Section “Fluid Applied Membrane Air Barriers” for installation of moisture barriers
   2. Division 7 Section “Styrene–Butadiene-Styrene” (SBS) modified bituminous membrane roofing
   3. Division 7 Section “Fire Resistive Joint Sytems” for insulation installed as part of fire resistive joint system
   4. Division 9 Section “ Non-Load Bearing Steel Framing” for installation of board to “Z” channels

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

1.4 INFORMATIONAL SUBMITTALS

A. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for each product.

1.5 QUALITY ASSURANCE

A. Surface-Burning Characteristics: As determined by testing identical products according to ASTM E 84 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Protect insulation materials from physical damage and from deterioration due to moisture, soiling, and other sources. Store inside and in a dry location. Comply with manufacturer's written instructions for handling, storing, and protecting during installation.

PART 2 - PRODUCTS

2.1 GLASS-FIBER BLANKET INSULATION

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. CertainTeed Corporation.
2. Guardian Building Products, Inc.
3. Johns Manville.
4. Knauf Insulation.
5. Owens Corning.

B. Unfaced, Glass-Fiber Blanket Insulation: ASTM C 665, Type I; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively, per ASTM E 84; passing ASTM E 136 for combustion characteristics.

2.2 MINERAL-WOOL BLANKET INSULATION

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Fibrex Insulations Inc.
2. Owens Corning.
3. Roxul Inc.
4. Thermafiber.

B. Unfaced, Mineral-Wool Blanket Insulation: ASTM C 665, Type I (blankets without membrane facing); consisting of fibers; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively, per ASTM E 84; passing ASTM E 136 for combustion characteristics.

2.3 SPRAY POLYURETHANE FOAM INSULATION

A. Closed-Cell Polyurethane Foam Insulation: ASTM C 1029, Type II, with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, per ASTM E 84.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. BaySystems NorthAmerica, LLC.
   b. or comparable product approved by Architect.

2. Minimum density of 1.5 lb/cu. ft. (24 kg/cu. m), thermal resistivity of 6.2 deg F x h x sq. ft./Btu x in. at 75 deg F (43 K x m/W at 24 deg C).

2.4 FOAM-PLASTIC BOARD INSULATION

A. Extruded-Polystrene Board Insulation: ASTM C 578, of type and minimum compressive strength indicated below, with maximum flame – spread and smoke developed indexes of 75 and 450, respectively, per ASTM E 84

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Divers; foam products
    b. Dow Chemical Company (the)
    c. Owens Corning
    d. Pactiv Building Products

2. Type IV, 25 psi

B. Adhesive for Bonding Insulation: Product with demonstrated capability to bond insulation securely to substrates without demaging insulation and substrates.

2.5 INSULATION FASTENERS

A. Adhesively Attached, Spindle-Type Anchors: Plate welded to projecting spindle; capable of holding insulation of specified thickness securely in position indicated with self-locking washer in place.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

    a. AGM Industries, Inc.; Series T TACTOO Insul-Hangers.
    b. Gemco; Spindle Type.

2. Spindle: Copper-coated, low-carbon steel; fully annealed; 0.105 inch (2.67 mm) in diameter; length to suit depth of insulation indicated.

B. Adhesively Attached, Angle-Shaped, Spindle-Type Anchors: Angle welded to projecting spindle; capable of holding insulation of specified thickness securely in position indicated with self-locking washer in place.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

    a. Gemco; 90-Degree Insulation Hangers.

C. Anchor Adhesive: Product with demonstrated capability to bond insulation anchors securely to substrates indicated without damaging insulation, fasteners, and substrates.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

    a. AGM Industries, Inc.; TACTOO Adhesive.
    b. Gemco; Tuff Bond Hanger Adhesive.

PART 3 - EXECUTION

3.1 PREPARATION

A. Clean substrates of substances that are harmful to insulation or that interfere with insulation attachment.

3.2 INSTALLATION, GENERAL

A. Comply with insulation manufacturer's written instructions applicable to products and applications indicated.

B. Install insulation that is undamaged, dry, and unsoiled and that has not been left exposed to ice, rain, or snow at any time.

C. Extend insulation to envelop entire area to be insulated. Cut and fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.

D. Provide sizes to fit applications indicated and selected from manufacturer's standard thicknesses, widths, and lengths. Apply single layer of insulation units to produce thickness indicated unless multiple layers are otherwise shown or required to make up total thickness.

3.3 INSTALLATION OF INSULATION FOR FRAMED CONSTRUCTION

A. Apply insulation units to substrates by method indicated, complying with manufacturer's written instructions. If no specific method is indicated, bond units to substrate with adhesive or use mechanical anchorage to provide permanent placement and support of units.

B. Foam-Plastic Board Insulation: Seal joints between units by applying adhesive, mastic, or sealant to edges of each unit to form a tight seal as units are shoved into place. Fill voids in completed installation with adhesive, mastic, or sealant as recommended by insulation manufacturer. (Alternate)

C. Glass-Fiber or Mineral-Wool Blanket Insulation: Install in cavities formed by framing members according to the following requirements:

1. Use insulation widths and lengths that fill the cavities formed by framing members. If more than one length is required to fill the cavities, provide lengths that will produce a snug fit between ends.
2. Place insulation in cavities formed by framing members to produce a friction fit between edges of insulation and adjoining framing members.
3. Maintain 3-inch (76-mm) clearance of insulation around recessed lighting fixtures not rated for or protected from contact with insulation.
4. For metal-framed wall cavities where cavity heights exceed 96 inches (2438 mm), support unfaced blankets mechanically and support faced blankets by taping flanges of insulation to flanges of metal studs.

D. Spray-Applied Insulation: Apply spray-applied insulation according to manufacturer's written instructions. Do not apply insulation until installation of pipes, ducts, conduits, wiring, and electrical outlets in walls is completed and windows, electrical boxes, and other items not

indicated to receive insulation are masked. After insulation is applied, make flush with face of studs by using method recommended by insulation manufacturer.

E. Miscellaneous Voids: Install insulation in miscellaneous voids and cavity spaces where required to prevent gaps in insulation using the following materials:
1. Spray Polyurethane Insulation: Apply according to manufacturer's written instructions.

3.4 INSTALLATION OF CAVITY-WALL INSULATION

A. Foam-plastic Board Insulation: Install pads of adhesive approximately 24 inches o.c. both ways on inside face, and as recommended by manufacturer. Fit courses of insulation between wall ties and other obstructions with edges butted tightly in both directions. Press units firmly against inside substrates.

1. Supplement adhesive attachment of insulation by securing boards with two-piece wall ties designed for this purpose and specified in Division 4 Section “Unit Masonry Assemblies”

3.5 INSTALLATION OF INSULATION IN CEILINGS FOR SOUND ATTENUATION

A. Where glass-fiber blankets are indicated for sound attenuation above ceilings, install blanket insulation over entire ceiling area in thicknesses indicated. Extend insulation 48 inches (1219 mm) up either side of partitions.

3.6 PROTECTION

A. Protect installed insulation from damage due to harmful weather exposures, physical abuse, and other causes. Provide temporary coverings or enclosures where insulation is subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.

B. Ignition Barrier: Spray foam insulation requires Intumescent coating for all applications. Bayseal

3.7 INSULATION SCHEDULE

A. Insulation Type 1: Unfaced, glass-fiber blanket insulation.: used for sound attenuation between classrooms and between classrooms and hallways. Also for all bathroom walls.

B. Insulation Type 2: Unfaced, mineral-wool blanket insulation. Used for fire resistance in walls requiring one hour fire separation.

C. Insulation Type 3: Polyurethane spray foam insulation. Used for all exterior walls and underside of roof deck. R-31 for roof (Alternate for exterior steel stud walls) R-19 for walls

D. Insulation Type 4: Extruded-Polystyrene Board Insulation used for Masonry Exterior Walls R-19 for walls.

END OF SECTION 07210

SECTION 07250 - WEATHER BARRIERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Building paper at stud wall sheathing
2. Flexible flashing.

B. Related Requirements:

1. Section 06160 "Sheathing" for sheathing joint and penetration treatment.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. For building paper, include data on air and water-vapor permeance based on testing according to referenced standards.

2. Flexible flashing, include membrane mils, sizes available and limitations

1.4 INFORMATIONAL SUBMITTALS

A. Evaluation Reports: For water-resistive barrier and flexible flashing, from ICC-ES.

PART 2 - PRODUCTS

2.1 WATER-RESISTIVE BARRIER

A. Building Paper: ASTM D 226, Type 1 (No. 15 asphalt-saturated organic felt), unperforated.

B. Building Paper: Water-vapor-permeable, asphalt-saturated kraft building paper.

1. Water vapor transmission not less than 35 g/sq. m x 24 hr per ASTM D 779.
2. Water resistance not less than 1 hour per ASTM F 1249.

C. Building-Wrap Tape: Pressure-sensitive plastic tape recommended by building-wrap manufacturer for sealing joints and penetrations in building wrap.

2.2 MISCELLANEOUS MATERIALS

A. Flexible Flashing: Composite, self-adhesive, flashing product consisting of a pliable, **butyl** rubber or rubberized-asphalt compound, bonded to a high-density polyethylene film, aluminum foil, or spunbonded polyolefin to produce an overall thickness of not less than 0.025 inch (0.64 mm) Retain "Products" Subparagraph and list of manufacturers and products below to require specific products or a comparable product from other manufacturers.

1. Products: Subject to compliance with requirements, provide one of the following:

   a. DuPont (E. I. du Pont de Nemours and Company); DuPont Flashing Tape.
   b. Grace Construction Products, a unit of W. R. Grace & Co. - Conn.; Vycor Butyl Self Adhered Flashing.
   c. Protecto Wrap Company; BT-25 XL.
   d. Raven Industries Inc.; Fortress Flashshield.
   e. Advanced Building Products Inc.; Wind-o-wrap.
   f. Carlisle Coatings & Waterproofing; CCW-705-TWF Thru-Wall Flashing.
   g. Fiberweb, Clark Hammerbeam Corp.; Aquaflash 500.
   h. Fortifiber Building Systems Group; [**Fortiflash 25**] [**Fortiflash 40**].
   i. Grace Construction Products, a unit of W. R. Grace & Co. - Conn.; [**Vycor Plus Self-Adhered Flashing**] [**Vycor V40 Self-Adhered Flashing**].
   j. MFM Building Products Corp.; Window Wrap.
   k. Polyguard Products, Inc.; [**Polyguard JT-20 Tape**] [**Polyguard JT-30 Tape**].
   l. Sandell Manufacturing Co., Inc.; Presto-Seal.
   m.

B. Primer for Flexible Flashing: Product recommended by manufacturer of flexible flashing for substrate.

C. Nails: ASTM F 1667.

PART 3 - EXECUTION

3.1 WATER-RESISTIVE BARRIER INSTALLATION

A. Ensure items which pass through membrane are properly and rigidly installed, substrate is free of projections and irregularities which may be detrimental to proper installation of membrane .

B. Cover exposed exterior surface of sheathing with water-resistive barrier securely fastened to framing immediately after sheathing is installed.

C. Cover sheathing with water-resistive barrier as follows:

1. Cut back barrier 1/2 inch (13 mm) on each side of the break in supporting members at expansion- or control-joint locations.
2. Apply barrier to cover vertical flashing with a minimum 4-inch (100-mm) overlap unless otherwise indicated.

D. Sealing: Seal edges, fasteners and items projecting through barrier

E. Building Paper: Apply horizontally with a 2-inch overlap and a 6-inch end lap; fasten to sheathing with galvanized staples or roofing nails.

F. Inspect and repair membrane prior to application of finished material over membrane; tape tears, perforations and similar damage.

3.2 FLEXIBLE FLASHING INSTALLATION

A. Apply flexible flashing where indicated to comply with manufacturer's written instructions.

1. Prime substrates as recommended by flashing manufacturer.
2. Lap seams and junctures with other materials at least 4 inches except that at flashing flanges of other construction, laps need not exceed flange width.
3. Lap flashing over water-resistive barrier at sides of openings.
4. Lap water-resistive barrier over flashing at heads and sills of openings
5. Lap water-resistive barrier over flashing at through flashing
6. After flashing has been applied, roll surfaces with a hard rubber or metal roller to ensure that flashing is completely adhered to substrates.

B. Protect flashing from damage of other trades or construction materials

C. Cover flashing within 30 days or per manufacturer’s written instructions.

END OF SECTION 07250

SECTION 07272 - FLUID-APPLIED MEMBRANE AIR BARRIERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:
   1. Vapor-permeable, fluid-applied air barriers for the interior of CMU block walls

B. Related Requirements:
   1. Section 042000 “Unit Masonry” for concrete masonry walls
   2. Section 092216 “Non-Structural Metal Framing” for metal and wood stud walls furred at interior side of CMU block walls.

1.3 DEFINITIONS

A. Air-Barrier Material: A primary element that provides a continuous barrier to the movement of air.

B. Air-Barrier Accessory: A transitional component of the air barrier that provides continuity.

C. Air-Barrier Assembly: The collection of air-barrier materials and accessories applied to an opaque wall, including joints and junctions to abutting construction, to control air movement through the wall.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site

   1. Review air-barrier requirements and installation, special details, mockups, air-leakage and bond testing, air-barrier protection, and work scheduling that covers air barriers.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

   1. Include manufacturer's written instructions for evaluating, preparing, and treating each substrate; technical data; wet and dry film thickness; and tested physical and performance properties of products.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Product Certificates: From air-barrier manufacturer, certifying compatibility of air barriers and accessory materials with Project materials that connect to or that come in contact with the barrier.

C. Product Test Reports: For each air-barrier assembly, for tests performed by a qualified testing agency.

1.7 QUALITY ASSURANCE

A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.

1. A company experienced in applying air barrier materials similar in material, design, and extent to those indicated for this Project, whose work has resulted in applications with a record of successful in-service performance.
2. Verification that Installer completed SWR Institute's Validated Air Barrier Training Program and is approved to perform work as herein specified by air and water-resistive barrier system manufacturer.

B. Mockups: Build mockups to set quality standards for materials and execution Keep mock-ups available for inspection throughout project.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Sequence deliveries to avoid delays, and to minimize on-site storage.

B. Remove and replace liquid materials that cannot be applied within their stated shelf life.

C. Deliver materials and products in labeled packages.

D. Store and handle in strict compliance with manufacturer's instructions and recommendations.

E. Protect from damage, weather, excessive temperatures, and construction operations.

F. Remove damaged material from site and dispose of in accordance with applicable regulations.

1.9 FIELD CONDITIONS

A. Environmental Limitations: Apply air barrier within the range of ambient and substrate temperatures recommended in writing by air-barrier manufacturer.

1. Protect substrates from environmental conditions that affect air-barrier performance.
2. Do not apply air barrier to a damp or wet substrate or during snow, rain, fog, or mist.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Source Limitations: Obtain primary air-barrier materials and air-barrier accessories from single source from single manufacturer.

B. VOC Content: 30 g/L or less.

2.2 PERFORMANCE REQUIREMENTS

A. Air-Barrier Performance: Air-barrier assembly and seals with adjacent construction shall be capable of performing as a continuous air barrier. Air-barrier assemblies shall be capable of accommodating substrate movement and of sealing substrate expansion and control joints, construction material changes, penetrations and transitions at perimeter conditions without deterioration and air leakage exceeding specified limits.

B. Air-Barrier Assembly Air Leakage: Maximum 0.04 cfm/sq. ft. of surface area at 1.57 lbf/sq. ft. (0.2 L/s x sq. m of surface area at 75 Pa) , when tested according to ASTM E 2357.

2.3 LOW-BUILD AIR BARRIERS, VAPOR PERMEABLE

A. Low-Build, Vapor-Permeable Air Barrier: Silyl-Terminated-Poly-Ether (STPe**)** material with an installed dry film thickness, according to manufacturer's written instructions, of 6 to 15 mils (1.5 to 0.38 mm) over smooth, void-free substrates.

1. Manufactures: subject to compliance with requirements, available manufacturers offering products that may be incorporated into the work:

   a. PROSOCO Inc.; R-Guard Cat5
   b. Dow Chemical Co.; Dowsil Defunderair 200
   c. GE Silicones; Elemax 2600

2. Physical and Performance Properties:

   a. Air Permeance: Maximum 0.004 cfm/sq. ft. of surface area at 1.57-lbf/sq. ft. (0.02 L/s x sq. m of surface area at 75-Pa) pressure difference; ASTM E 2178.
   b. Vapor Permeance: Minimum 10 perms (580 ng/Pa x s x sq. m); ASTM E 96/E 96M, Desiccant Method, Procedure A.
   c. Adhesion to Substrate: Minimum 16 lbf/sq. in. (110 kPa) when tested according to ASTM D 4541.
   d. Fire Propagation Characteristics: Passes NFPA 285 testing as part of an approved assembly.

2.4 ACCESSORY MATERIALS

A. Requirement: Provide primers, transition strips, termination strips, joint reinforcing fabric and strips, joint sealants, counterflashing strips, flashing sheets and metal termination bars, termination mastic, substrate patching materials, adhesives, tapes, foam sealants, lap sealants, and other accessory materials that are recommended in writing by air-barrier manufacturer to

produce a complete air-barrier assembly and that are compatible with primary air-barrier material and adjacent construction to which they may seal.

1. Liquid-type auxiliary materials shall comply with VOC requirements.
2. Wet-weather accessories compatible with the primary Wet-Weather Fluid Applied Vapor-Permeable Membrane System shall be comprised of Silyl-Terminated-Poly-Ether (STPe).

B. Substrate-Patching Material: Manufacturer's standard substrate filler as recommended for preparation of cracks and overdriven fasteners, as recommended by air barrier manufacturer.

C. Stainless-Steel Sheet: ASTM A 240/A 240M, Type 304, and Series 300 stainless-steel fasteners.

D. Preformed Silicone Extrusion: Manufacturer's standard system consisting of cured low-modulus silicone extrusion, sized to fit opening widths, with a single-component, neutral-curing, Class 100/50 (low-modulus) silicone sealant for bonding extrusions to substrates.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a) PROSOCO, Inc.
b) Dow Chemical
c) GE Silicones

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements and other conditions affecting performance of the Work.

1. Verify that substrates are sound and free of oil, grease, dirt, excess mortar, or other contaminants.
2. Verify that substrates have cured and aged for minimum time recommended in writing by air-barrier manufacturer.
3. Verify that substrates are visibly dry and free of moisture, unless approved by air barrier manufacturer.Test concrete substrates for capillary moisture by plastic sheet method according to ASTM D 4263.
4. Verify that masonry joints are flush and completely filled with mortar.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 SURFACE PREPARATION

A. Clean, prepare, treat, fill, and seal substrate and joints and cracks in substrate according to manufacturer's written instructions and details. Provide clean, dust-free, and dry substrate for air-barrier application.

1. Surfaces to receive fluid-applied, STPe accessory materials may be dry, damp, or wet to the touch. Brush away any standing water present before application. The products will tolerate rain immediately after application.

B. Mask off adjoining surfaces not covered by air barrier to prevent spillage and overspray affecting other construction.

C. Remove film-forming coatings, curing compounds, and form-release agents from concrete, and grease, oil, bitumen, paints, and other contaminants from all substrates.

D. Remove fins, ridges, mortar, and other projections and fill honeycomb, aggregate pockets, holes, and other voids in concrete with substrate-patching material.

E. Remove excess mortar from masonry ties, shelf angles, and other obstructions.

F. At changes in substrate plane, apply sealant or termination mastic beads at sharp corners and edges to form a smooth transition from one plane to another. See STPe product manufacturer's installation guidelines illustrations.

G. Cover gaps in substrate plane and form a smooth transition from one substrate plane to another with stainless-steel sheet mechanically fastened to structural framing to provide continuous support for air barrier.

H. Bridge isolation joints, expansion joints, and discontinuous wall-to-wall, deck-to-wall, and deck-to-deck joints with air-barrier accessory material that accommodates joint movement according to manufacturer's written instructions and details.

I. Apply primer to substrates at required rate and allow it to dry, as recommended by air barrier manufacturer.

3.3 JOINT TREATMENT

A. Concrete and Masonry: Prepare, treat, rout, and fill joints and cracks in substrate according to ASTM C 1193 and air-barrier manufacturer's written instructions. Remove dust and dirt from joints and cracks complying with ASTM D 4258 before coating surfaces.

1. Prepare, treat, rout, and fill joints and cracks in substrate according to ASTM C 1193 and air-barrier manufacturer's written instructions.
2. Remove dust and dirt from joints and cracks complying with ASTM D 4258 before coating surfaces.

3.4 ACCESSORIES INSTALLATION

A. Install accessory materials according to air-barrier manufacturer's written instructions and details to form a seal with adjacent construction and ensure continuity of air and water barrier.

B. Seal masonry reinforcing or ties and penetrations as recommended by air barrier manufacturer.

C. Seal top of through-wall flashings to air barrier as recommended by air barrier manufacturer.

D. Seal exposed edges of strips at seams, cuts, penetrations, and terminations not concealed by metal counterflashings or ending in reglets as recommended by air barrier manufacturer.

E. Repair punctures, voids, and deficient lapped seams in strips and transition strips as recommended by air barrier manufacturer.

3.5 PRIMARY AIR-BARRIER MATERIAL INSTALLATION

A. Apply air-barrier material to form a seal with strips and transition strips and to achieve a continuous air barrier according to air-barrier manufacturer's written instructions and details. Apply air-barrier material within manufacturer's recommended application temperature ranges.

1. Unless manufacturer recommends in writing against priming, apply primer to substrates at required rate and allow it to dry.
2. Where multiple prime coats are needed to achieve required bond, allow adequate drying time between coats.

B. Low-Build Air Barriers: Apply continuous unbroken air-barrier material to substrates according to the following thickness. Apply an increased thickness of air-barrier material in full contact around protrusions such as masonry ties.
1. Vapor-Permeable, Low-Build Air Barrier: Apply dry film thickness as recommended by air barrier manufacturer's literature to comply with performance requirements. Apply additional material as needed to achieve void- and pinhole-free surface, but do not exceed thickness on which required vapor permeability is based.

C. Do not cover air barrier until it has been tested and inspected by testing agency.

D. Correct deficiencies in air barrier that does not comply with requirements; repair substrates and reapply air-barrier components.

3.6 FIELD QUALITY CONTROL

A. ABAA Quality Assurance Program: Perform examinations, preparation, installation, testing, and inspections under ABAA's Quality Assurance Program.

B. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.

C. Inspections: Air-barrier materials, accessories, and installation are subject to inspection for compliance with requirements. Inspections may include the following:

1. Continuity of air-barrier system has been achieved throughout the building envelope with no gaps or holes.
2.
3. Surfaces have been primed, if applicable.
4. Compatible materials have been used.
5. Transitions at changes in direction and structural support at gaps have been provided.
6. Connections between assemblies (air-barrier and sealants) have complied with requirements for cleanliness, surface preparation and priming, structural support, integrity, and continuity of seal.
7. All penetrations have been sealed.

D. Tests: As determined by testing agency from among the following tests:

1. Air-Leakage-Location Testing: Air-barrier assemblies will be tested for evidence of air leakage according to ASTM E 1186, chamber pressurization or depressurization with smoke tracers or ASTM E 1186, chamber depressurization using detection liquids
2. Air-Leakage-Volume Testing: Air-barrier assemblies will be tested for air-leakage rate according to ASTM E 783 or ASTM E 2357.
3. Adhesion Testing: Air-barrier assemblies will be tested for required adhesion to substrate according to ASTM D 4541 for each 600 sq. ft. (56 sq. m) of installed air barrier or part thereof.

E. Air barriers will be considered defective if they do not pass tests and inspections.

1. Apply additional air-barrier material, according to manufacturer's written instructions, where inspection results indicate insufficient thickness.
2. Remove and replace deficient air-barrier components for retesting as specified above.

F. Repair damage to air barriers caused by testing; follow manufacturer's written instructions.

G. Prepare test and inspection reports.

3.7 CLEANING AND PROTECTION

A. Protect air-barrier system from damage during application and remainder of construction period, according to manufacturer's written instructions.

1. Protect air barrier from exposure to UV light and harmful weather exposure as recommended in writing by manufacturer. If exposed to these conditions for longer than recommended, remove and replace air barrier or install additional, full-thickness, air-barrier application after repairing and preparing the overexposed materials according to air-barrier manufacturer's written instructions.
2. Protect air barrier from contact with incompatible materials and sealants not approved by air-barrier manufacturer.

B. Clean spills, stains, and soiling from construction that would be exposed in the completed work using cleaning agents and procedures recommended in writing by manufacturer of affected construction.

C. Remove masking materials after installation.

END OF SECTION 072726

SECTION 07311 - ASPHALT SHINGLES

TIPS:

To view non-printing **Editor's Notes** that provide guidance for editing, click on MasterWorks/Single-File Formatting/Toggle/Editor's Notes.

To read **detailed research, technical information about products and materials, and coordination checklists**, click on MasterWorks/Supporting Information.

Content Requests:

<Double click here to submit questions, comments, or suggested edits to this Section.>

Access Manufacturer-Provided, AIA MasterSpec-Based Sections:

<Double click here for this Section based on specific manufacturer's products set as Basis-of-Design at ProductMasterSpec.com.>

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes: Asphalt Shingle roof at outdoor storage building

1. Glass-fiber-reinforced asphalt shingles.
2. Underlayment materials.
3. Metal flashing and trim.

1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.3 ACTION SUBMITTALS

A. Product Data: For the following:

1. Asphalt shingles.
2. Underlayment materials.
3. Asphalt roofing cement.
4. Elastomeric flashing sealant.

B. Shop Drawings: For metal flashing and trim.

C. Samples: For each exposed product and for each color and blend specified.

1.4 INFORMATIONAL SUBMITTALS

A. Product test reports.

B. Research reports for synthetic underlayment.

C. Sample warranty.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance data.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: An authorized installer who is trained and approved by manufacturer.

1.7 WARRANTY

A. Materials Warranty: Manufacturer agrees to repair or replace asphalt shingles that fail within specified warranty period.

1. Materials Warranty Period: 40 years from date of Substantial Completion, prorated, with first 10 years nonprorated.
2. Wind-Speed Warranty Period: Asphalt shingles will resist blow-off or damage caused by wind speeds of up to 130 mph for 15 years from date of Substantial Completion.
3. Algae-Resistance Warranty Period: Asphalt shingles will not discolor for 10 years from date of Substantial Completion.
4. Workmanship Warranty Period: 25 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Exterior Fire-Test Exposure: Provide asphalt shingles and related roofing materials identical to those of assemblies tested for Class A fire resistance in accordance with ASTM E108 or UL 790 by Underwriters Laboratories or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify products with appropriate markings of applicable testing agency.

B. Wind Resistance: Provide asphalt shingles that comply with requirements of ASTM D3161/D3161M, Class F, and with ASTM D7158/D7158M, Class H.

C. Energy Performance, ENERGY STAR: Provide asphalt shingles that are listed on the DOE's "ENERGY STAR Roof Product List" for steep-slope roof products.

2.2 GLASS-FIBER-REINFORCED ASPHALT SHINGLES

A. Three-Tab-Strip Asphalt Shingles: ASTM D3462/D3462M; glass-fiber reinforced, mineral-granule surfaced, and self-sealing; with tabs regularly spaced.

1. Basis of Design: Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include but not limited to, the following:
   a. GAF
   b. Owen Corning
   c. Cetainteed
2. Strip Size: Manufacturer's standard
3. Algae Resistance: Granules resist algae discoloration.
4. Color and Blends: As selected by Architect from manufacturer's full range

B. Hip and Ridge Shingles: Manufacturer's standard units to match asphalt shingles

2.3 UNDERLAYMENT MATERIALS

A. Organic Felt: Asphalt-saturated organic felts (30 lb. per 100 sq.ft.) , nonperforated and complying with the following:
   1. ASTM D4869/D4869M:Type II

2.4 ACCESSORIES

A. Asphalt Roofing Cement: ASTM D4586/D4586M Type II, asbestos free.

B. Elastomeric Flashing Sealant: ASTM C920, Type S, Grade NS, one-part, non-sag, elastomeric polymer sealant; of class and use classifications required to seal joints and remain watertight; recommended in writing by manufacturer for installation of flashing systems.

Roofing Nails: ASTM F1667, Where nails are in Standard round wire, zinc-coated steel or aluminum; 10 to 12 gauge, smooth, barbed or deformed shank, with heads 3/8 inch (9mm) to 7/16 inch (11mm) in diameter. Length must be sufficient to penetrate into solid wood at least 3/4 inch (19mm) or through plywood board by at least 1/8 inch (3.18mm)

1. contact with metal flashing, use nails made from same metal as flashing.

C. Underlayment Nails: Aluminum, stainless steel, or hot-dip galvanized-steel wire nails with low-profile metal or plastic caps, 1-inch- minimum diameter.

2.5 METAL FLASHING AND TRIM

A. Comply with requirements in Section 07620 "Sheet Metal Flashing and Trim."

1. Sheet Metal: 24 gauge hot-dip galvanized steel sheet, complying with ASTM A 653/A 653M, G90/Z275

B. Fabricate sheet metal flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of the item unless otherwise indicated on Drawings.

1. Vent-Pipe Flashings: ASTM B749, Type L51121, at least 1/16 inch thick. Provide lead sleeve sized to slip over and turn down into pipe, soldered to skirt at slope of roof, and extending at least 4 inches from pipe onto roof.

PART 3 - EXECUTION

3.1 INSTALLATION OF UNDERLAYMENT MATERIALS

A. Comply with asphalt shingle and underlayment manufacturers' written installation instructions and with recommendations in NRCA's "The NRCA Roofing Manual: Steep-Slope Roof Systems" applicable to products and applications indicated unless more stringent requirements are specified in this Section or indicated on Drawings.

B. Asphalt-Saturated Felt: Install on roof deck parallel with and starting at eaves and fasten with underlayment roofing nails.

1. Single-Layer Installation:

    a. Lap sides a minimum of 4 inches over underlying course.
    b. Lap ends a minimum of 4 inches.
    c. Stagger end laps between succeeding courses at least 72 inches

2. Double-Layer Installation:

    a. Install a 19-inch- wide starter course at eaves and completely cover with a 36-inch-wide second course.
    b. Install succeeding 36-inch- wide courses lapping previous courses 19 inches in shingle fashion.
    c. Lap ends a minimum of 4 inches Stagger end laps between succeeding courses at least 72 inches
    d. Apply a continuous layer of asphalt roofing cement over starter course and on felt surface to be concealed by succeeding courses as each felt course is installed. Apply over entire roof

3. Install felt underlayment on roof deck not covered by self-adhering, polymer-modified bitumen sheet unless otherwise specified in this Section or indicated on Drawings.

    a. Lap sides of felt over self-adhering sheet not less than 4 inches in direction that sheds water.
    b. Lap ends of felt not less than 6 inches over self-adhering sheet.

4. Install fasteners in a grid pattern of 12 inches between side laps with 6-inch spacing at side and end laps.
5.

C. Self-Adhering, Polymer-Modified Bitumen Sheet: Install, wrinkle free, on roof deck in locations indicated on Drawings.

1. Comply with low-temperature installation restrictions of underlayment manufacturer.
2. Install lapped in direction that sheds water.

    a. Lap sides not less than 4 inches

b. Lap ends not less than 6 inches , staggered 24 inches between succeeding courses
c. Roll laps with roller.

3. Prime concrete, masonry, and metal surfaces to receive self-adhering sheet.
4. Cover underlayment within seven days.

3.2 INSTALLATION OF METAL FLASHING AND TRIM

A. Install metal flashings and trim to comply with requirements in Section 07620 "Sheet Metal Flashing and Trim."

1. Install metal flashings in accordance with recommendations in ARMA's "Asphalt Roofing Residential Manual - Design and Application Methods" and NRCA's "NRCA Guidelines for Asphalt Shingle Roof Systems."
2. Bed flanges of metal flashings using asphalt roofing cement or elastomeric flashing sealant.

B. Pipe Flashings: Form flashing around pipe penetrations and asphalt shingles. Fasten and seal to asphalt shingles as recommended by manufacturer.

3.3 INSTALLATION OF ASPHALT SHINGLES

A. Install asphalt shingles in accordance with manufacturer's written instructions and recommendations in ARMA's "Asphalt Roofing Residential Manual - Design and Application Methods" and] NRCA's "NRCA Guidelines for Asphalt Shingle Roof Systems."

B. Install starter strip along lowest roof edge, consisting of an asphalt shingle strip with tabs removed at least 7 inches wide with self-sealing strip face up at roof edge.

1. Extend asphalt shingles 3/4 inch over fasciae at eaves and rakes.
2. Install starter strip along rake edge.

C. Install first and remaining courses of laminated asphalt shingles stair-stepping diagonally across roof deck with manufacturer's recommended offset pattern at succeeding courses, maintaining uniform exposure.

D. Install first and remaining courses of three-tab-strip asphalt shingles stair-stepping diagonally across roof deck with manufacturer's recommended offset pattern at succeeding courses, maintaining uniform exposure.

E. Fasten asphalt shingle strips with a minimum of four roofing nails, but not less than the number indicated in manufacturer's written instructions for roof slope and design wind speed indicated on Drawings and for warranty requirements specified in this Section.

F. Hip and Ridge Shingles: Maintain same exposure of cap shingles as roofing-shingle exposure. Lap cap shingles at ridges to shed water away from direction of prevailing winds.

1. Fasten with roofing nails of sufficient length to penetrate sheathing.
2. Fasten ridge cap asphalt shingles to cover ridge vent without obstructing airflow.

END OF SECTION 07311

SECTION 07460 - SIDING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Fiber-cement siding.

B. Related Sections:
1. Section 06160 "Sheathing" for wall sheathing and weather-resistive barriers.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Samples for Initial Selection: For siding and soffit including related accessories.

C. Samples for Verification: For each type, color, texture, and pattern required.

1. 12-inch- (300-mm-) long-by-actual-width Sample of siding.
2. 12-inch- (300-mm-) long-by-actual-width Samples of trim and accessories.

1.4 INFORMATIONAL SUBMITTALS

A. Product Certificates: For each type of siding from manufacturer.

B. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for fiber-cement siding.

C. Research/Evaluation Reports: For each type of siding required, from the ICC .

D. Warranty: Sample of special warranty.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For each type of siding and related accessories to include in maintenance manuals.

1.6 QUALITY ASSURANCE

A. Labeling: Provide fiber-cement siding that is tested and labeled according to ASTM C 1186 by a qualified testing agency acceptable to authorities having jurisdiction.

B. Source Limitations: Obtain each type, color, texture, and pattern of siding and soffit, including related accessories, from single source from single manufacturer.

C. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for fabrication and installation.

1. Build mockup of typical wall area as shown on Drawings.
2. Build mockups for siding including accessories.

    a. Size: 48 inches (1200 mm) long by 60 inches (1800 mm) high .
    b. Include outside corner on one end of mockup and inside corner on other end.

3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
4. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

D. Preinstallation Conference: Conduct conference at Project site .

1.7 DELIVERY, STORAGE, AND HANDLING

A. Store materials in a dry, well-ventilated, weather tight place.

1.8 COORDINATION

A. Coordinate installation with flashings and other adjoining construction to ensure proper sequencing.

1.9 WARRANTY

A. Special Warranty: Standard form in which manufacturer agrees to repair or replace siding that fail(s) in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

    a. Structural failures including cracking, deforming.
    b. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
    c. .
2. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 FIBER-CEMENT SIDING

A. General: ASTM C 1186, Type A, Grade II, fiber-cement board, noncombustible when tested according to ASTM E 136; with a flame-spread index of 25 or less when tested according to ASTM E 84.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. Cemplank.
b. CertainTeed Corp.
c. GAF Materials Corporation.
d. James Hardie.
e. MaxiTile, Inc; a California corporation.
f. Nichiha Fiber Cement.

2. Horizontal Pattern: Boards 5-1/4 inches (133 mm) wide in plain style.

a. Texture: Smooth .

3. Panel Texture: 48-inch- (1200-mm-) wide sheets with texture.

2.2 FIBER-CEMENT SOFFIT

A. General: ASTM C 1186, Type A, Grade II, fiber-cement board, noncombustible when tested according to ASTM E 136; with a flame-spread index of 25 or less when tested according to ASTM E 84.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following the following:

a. Cemplank.
b. CertainTeed Corp.
c. GAF Materials Corporation.
d. James Hardie.
e. Nichiha Fiber Cement>.

B. Pattern: [**12-inch- (300-mm-)**] wide sheets with smooth texture.

C. Ventilation: Provide perforated/vented soffit

D. Factory Priming: Manufacturer's standard acrylic primer.

2.3 ACCESSORIES

A. Siding Accessories, General: Provide starter strips, edge trim, outside and inside corner caps, and other items as recommended by siding manufacturer for building configuration.

1. Provide accessories made from same material as adjacent siding unless otherwise indicated.

B. Decorative Accessories: Provide the following fiber-cement decorative accessories as indicated:
1. Door casings .
2. Fascia.
3. Moldings and trim.
4.

C. Colors for Decorative Accessories: Match adjacent siding.

D. Flashing: Provide aluminum and self adhered flashing complying with Section 07620 "Sheet Metal Flashing and Trim" at window and door heads and where indicated.

1. Finish for Aluminum Flashing: Same as scheduled opening .

E. Fasteners:
1. For fastening to metal, use ribbed bugle-head screws of sufficient length to penetrate a minimum of 1/4 inch (6 mm), or three screw-threads, into substrate.
2. For fastening aluminum, use aluminum fasteners. Where fasteners will be exposed to view, use prefinished aluminum fasteners in color to match item being fastened.
3. For fastening fiber cement, use stainless-steel fasteners.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates for compliance with requirements for installation tolerances and other conditions affecting performance of siding and soffit and related accessories.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Clean substrates of projections and substances detrimental to application.

3.3 INSTALLATION

A. General: Comply with siding and soffit manufacturer's written installation instructions applicable to products and applications indicated unless more stringent requirements apply.

1. Do not install damaged components.
2. Center nails in elongated nailing slots without binding siding to allow for thermal movement.

B. Install fiber-cement siding, soffit and related accessories.

1. Install fasteners no more than 24 inches (600 mm) o.c.

C. Install joint sealants as specified in Section 07920 "Joint Sealants" and to produce a weathertight installation.

D. Where aluminum siding will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or by applying sealant or tape or installing nonconductive spacers as recommended by manufacturer for this purpose.

3.4 ADJUSTING AND CLEANING

A. Remove damaged, improperly installed, or otherwise defective materials and replace with new materials complying with specified requirements.

B. Clean finished surfaces according to manufacturer's written instructions and maintain in a clean condition during construction.

END OF SECTION 07460

SECTION 075216 - SBS MODIFIED BITUMINOUS MEMBRANE ROOFING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Styrene-butadiene-styrene (SBS)-modified bituminous membrane
2. Substrate board.
3. Vapor retarder / air barrier.
4. Roof insulation.
5. Cover board.
6. Walkways.

B. Related Information:

1. Section 070150 "Preparation for Reroofing" for full tearoff of existing roofing system and temporary protection prior to installation of new roofing.
2. Division 07 Section "Manufactured Roof Expansion Joints" for new expansion joint components installed by this Installer and covered under system warranty specified in this Section.
3. Division 07 Section "Joint Sealants" for application requirements for joint sealants required as part of the work of this Section.

1.2 DEFINITIONS

A. Roofing Terminology: Definitions in ASTM D1079 and glossary of NRCA's "The NRCA Roofing Manual: Membrane Roof Systems" apply to Work of this Section.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Roofing Conference: Conduct conference at Project site.

1. Meet with Owner, Architect, Owner's insurer if applicable, testing and inspecting agency representative, roofing Installer, roofing system manufacturer's representative, and installers whose work interfaces with or affects roofing, including installers of roof accessories and roof-mounted equipment.
2. Review methods and procedures related to roofing installation, including manufacturer's written instructions, specifications, drawing details, and referenced details.
3. Review and finalize construction schedule, and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
4. Review structural loading limitations of roof deck during and after roofing.
5. Review base flashings, special roofing details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that affects roofing system.
6. Review governing regulations and requirements for insurance and certificates if applicable.
7. Review temporary protection requirements for roofing system before, during, and after installation.
8. Review roof observation and repair procedures after roofing installation.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: Include plans, sections, details, and attachments to other work, including the following:

1. Layout and thickness of insulation.
2. Base flashings and membrane terminations.
3. Flashing details at penetrations.
4. Tapered insulation, including slopes.
5. Roof plan showing orientation of steel roof deck and orientation of roof membrane, fastening spacings, and patterns for mechanically fastened portions of roofing system.
6. Crickets, saddles, and tapered edge strips, including slopes.
7. Insulation fastening patterns for corner, perimeter, and field-of-roof locations.

C. Samples for Verification: For the following products:

1. Cap Sheet: Samples of specified color.
2. Flashing Sheet: Samples of specified color if different than cap sheet.
3. Walkway Pads or Rolls: Samples of specified color.

D. Wind Uplift Resistance Submittal: For roofing system indicating compliance with wind uplift performance requirements.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Contractor's Product Certificate: Submit notarized certificate, indicating products intended for Work of this Section, including product names and numbers and manufacturers' names, with statement indicating that products to be provided meet the requirements of the Contract Documents.

C. Manufacturer Certificates:

1. Performance Requirement Certificate: Signed by roof membrane manufacturer certifying that roofing system complies with requirements specified in "Performance Requirements" Article.

a. Submit evidence of complying with performance requirements.

2. Special Warranty Certificate: Signed by roof membrane manufacturer, certifying that all materials supplied under this Section are acceptable for special warranty.

D. Field quality-control reports.

E. Sample Warranties: For manufacturer's special warranties.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance Data: For roofing system to include in maintenance manuals.

1.7 QUALITY ASSURANCE

A. Manufacturer Qualifications: A qualified listed manufacturer that is UL listed for roofing system identical to that used for this Project.

B. Installer Qualifications: An employer of workers trained and certified by manufacturer, including a full-time on-site supervisor with a minimum of three years' experience installing products comparable to those specified, able to communicate verbally with Contractor, Architect, and employees, and qualified by the roofing system manufacturer to install manufacturer's product and furnish warranty of type specified.

1. For torch-applied applications, employ workers certified under NRCA's Certified Roofing Torch Applicator (CERTA) program.

C. Roofing Inspector Qualifications: A technical representative of manufacturer not engaged in the sale of products and experienced in the installation and maintenance of the specified roofing system, qualified to perform roofing observation and inspection specified in Field Quality Control Article, to determine Installer’s compliance with the requirements of this Project, and approved by the manufacturer to issue warranty certification. The Roofing Inspector shall be one of the following:

1. An authorized full-time technical employee of the manufacturer.
2. An independent party certified as a Registered Roof Observer by the Roof Consultants Institute, retained by the Contractor or the Manufacturer and approved by the Manufacturer.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Deliver roofing materials to Project site in original containers with seals unbroken and labeled with manufacturer's name, product brand name and type, date of manufacture, approval or listing agency markings, and directions for storing and mixing with other components.

B. Store liquid materials in their original undamaged containers in a clean, dry, protected location and within the temperature range required by roofing system manufacturer.

1. Protect stored liquid material from direct sunlight.
2. Discard and legally dispose of liquid material that cannot be applied within its stated shelf life.

C. Protect roof insulation materials from physical damage and from deterioration by sunlight, moisture, soiling, and other sources.

1. Store in a dry location.
2. Comply with insulation manufacturer's written instructions for handling, storing, and protecting during installation.

D. Handle and store roofing materials, and place equipment in a manner to avoid permanent deflection of deck.

1.9 FIELD CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit roofing system to be installed according to manufacturer's written instructions and warranty requirements.

B. Daily Protection: Coordinate installation of roofing so insulation and other components of roofing system not permanently exposed are not subjected to precipitation or left uncovered at the end of the workday or when rain is forecast.

1. Provide tie-offs at end of each day's work to cover exposed roofing and insulation with a course of roofing sheet securely in place with joints and edges sealed.
2. Complete terminations and base flashings and provide temporary seals to prevent water from entering completed sections of roofing.
3. Remove temporary plugs from roof drains at end of each day.
4. Remove and discard temporary seals before beginning work on adjoining roofing.

1.10 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of roofing system that fail in materials or workmanship within specified warranty period.

1. Special warranty includes roof membrane, base flashings, roof insulation, fasteners, cover boards, substrate board, and other components of roofing system.
2. Warranty Period: 15 years from date of Substantial Completion.

B. Special Project Warranty: Submit roofing Installer's warranty, on warranty form at end of this Section, signed by Installer, covering the Work of this Section, including all components of roofing system such as roof membrane, base flashing, roof insulation, fasteners, cover boards, substrate boards, vapor retarder / air barriers, and walkway products, for the following warranty period:

1. Warranty Period: Two years from date of Substantial Completion.

C. Extended Roof System Warranty: Warranties specified in this Section include the following components and systems specified in other sections supplied by the roofing system Manufacturer, and installed by the roofing system Installer:

1. Sheet metal flashing and trim, including roof penetration flashings.
2. Copings, roof edge, counterflashings, and reglets.
3. Roof and parapet expansion joint assemblies.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. General Performance: Installed roofing system and flashings shall withstand specified uplift pressures, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Roof system and flashings shall remain watertight.

1. Accelerated Weathering: Roof membrane shall withstand 2000 hours of exposure when tested according to ASTM G152, ASTM G154, or ASTM G155.

2. Impact Resistance: Roof membrane shall resist impact damage when tested according to ASTM D3746/D3746M, ASTM D4272/D4272M, or the "Resistance to Foot Traffic Test" in FM Approvals 4470.

B. Material Compatibility: Roofing materials shall be compatible with one another and adjacent materials under conditions of service and application required, as demonstrated by roof membrane manufacturer based on testing and field experience.

C. Wind Uplift Resistance: Provide membrane roofing system that is identical to systems that have been successfully tested by a qualified testing and inspecting agency in accordance with ANSI/FM 4474, UL 580, or UL 1897, and to resist uplift pressures calculated in accordance with ASCE-7 and applicable code.

1. All Zones (Corner, Perimeter, and Field-of-Roof) Uplift Pressures: As indicated on Contractor's approved shop drawings based upon Project design wind speed indicated on Drawings.

D. Flashings: Provide base flashings, perimeter flashings, detail flashings and component materials that comply with requirements and recommendations of the following:

1. FMG 1-49 Loss Prevention Data Sheet for Perimeter Flashings.
2. FMG 1-29 Loss Prevention Data Sheet for Above Deck Roof Components.
3. NRCA Roofing Manual (Sixth Edition) for construction details and recommendations.
4. SMACNA Architectural Sheet Metal Manual (Seventh Edition) for construction details.

E. MANUFACTURERS

F. Basis of Design: Subject to compliance with requirements, provide listed products of Firestone Building Products/HolcimElevate, or comparable products by one of the following:

1. GAF Materials Corporation.
2. Siplast, Inc.

G. Source Limitations: Obtain components for roofing system from roof membrane manufacturer or manufacturer approved by roof membrane manufacturer.

2.2 SBS MODIFIED BITUMINOUS BASE PLY SHEET

A. SBS-Modified Bitumen Type I, Polyester- and Glass-Fiber-Mat Base Sheet, Torch: ASTM D6164/D6164M, Type II, Grade S, SBS-modified asphalt sheet, reinforced with a combination of polyester fabric and glass fibers, smooth surfaced, suitable for torch application method.

1. Basis of Design Product: Firestone/HolcimElevate, SBS Premium Poly Base.

a. Peak Load at 73 deg. F, ASTM D5147: Not less than 70 lbf/in.
b. Tear Strength at 73 deg. F, ASTM D5147: Not less than 70 lbf.

2.3 SBS MODIFIED BITUMINOUS CAP SHEET

A. SBS-Modified Bitumen Type I, Polyester- and Glass-Fiber-Mat, Granule-Surfaced Cap Sheet, Torch: ASTM D6162/D6162M, Type I, Grade G, SBS-modified asphalt sheet, reinforced with a combination of polyester fabric and glass fibers; suitable for torch application method.

1. Basis of Design Product: Firestone/HolcimElevate, SBS Premium FR Torch.

a. Peak Load at 73 deg. F, ASTM D5147: Not less than 50 lbf/in.
b. Tear Strength at 73 deg. F, ASTM D5147: Not less than 50 lbf.

2. Granule Color: White.

2.4 BASE FLASHING SHEET MATERIALS

A. Backer Sheet: ASTM D4601/D4601M, Type I, asphalt-impregnated and -coated, glass-fiber sheet, dusted with fine mineral surfacing on both sides, or use product specified for base ply sheet.

B. Granule-Surfaced Flashing Sheet: ASTM D6164/D6164M, Type II, Grade G, SBS-modified asphalt sheet, reinforced with polyester fabric, granule surfaced, suitable for application method specified, and as follows:

1. Granule Color: Match cap sheet.

2.5 AUXILIARY ROOFING MATERIALS

A. General: Auxiliary materials recommended by roofing system manufacturer for intended use and compatible with other roofing components.

B. Metal Termination Bars: Manufacturer's standard, predrilled stainless-steel or aluminum bars, approximately 1 by 1/8 inch thick; with anchors.

C. Cold-Applied Polymer-Modified Asphalt Adhesive: Roof membrane manufacturer's standard solvent-and asbestos-free, cold-applied adhesive, specially formulated for compatibility and use with specified roof membranes.

D. Asphalt Roofing Cement: ASTM D4586/D4586M, asbestos free, of consistency required by roofing system manufacturer for application.

E. Mastic Sealant: Polyisobutylene, plain or modified bitumen; nonhardening, nonmigrating, nonskinning, and nondrying.

F. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Approvals 4470, designed for fastening roofing components to substrate; tested by manufacturer for required pullout strength, and acceptable to roofing system manufacturer.

G. Miscellaneous Accessories: Provide those recommended by roofing system manufacturer.

2.6 SUBSTRATE BOARDS

A. Substrate Board: ASTM C1177/C1177M, glass-mat, water-resistant gypsum substrate or ASTM C1278/C1278M, fiber-reinforced gypsum board. Use product approved in writing as substrate by roofing membrane manufacturer.

1. Thickness: 1/2 inch.
2. Surface Finish: Factory primed or unprimed as recommended by roofing membrane manufacturer based upon performance requirements.

B. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Approvals 4470, designed for fastening substrate board to roof deck.

2.7 VAPOR RETARDER / AIR BARRIER

A. Self-Adhering-Sheet Vapor retarder / air barrier: ASTM D1970/D1970M, polyethylene film laminated to layer of rubberized asphalt adhesive, minimum 40-mil-total thickness; maximum permeance rating of 0.1 perm; cold applied, with slip-resisting surface and release paper backing. Provide primer when recommended by vapor retarder / air barrier manufacturer.

2.8 ROOF INSULATION

A. General: Preformed roof insulation boards manufactured or approved by PVC roof membrane manufacturer, approved for use in FM Approvals' RoofNav listed roof assemblies.

B. Polyisocyanurate Board Insulation: ASTM C1289, Type II, Class 1, Grade 2, glass-fiber mat facer on both major surfaces.

1. Compressive Strength: 20 psi.

C. Tapered Insulation: Provide factory-tapered insulation boards.

1. Material: Match roof insulation.
2. Minimum Thickness: 1/4 inch.
3. Slope:

a. Roof Field: 1/4 inch per foot unless otherwise indicated on Drawings.
b. Saddles and Crickets: 1/2 inch per foot unless otherwise indicated on Drawings.

2.9 INSULATION ACCESSORIES

A. General: Roof insulation accessories recommended by insulation manufacturer for intended use and compatibility with other roofing system components.

B. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Approvals 4470, designed for fastening roof insulation to substrate, and acceptable to roofing system manufacturer.

C. Insulation Adhesive: Insulation manufacturer's recommended adhesive formulated to attach roof insulation to substrate or to another insulation layer as follows:

1. Bead-applied, low-rise, one-component or multicomponent urethane adhesive.

D. Wood Nailer Strips: Comply with requirements in Section 061053 "Miscellaneous Rough Carpentry."

E. Tapered Edge Strips: ASTM C208, Type II, Grade 1, cellulosic-fiber insulation board.

F. Cover Board: ASTM C1177/C1177M, glass-mat, water-resistant gypsum board or ASTM C1278/C1278M fiber-reinforced gypsum board.

1. Thickness: 1/2 inch.
2. Surface Finish: Factory primed or unprimed as recommended by roofing membrane manufacturer for application.

2.10 WALKWAYS

A. Walkway Pads: Polymer-modified, reconstituted rubber pads with slip-resisting textured surface, manufactured as a traffic pad for foot traffic and acceptable to roofing system manufacturer, 1/2-inch-thick, minimum.

1. Pad Size: Approximately 36 by 60 inches.
2. Color: Contrasting with cap sheet.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements and other conditions affecting performance of the Work.

1. Verify that roof openings and penetrations are in place, curbs are set and braced, and roof-drain bodies are securely clamped in place.
2. Verify that wood cants, blocking, and nailers are securely anchored to roof deck at penetrations and terminations and that nailers match thicknesses of insulation.
3. Verify that deck is securely fastened with no projecting fasteners and with no adjacent units in excess of 1/16 inch out of plane relative to adjoining deck.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Clean substrate of dust, debris, moisture, and other substances detrimental to roofing installation according to roofing system manufacturer's written instructions.

1. Remove sharp projections.

B. Prevent materials from entering and clogging roof drains and conductors and from spilling or migrating onto surfaces of other construction.

1. Remove roof-drain plugs when no work is taking place or when rain is forecast.

3.3 INSTALLATION OF ROOFING, GENERAL

A. Install roofing system according to roofing system manufacturer's written instructions, assembly requirements, and approved shop drawings.

B. Complete terminations and base flashings and provide temporary seals to prevent water from entering completed sections of roofing system at the end of the workday or when rain is forecast.

1. Remove and discard temporary seals before beginning work on adjoining roofing.

C. Install roof membrane and auxiliary materials to tie into existing roofing to maintain weathertightness of transition.

D. Coordinate installation and transition of roofing system component serving as an air barrier with air barrier specified in Section 072726 "Fluid-Applied Membrane Air Barriers."

E. Installation Details: Install roofing system in accordance with applicable NRCA Manual Plates and NRCA recommendations; modify as required to comply with manufacturer's approved details and perimeter fastening requirements of FM Global references if applicable.

3.4 INSTALLATION OF SUBSTRATE BOARD

A. Install substrate board with long joints in continuous straight lines, with end joints staggered not less than 24 inches in adjacent rows.

1. At steel roof decks, install substrate board at right angle to flutes of deck.

a. Locate end joints over crests of steel roof deck.

2. Tightly butt substrate boards together.
3. Cut substrate board to fit tight around penetrations and projections, and to fit tight to intersecting sloping roof decks.
4. Fasten substrate board to top flanges of steel deck to resist uplift pressure at corners, perimeter, and field of roof according to roofing system manufacturers' written instructions.

3.5 INSTALLATION OF VAPOR RETARDER / AIR BARRIER

A. Self-Adhering-Sheet Vapor retarder / air barrier: Prime substrate if required by manufacturer. Install self-adhering-sheet vapor retarder / air barrier over area to receive vapor retarder / air barrier, side and end lapping each sheet a minimum of 3-1/2 and 6 inches, respectively.

1. Extend vertically up parapet walls and projections to a minimum height equal to height of insulation and cover board.
2. Seal laps by rolling.

B. Completely seal vapor retarder / air barrier at terminations, obstructions, and penetrations to prevent air movement into roofing system.

3.6 INSTALLATION OF INSULATION

A. Coordinate installing roofing system components, so insulation is not exposed to precipitation or left exposed at the end of the workday.

B. Comply with roofing system and insulation manufacturer's written instructions for installing roof insulation.

C. Cant Strips: Install and secure cant strips at junctures of roofing system with vertical surfaces or angle changes greater than 45 deg F.

D. Installation Over Metal Decking:

1. Install base layer of insulation with joints staggered not less than 24 inches in adjacent rows end joints staggered not less than 12 inches in adjacent rows and with long joints continuous at right angle to flutes of decking.

    a. Locate end joints over crests of decking.
    b. Trim insulation neatly to fit around penetrations and projections, and to fit tight to intersecting sloping roof decks.
    c. Make joints between adjacent insulation boards not more than 1/4 inch in width.
    d. At internal roof drains, slope insulation to create a square drain sump, with each side equal to the diameter of the drain bowl plus 24 inches.

        1) Trim insulation, so that water flow is unrestricted.

    e. Fill gaps exceeding 1/4 inch with insulation.
    f. Cut and fit insulation within 1/4 inch of nailers, projections, and penetrations.
    g. Mechanically attach base layer of insulation and substrate board using mechanical fasteners specifically designed and sized for fastening specified board-type roof insulation to deck type.

        1) Fasten insulation to resist specified uplift pressure at corners, perimeter, and field of roof.

    h. Adhere base layer of insulation where roof deck is exposed on interior to substrate using adhesive according to manufacturer's written instructions.

        1) Adhere insulation to resist specified uplift pressure at corners, perimeter, and field of roof.

2. Install upper layers of insulation and tapered insulation, with joints of each layer offset not less than 12 inches from previous layer of insulation.

    a. Staggered end joints within each layer not less than 24 inches in adjacent rows.
    b. Install with long joints continuous and with end joints staggered not less than 12 inches in adjacent rows.
    c. Trim insulation neatly to fit around penetrations and projections, and to fit tight to intersecting sloping roof decks.
    d. Make joints between adjacent insulation boards not more than 1/4 inch in width.
    e. At internal roof drains, slope insulation to create a square drain sump, with each side equal to the diameter of the drain bowl plus 24 inches.
    f. Trim insulation, so that water flow is unrestricted.
    g. Fill gaps exceeding 1/4 inch with insulation.
    h. Cut and fit insulation within 1/4 inch of nailers, projections, and penetrations.
    i. Adhere each layer of insulation to substrate using adhesive according to manufacturer's written instructions.

1) Adhere insulation to resist specified uplift pressure at corners, perimeter, and field of roof.

3. Flat Insulation System on Sloped Roof Deck: Install insulation at minimum thickness indicated on Drawings.
4. Tapered Insulation System for Flat Roof Deck: Install insulation at minimum thickness indicated on Drawings.

3.7 INSTALLATION OF COVER BOARDS

A. Install cover boards over insulation with long joints in continuous straight lines with end joints staggered between rows. Offset joints of insulation below a minimum of 6 inches in each direction.

1. Trim cover board neatly to fit around penetrations and projections, and to fit tight to intersecting sloping roof decks.
2. At internal roof drains, conform to slope of drain sump.

a. Trim cover board so that water flow is unrestricted.

3. Cut and fit cover board tight to nailers, projections, and penetrations.

a. Set cover board in ribbons of bead-applied insulation adhesive, firmly pressing and maintaining insulation in place.

3.8 INSTALLATION OF ROOFING MEMBRANE, GENERAL

A. Install roofing system according to roofing system manufacturer's written instructions and applicable recommendations in ARMA/NRCA's "Quality Control Guidelines for the Application of Polymer Modified Bitumen Roofing."

1. Deck Type: Metal deck.

2. Number of Smooth-Surfaced SBS-Modified Asphalt Sheets: One.

a. Adhering Method: Torch.

3. Granular-Surfaced SBS-Modified Asphalt Cap Sheet:

a. Adhering Method: Torch.

B. Start installation of roofing in presence of roofing system manufacturer's technical personnel and Owner's testing and inspection agency.

C. Coordinate installation of roofing system so insulation and other components of the roofing system not permanently exposed are not subjected to precipitation or left uncovered at the end of the workday or when rain is forecast.

1. Provide tie-offs at end of each day's work to cover exposed roofing sheets and insulation with a course of coated felt set in roofing cement or hot roofing asphalt, with joints and edges sealed.

2. Complete terminations and base flashings and provide temporary seals to prevent water from entering completed sections of roofing system.
3. Remove and discard temporary seals before beginning work on adjoining roofing.

3.9 INSTALLATION OF SBS-MODIFIED BASE PLY SHEET

A. Before installing, unroll base sheet, cut into workable lengths, and allow to lie flat for a time period recommended by manufacturer for the ambient temperature.

B. Install base ply sheet according to roofing manufacturer's written instructions, starting at low point of roofing system.

1. Extend roofing sheets over and terminate above cants.
2. Install base ply sheet in a shingle fashion.

a. Torch apply to substrate in accordance with manufacturer's written instructions and NRCA CERTA guidelines.
b. Adhere base ply sheet to resist specified uplift pressure at corners, perimeter, and field of roof.

C. Install base ply sheet without wrinkles, rears, and free from air pockets.

D. Laps: Accurately align roofing sheets, without stretching, and maintain uniform side and end laps.

1. Lap side laps as recommended by roof membrane manufacturer but not less than 3 inches.
2. Lap end laps as recommended by roof membrane manufacturer but not less than 12 inches.
3. Stagger end laps not less than 18 inches.
4. Heat weld or completely bond and seal end and side laps, leaving no voids.
5. Roll laps with a 20-pound roller.

E. Repair tears and voids in laps and lapped seams not completely sealed.

F. Apply pressure to the body of the base sheet according to manufacturer's instructions, to remove air pockets and to result in complete adhesion of base sheet to substrate.

3.10 INSTALLATION OF SBS-MODIFIED BITUMINOUS CAP SHEET

A. Before installing, unroll cap sheet, cut into workable lengths, and allow to lie flat for a time period recommended by manufacturer for the ambient temperature at which cap sheet will be installed.

B. Install modified bituminous roofing cap sheet according to roofing manufacturer's written instructions, starting at low point of roofing system.

1. Extend cap sheet over and terminate above cants.
2. Install cap sheet in a shingle fashion.
3. Install cap sheet as follows:

a. Torch apply to substrate in accordance with manufacturer's written instructions and NRCA CERTA guidelines.

4. Install cap sheet without wrinkles or tears, and free from air pockets.

5. Install cap sheet so side and end laps shed water.

C. Laps: Accurately align roofing sheets, without stretching, and maintain uniform side and end laps.

1. Lap side laps as recommended by roof membrane manufacturer but not less than 3 inches.
2. Lap end laps as recommended by roof membrane manufacturer but not less than 12 inches.
3. Stagger end laps not less than 18 inches.
4. Heat weld laps, leaving no voids.
5. Roll laps with a 20-pound roller.
6. Repair tears and voids in laps and lapped seams not completely sealed.

D. Apply pressure to the body of the cap sheet according to manufacturer's instructions, to remove air pockets and to result in complete adhesion of base sheet to substrate.

E. Apply roofing granules of same color as roof membrane to cover exuded bead at laps while bead is hot, to provide a continuous color appearance.

3.11 INSTALLATION OF FLASHING AND STRIPPING

A. Install base flashing over cant strips and other sloped and vertical surfaces, at roof edges, and at penetrations through roof, and secure to substrates according to roofing system manufacturer's written instructions and as follows:

1. Prime substrates with asphalt primer if required by roofing system manufacturer.
2. Backer Sheet Application:

    a. Adhere backer sheet to substrate in cold-applied adhesive.
    a. Seal all laps.

3. Flashing Sheet Application: Adhere flashing sheet to substrate in cold-applied adhesive at rate required by roofing system manufacturer.

    a. Heat weld laps, leaving no voids.

B. Extend base flashing up walls or parapets a minimum of 8 inches above roofing membrane and 4 inches onto field of roofing membrane.

C. Mechanically fasten top of base flashing securely at terminations and perimeter of roofing using continuous termination bar.

D. Install roofing cap-sheet stripping where metal flanges and edgings are set on roofing according to roofing system manufacturer's written instructions.

E. Roof Drains: Set 30-by-30-inch-4-pound lead flashing in bed of asphaltic adhesive on completed roofing membrane.

1. Cover lead flashing with roofing cap-sheet stripping and extend a minimum of 6 inches beyond edge of metal flashing onto field of roofing membrane.
2. Clamp roofing membrane, metal flashing, and stripping into roof-drain clamping ring.
3. Install stripping according to roofing system manufacturer's written instructions.

3.12 INSTALLATION OF WALKWAYS

A. Walkway Pads: Install walkway pads using units of size indicated or, if not indicated, of manufacturer's standard size, according to walkway pad manufacturer's written instructions.

1. Install walkways at the following locations:

a. Perimeter of each rooftop unit.
b. Between each rooftop unit location, creating a continuous path connecting rooftop unit locations.
c. Between each roof hatch and each rooftop unit location or path connecting rooftop unit locations.
d. Top and bottom of each roof access ladder.
e. Between each roof access ladder and each rooftop unit location or path connecting rooftop unit locations.
f. Additional locations indicated on Drawings and as required by roof membrane manufacturer's warranty requirements.

2. Provide 3-inch clearance between adjoining pads.
3. Heat weld to substrate or adhere walkway products to substrate with compatible adhesive according to roofing system manufacturer's written instructions.

3.13 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified testing agency to inspect substrate conditions, surface preparation, roof membrane application, flashings, protection, and drainage components, and to furnish reports to Architect.

B. Final Roof Inspection: Arrange for roofing system manufacturer's technical personnel to inspect roofing installation on completion, in presence of Architect, and to prepare inspection report.

1. Notify Architect and Owner 48 hours in advance of date and time of inspection.

C. Repair or remove and replace components of roofing system where inspections indicate that they do not comply with specified requirements.

D. Roofing system will be considered defective if it does not pass tests and inspections.

1. Additional testing and inspecting, at Contractor's expense, will be performed to determine if replaced or additional work complies with specified requirements.

3.14 PROTECTING AND CLEANING

A. Protect roofing system from damage and wear during remainder of construction period.

1. When remaining construction does not affect or endanger roofing, inspect roofing system for deterioration and damage, describing its nature and extent in a written report, with copies to Architect and Owner.

B. Correct deficiencies in or remove roofing system that does not comply with requirements, repair substrates, and repair or reinstall roofing system to a condition free of damage and deterioration at time of Substantial Completion and according to warranty requirements.

C. Clean overspray and spillage from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

SECTION CONTINUES

3.15 ROOFING INSTALLER'S WARRANTY

A. WHEREAS _____ of _____, herein called the "Roofing Installer," has performed roofing and associated work ("work") on the following project:

1. Owner: _____.

2. Address: _____.

3. Building Name/Type: _____.

4. Address: _____.

5. Area of Work: _____.

6. Acceptance Date: _____.

7. Warranty Period: _____.

8. Expiration Date: _____.

B. AND WHEREAS Roofing Installer has contracted (either directly with Owner or indirectly as a subcontractor) to warrant said work against leaks and faulty or defective materials and workmanship for designated Warranty Period,

C. NOW THEREFORE Roofing Installer hereby warrants, subject to terms and conditions herein set forth, that during Warranty Period Roofing Installer will, at Roofing Installer's own cost and expense, make or cause to be made such repairs to or replacements of said work as are necessary to correct faulty and defective work and as are necessary to maintain said work in a watertight condition.

D. This Warranty is made subject to the following terms and conditions:

1. Specifically excluded from this Warranty are damages to work and other parts of the building, and to building contents, caused by:

   a. lightning;
   b. peak gust wind speed exceeding 74 MPH;
   c. fire;
   d. failure of roofing system substrate, including cracking, settlement, excessive deflection, deterioration, and decomposition;
   e. faulty construction of parapet walls, copings, chimneys, skylights, vents, equipment supports, and other edge conditions and penetrations of the work.
   f. vapor condensation on bottom of roofing; and
   g. activity on roofing by others, including construction contractors, maintenance personnel, other persons, and animals, whether authorized or unauthorized by Owner.

2. When work has been damaged by any of foregoing causes, Warranty shall be null and void until such damage has been repaired by Roofing Installer and until cost and expense thereof have been paid by Owner or by another responsible party so designated.

3. Roofing Installer is responsible for damage to work covered by this Warranty but is not liable for consequential damages to building or building contents resulting from leaks or faults or defects of work.
4. During Warranty Period, if Owner allows alteration of work by anyone other than Roofing Installer, including cutting, patching, and maintenance in connection with penetrations, attachment of other work, and positioning of anything on roof, this Warranty shall become null and void on date of said alterations, but only to the extent said alterations affect work covered by this Warranty. If Owner engages Roofing Installer to perform said alterations, Warranty shall not become null and void unless Roofing Installer, before starting said work, shall have notified Owner in writing, showing reasonable cause for claim, that said alterations would likely damage or deteriorate work, thereby reasonably justifying a limitation or termination of this Warranty.
5. During Warranty Period, if original use of roof is changed and it becomes used for, but was not originally specified for, a promenade, work deck, spray-cooled surface, flooded basin, or other use or service more severe than originally specified, this Warranty shall become null and void on date of said change, but only to the extent said change affects work covered by this Warranty.
6. Owner shall promptly notify Roofing Installer of observed, known, or suspected leaks, defects, or deterioration and shall afford reasonable opportunity for Roofing Installer to inspect work and to examine evidence of such leaks, defects, or deterioration.
7. This Warranty is recognized to be the only warranty of Roofing Installer on said work and shall not operate to restrict or cut off Owner from other remedies and resources lawfully available to Owner in cases of roofing failure. Specifically, this Warranty shall not operate to relieve Roofing Installer of responsibility for performance of original work according to requirements of the Contract Documents, regardless of whether Contract was a contract directly with Owner or a subcontract with Owner's General Contractor.

E. IN WITNESS THEREOF, this instrument has been duly executed this _____ day of _____, _____.

1. Authorized Signature: _____

2. Name: _____

3. Title: _____

END OF SECTION

SECTION 07610 - SHEET METAL ROOFING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Flat-seam metal roofing, custom fabricated for canopies
2. Standing-seam metal roofing at Stair 2, custom fabricated .

B. Related Sections:

1. Division 7 Section "Building Insulation" for roof insulation and sheet vapor retarders separate from self-adhering underlayments.
2. Division 7 Section "Sheet Metal Flashing and Trim" for gutters, downspouts, fasciae, copings, and flashings that are not part of sheet metal roofing.
3. Division 7 Section "Manufactured Roof Specialties" for manufactured that are not part of sheet metal roofing.
4. Division 7 Section "Roof Accessories" for manufactured roof accessories.
5. Division 7 Section "Joint Sealants" for field-applied sealants adjoining sheet metal roofing.

1.3 PERFORMANCE REQUIREMENTS

A. General Performance: Sheet metal roofing system including, but not limited to, metal roof panels, cleats, clips, anchors and fasteners, sheet metal flashing integral with sheet metal roofing, fascia panels, trim, underlayment, and accessories shall comply with requirements indicated without failure due to defective manufacture, fabrication, installation, or other defects in construction. Sheet metal roofing shall remain watertight.

B. Thermal Movements: Provide sheet metal roofing that allows for thermal movements from ambient and surface temperature changes. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change (Range): 120 deg F, ambient; 180 deg F , material surfaces.

C. Energy Performance: Provide metal roofing with solar reflectance index not less than 29 when calculated according to ASTM E 1980 based on testing identical products by a qualified testing agency.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each manufactured product and accessory.

B. Shop Drawings: Show fabrication and installation layouts of sheet metal roofing, including plans, elevations, expansion joint locations, and keyed details. Distinguish between shop- and field-assembled work. Include the following:

1. Details for forming sheet metal roofing, including seams and dimensions.
2. Details for joining and securing sheet metal roofing, including layout of fasteners, cleats, clips, and other attachments. Include pattern of seams.
3. Details of termination points and assemblies, including fixed points.
4. Details of expansion joints, including showing direction of expansion and contraction.
5. Details of roof penetrations.
6. Details of edge conditions, including eaves, ridges, valleys, rakes, crickets, and counterflashings.
7. Details of special conditions.
8. Details of connections to adjoining work.
9. Detail the following accessory items, at a scale of not less than 3 inches per 12 inches:

    a. Flashing and trim.
    b. Gutters and downspouts as they relate to adjacent sheet metal roofing.
    c. Roof curbs.

C. Samples for Initial Selection: For each type of sheet metal roofing indicated, with factory-applied color finishes.

1. Include similar Samples of trim and accessories involving color selection.

D. Samples for Verification: For each type of exposed finish required, prepared on Samples of size indicated below:

1. Sheet Metal Roofing: 12 inches long by actual width of unit, including finished seam and in required profile. Include fasteners, cleats, clips, and other attachments.
2. Trim and Metal Closures: 12 inches long and in required profile. Include fasteners and other exposed accessories.
3. Other Accessories: 12-inch- long Samples for each type of other accessory.

E. Coordination Drawings: Roof plans drawn to scale with coordinated details for penetrations and roof-mounted items. Show the following:

1. Sheet metal roofing and attachments.
2. Roof-mounted items including roof hatches, equipment supports, pipe supports and penetrations, lighting fixtures, snow guards, and items mounted on roof curbs.

F. Qualification Data: For qualified Installer .

G. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for each product.

H. Maintenance Data: For roofing sheet metals and accessories to include in maintenance manuals.

I. Warranties: Sample of special warranties.

1.5 QUALITY ASSURANCE

A. Custom-Fabricated Sheet Metal Roofing Fabricator Qualifications: Shop that employs skilled workers who custom fabricate sheet metal roofing similar to that required for this Project and whose products have a record of successful in-service performance.

B. Sheet Metal Roofing Standard: Comply with SMACNA's "Architectural Sheet Metal Manual" unless more stringent requirements are specified or shown on Drawings.

C. Preliminary Roofing Conference: Before starting roof sheathing construction, conduct conference at Project site. Comply with requirements for preinstallation conferences in Division 1 Section "Project Management and Coordination."

1. Review methods and procedures related to roof sheathing construction and sheet metal roofing including, but not limited to, items listed for the Preinstallation Conference.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Do not store sheet metal roofing materials in contact with other materials that might cause staining, denting, or other surface damage. Store sheet metal roofing materials away from uncured concrete and masonry.

B. Protect strippable protective covering on sheet metal roofing from exposure to sunlight and high humidity, except to the extent necessary for the period of sheet metal roofing installation.

1.7 COORDINATION

A. Coordinate installation of roof curbs, equipment supports, and roof penetrations, which are specified in other Sections.

B. Coordinate sheet metal roofing with rain drainage work, flashing, trim, and construction of sheathing, parapets, walls, and other adjoining work to provide a leakproof, secure, and noncorrosive installation.

1.8 WARRANTY

A. Special Warranty: Warranty form at the end of this Section in which Installer agrees to repair or replace components of sheet metal roofing that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Structural failures, including but not limited to rupturing, cracking, or puncturing.
b. Wrinkling or buckling.
c. Loose parts.
d. Failure to remain weathertight, including uncontrolled water leakage.
e. Deterioration of metals, metal finishes, and other materials beyond normal weathering, including non-uniformity of color or finish.

f. Galvanic action between sheet metal roofing and dissimilar materials.

2. Warranty Period: Two years from date of Substantial Completion.

B. Special Warranty on Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace sheet metal roofing that shows evidence of deterioration of factory-applied finishes within specified warranty period.

1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:

a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.

2. Finish Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 ROOFING SHEET METALS

A. General: Protect mechanical and other finishes on exposed surfaces from damage by applying a strippable, temporary protective film before shipping.

B. Metallic-Coated Steel Sheet: Restricted flatness steel sheet, metallic coated by the hot-dip process and prepainted by the coil-coating process to comply with ASTM A 755/A 755M.
1. Aluminum-Zinc Alloy-Coated Steel Sheet: ASTM A 792/A 792M, Class AZ50 coating designation, Grade 40; structural quality.
2. Thickness: Nominal 22 ga. unless otherwise indicated.

3. Surface: Embossed.
4. Exposed Coil-Coated Finish:
a. Four-Coat Fluoropolymer: AAMA 621. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat and clear coats. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

5. Color: As selected by Architect from manufacturer's full range .
6. Concealed Finish: Pretreat with manufacturer's standard white or light-colored acrylic or polyester-backer finish, consisting of prime coat and wash coat with a minimum total dry film thickness of 0.5 mil.

2.2 UNDERLAYMENT MATERIALS

A. Self-Adhering, High-Temperature Sheet: Minimum 30 to 40 mils thick, consisting of slip-resisting polyethylene-film top surface laminated to layer of butyl or SBS-modified asphalt adhesive, with release-paper backing; cold applied. Provide primer when recommended by underlayment manufacturer.

1. Thermal Stability: ASTM D 1970; stable after testing at 240 deg F.
2. Low-Temperature Flexibility: ASTM D 1970; passes after testing at minus 20 deg F.
3. Products: Subject to compliance with requirements, provide one of the following :

a. Carlisle Coatings & Waterproofing Inc.; CCW WIP 300HT.
b. Grace Construction Products, a unit of W. R. Grace & Co.; Ultra.
c. Henry Company; Blueskin PE200 HT.
d. Metal-Fab Manufacturing, LLC; MetShield.
e. Owens Corning; WeatherLock Metal High-Temperature Underlayment.

B. Slip Sheet: Building paper, 3-lb/100 sq. ft. minimum, rosin sized.

2.3 MISCELLANEOUS MATERIALS

A. General: Provide materials and types of fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items as required for a complete roofing system and as recommended by fabricator for sheet metal roofing.

B. Snap-On Seams: Provide snap-on seams integrated with panel-edge profile as recommended by portable roll-forming equipment manufacturer to produce sheet metal roofing assemblies that comply with UL 580 for wind-uplift resistance classification specified in "Quality Assurance" Article.

1. General:

a. Exposed Fasteners: Heads matching color of sheet metal roofing using plastic caps or factory-applied coating.
b. Fasteners for Flashing and Trim: Blind fasteners or self-drilling screws, gasketed, with hex-washer head.
c. Blind Fasteners: High-strength aluminum or stainless-steel rivets suitable for metal being fastened.

2. Fasteners for Aluminum-Zinc Alloy-Coated Steel Sheet: Hot-dip galvanized steel according to ASTM A 153/A 153M, ASTM F 2329, or Series 300 stainless steel.

C. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch wide and 1/8 inch thick.

D. Elastomeric Sealant: ASTM C 920, elastomeric polyurethane or silicone polymer sealant ; low modulus; of type, grade, class, and use classifications required to seal joints in sheet metal roofing and remain watertight.

2.4 ACCESSORIES

A. Sheet Metal Accessories: Provide components required for a complete sheet metal roofing assembly including trim, copings, fasciae, corner units, clips, flashings, sealants, gaskets, fillers, metal closures, closure strips, and similar items. Match material and finish of sheet metal roofing unless otherwise indicated.

1. Provide accessories as recommended by portable roll-forming equipment manufacturer to produce sheet metal roofing assemblies that comply with UL 580 for wind-uplift resistance classification specified in "Quality Assurance" Article.
2. Cleats: For mechanically seaming into joints and formed from the following materials:

a. Aluminum Roofing: 0.0250-inch- thick stainless steel.

3. Clips: Minimum 0.0625-inch- thick, stainless-steel panel clips designed to withstand negative-load requirements.
4. Backing Plates: Plates at roofing splices, fabricated from material recommended by SMACNA.
5. Closure Strips: Closed-cell, expanded, cellular, rubber or crosslinked, polyolefin foam or closed-cell laminated polyethylene; minimum 1-inch- thick, flexible-closure strips; cut or premolded to match sheet metal roofing profile. Provide closure strips where indicated or necessary to ensure weathertight construction.
6. Flashing and Trim: Formed from same material and with same finish as sheet metal roofing, minimum 0.018 inch thick.

B. Pipe Flashing: Premolded, EPDM pipe collar with flexible aluminum ring bonded to base.

C. Roof Curbs: Fabricated from same material and finish as sheet metal roofing, minimum thickness matching the sheet metal roofing ; with bottom of skirt profiled to match roof panel profiles; with weatherproof top box and integral full-length cricket. Fabricate curb subframing of nominal 0.062-inch- thick, angle-, C-, or Z-shaped galvanized steel or stainless-steel sheet. Fabricate curb and subframing to withstand indicated loads of size and height indicated. Coordinate dimensions with rough-in information or Shop Drawings of equipment to be supported.

1. Insulate curbs with 1-inch- thick, rigid insulation.
2. Install wood nailers at tops of curbs.

2.5 FABRICATION

A. General: Custom fabricate sheet metal roofing to comply with details shown and recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to the design, dimensions (panel width and seam height), geometry, metal thickness, and other characteristics of installation indicated. Fabricate sheet metal roofing and accessories at the shop to greatest extent possible.

1. Flat-Seam Roofing: Form flat-seam panels from metal sheets 20 by 28 inches with 1/2-inch notched and folded edges.
2. Standing-Seam Roofing: Form standing-seam panels with finished seam height of 1-1/2 inches or as indicated .

B. Fabrication Tolerances: Fabricate sheet metal roofing that is capable of installation to a tolerance of 1/4 inch in 20 feet on slope and location lines as indicated and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.

C. Form exposed sheet metal work to fit substrates without excessive oil canning, buckling, and tool marks; true to line and levels indicated; and with exposed edges folded back to form hems.

1. Lay out sheet metal roofing so transverse seams, if required, are made in direction of flow with higher panels overlapping lower panels.
2. Offset transverse seams from each other 12 inches minimum.
3. Fold and cleat eaves and transverse seams in the shop.
4. Form and fabricate sheets, seams, strips, cleats, valleys, ridges, edge treatments, integral flashings, and other components of metal roofing to profiles, patterns, and drainage arrangements shown on Drawings and as required for leakproof construction.

D. Expansion Provisions: Fabricate sheet metal roofing to allow for expansion in running work sufficient to prevent leakage, damage, and deterioration of the Work. Where lapped expansion provisions cannot be used, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with butyl sealant concealed within joints.

E. Sealant Joints: Where movable, nonexpansion-type joints are indicated or required to produce weathertight seams, form metal to provide for proper installation of elastomeric sealant in compliance with SMACNA standards.

F. Metal Protection: Where dissimilar metals will contact each other, protect against galvanic action by painting contact surfaces with bituminous coating, by applying self-adhering sheet underlayment to each contact surface, or by other permanent separation as recommended by fabricator of sheet metal roofing or manufacturers of the metals in contact.

G. Sheet Metal Accessories: Custom fabricate flashings and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of item indicated. Obtain field measurements for accurate fit before shop fabrication.

1. Form exposed sheet metal accessories without excessive oil canning, buckling, and tool marks and true to line and levels indicated, with exposed edges folded back to form hems.
2. Seams: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with elastomeric sealant unless otherwise recommended by sealant manufacturer for intended use. Rivet joints where necessary for strength.
3. Sealed Joints: Form nonexpansion but movable joints in metal to accommodate elastomeric sealant.
4. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of accessories exposed to view.
5. Fabricate cleats and attachment devices of sizes as recommended by SMACNA's "Architectural Sheet Metal Manual" for application, but not less than thickness of metal being secured.

H. Do not use graphite pencils to mark metal surfaces.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, substrate, and other conditions affecting performance of the Work.

1. Examine solid roof sheathing to verify that sheathing joints are supported by framing or blocking, that tops of fasteners are flush with surface, and that installation is within flatness tolerances required for finished roofing installation.
2. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and completely anchored, and that provision has been made for drainage, flashings, and penetrations through sheet metal roofing.

B. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.

C. Examine roughing-in for components and systems penetrating sheet metal roofing to verify actual locations of penetrations relative to seam locations of sheet metal roofing before installation.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

E. Self-Adhering Sheet Underlayment: Install self-adhering sheet underlayment, wrinkle free, on roof sheathing under sheet metal roofing. Apply primer if required by underlayment manufacturer. Comply with temperature restrictions of underlayment manufacturer for installation; use primer rather than nails for installing underlayment at low temperatures. Apply over entire roof , in shingle fashion to shed water, with end laps of not less than 6 inches staggered 24 inches between courses. Overlap side edges not less than 3-1/2 inches. Roll laps with roller. Cover underlayment within 14 days.

1. Roof perimeter for a distance up from eaves of 36 inches beyond interior wall line.
2. Valleys, from lowest to highest point, for a distance on each side of 18 inches . Overlap ends of sheets not less than 6 inches.
3. Rake edges for a distance of 18 inches .
4. Hips and ridges for a distance on each side of 12 inches .
5. Roof to wall intersections for a distance from wall of 18 inches .
6. Around dormers, chimneys, skylights, and other penetrating elements for a distance from element of 18 inches .

F. Install flashings to cover underlayment to comply with requirements in Division 7 Section "Sheet Metal Flashing and Trim."

G. Apply slip sheet before installing sheet metal roofing.

3.2 INSTALLATION, GENERAL

A. General: Anchor sheet metal roofing and other components of the Work securely in place, with provisions for thermal and structural movement. Install fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items as required for a complete roofing system and as recommended by fabricator for sheet metal roofing.

1. Field cutting of sheet metal roofing by torch is not permitted.
2. Provide metal closures at peaks rake edges rake walls eaves and each side of ridge and hip caps.
3. Flash and seal sheet metal roofing with closure strips at eaves, rakes, and perimeter of all openings. Fasten with self-tapping screws.
4. Locate and space fastenings in uniform vertical and horizontal alignment. Predrill panels for fasteners.
5. Install ridge and hip caps as sheet metal roofing work proceeds.
6. Locate roofing splices over, but not attached to, structural supports. Stagger roofing splices and end laps to avoid a four-panel lap splice condition. Install backing plates at roofing splices.
7. Install sealant tape where indicated.
8. Lap metal flashing over sheet metal roofing to allow moisture to run over and off the material.
9. Do not use graphite pencils to mark metal surfaces.

B. Thermal Movement. Rigidly fasten metal roof panels to structure at only one location for each panel. Allow remainder of panel to move freely for thermal expansion and contraction.

C. Fasteners: Use fasteners of sizes that will penetrate sheathing not less than 1-1/4 inches for nails and not less than 3/4 inch for wood screws .

D. Metal Protection: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating, by applying self-adhering sheet underlayment to each contact surface, or by other permanent separation as recommended by SMACNA.

1. Coat back side of uncoated aluminum sheet metal roofing with bituminous coating where roofing will contact wood, ferrous metal, or cementitious construction.

E. Conceal fasteners and expansion provisions where possible in exposed work and locate to minimize possibility of leakage. Cover and seal fasteners and anchors as required for a tight installation.

F. Fasciae: Align bottom of sheet metal roofing and fasten with blind rivets, bolts, or self-tapping screws. Flash and seal sheet metal roofing with closure strips where fasciae meet soffits, along lower panel edges, and at perimeter of all openings.

3.3 CUSTOM-FABRICATED SHEET METAL ROOFING INSTALLATION

A. Fabricate and install work with lines and corners of exposed units true and accurate. Form exposed faces flat and free of buckles, excessive waves, and avoidable tool marks, considering temper and reflectivity of metal. Provide uniform, neat seams with minimum exposure of solder, welds, and sealant. Fold back sheet metal to form a hem on concealed side of exposed edges unless otherwise indicated.

1. Install cleats to hold sheet metal panels in position. Attach each cleat with two fasteners to prevent rotation.
2. Fasten cleats not more than 12 inches o.c. Bend tabs over fastener head.
3. Provide expansion-type cleats and clips for roof panels that exceed 30 feet in length.

B. Seal joints as shown and as required for watertight construction. For roofing with 3:12 slopes or less, use cleats at transverse seams.

1. Where sealant-filled joints are used, embed hooked flanges of joint members not less than 1 inch into sealant. Form joints to completely conceal sealant. When ambient temperature at time of installation is moderate, between 40 and 70 deg F, set joint members for 50 percent movement each way. Adjust setting proportionately for installation at higher ambient temperatures. Do not install sealant-type joints at temperatures below 40 deg F.
2. Prepare joints and apply sealants to comply with requirements in Division 7 Section "Joint Sealants."

C. Rivets: Rivet joints in where indicated and where necessary for strength.

D. Flat-Seam Roofing: Attach flat-seam metal panels to substrate with cleats, starting at eave and working upward toward ridge. After panels are in place, mallet seams and solder.

1. Attach roofing panels with cleats spaced not more than 24 inches o.c. <**Insert cleat spacing**>. Lock and solder panels to base flashing.

2. Attach edge flashing to face of roof edge with continuous cleat fastened to roof substrate at [**12 inches**] <**Insert cleat spacing**> o.c. Lock panels to edge flashing and [**solder**] [**apply sealant**].

E. Standing-Seam Roofing: Attach standing-seam metal panels to substrate with cleats, double fastened at 12 inches o.c. Install panels reaching from eave to ridge before moving to adjacent panels. Before panels are interlocked, apply continuous bead of sealant to top of flange of lower panel. Lock standing seams by folding over twice so cleat and panel edges are completely engaged.

1. Lock each panel to panel below with sealed transverse seam.
2. Loose-lock panels at eave edges to continuous cleats and flanges at roof edge at gutters.
3. Loose-lock panels at eave edges to continuous edge flashing exposed 24 inches from roof edge. Attach edge flashing to face of roof edge with continuous cleat fastened to roof substrate at 12 inches o.c. Lock panels to edge flashing.
4. Fold over seams after locking at ridges and hips.

3.4 ACCESSORY INSTALLATION

A. General: Install accessories with positive anchorage to building and weathertight mounting and provide for thermal expansion. Coordinate installation with flashings and other components.

1. Install components required for a complete sheet metal roofing assembly including trim, copings, seam covers, flashings, sealants, gaskets, fillers, metal closures, closure strips, and similar items.
2. Install accessories integral to sheet metal roofing that are specified in Division 7 Section "Sheet Metal Flashing and Trim" to comply with that Section's requirements.

B. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.

1. Install flashing and trim as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, eaves, rakes, corners, bases, framed openings, ridges, fasciae, and fillers.
2. Install continuous strip of self-adhering underlayment at edge of continuous flashing overlapping self-adhering underlayment, where "continuous seal strip" is indicated in SMACNA's "Architectural Sheet Metal Manual," and where indicated on Drawings.
3. Install exposed flashing and trim without excessive oil canning, buckling, and tool marks and true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and to result in waterproof and weather-resistant performance.
4. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet with no joints allowed within 24 inches of corner or intersection. Where lapped expansion provisions cannot be used or would not be sufficiently weather resistant and waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, and filled with butyl sealant concealed within joints.

C. Pipe Flashing: Form flashing around pipe penetration and sheet metal roofing. Fasten and seal to sheet metal roofing as recommended by SMACNA.

D. Roof Curbs: Install curbs at locations indicated on Drawings. Install flashing around bases where they meet sheet metal roofing.

3.5 ERECTION TOLERANCES

A. Installation Tolerances: Shim and align sheet metal roofing within installed tolerances specified in MCA's "Guide Specification for Residential Metal Roofing."

3.6 CLEANING AND PROTECTION

A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.

B. Clean off excess sealants.

C. Remove temporary protective coverings and strippable films as sheet metal roofing is installed unless otherwise indicated in manufacturer's written installation instructions. On completion of sheet metal roofing installation, clean finished surfaces as recommended by sheet metal roofing manufacturer. Maintain sheet metal roofing in a clean condition during construction.

D. Replace sheet metal roofing components that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

3.7 ROOFING INSTALLER'S WARRANTY - FORMAT

A. WHEREAS <**Insert name**> of <**Insert address**>, herein called the "Roofing Installer," has performed roofing and associated work ("work") on the following project:

1. Owner: <**Insert name of Owner**>.
2. Address: <**Insert address**>.
3. Building Name/Type: <**Insert information**>.
4. Address: <**Insert address**>.
5. Area of Work: <**Insert information**>.
6. Acceptance Date: <**Insert date**>.
7. Warranty Period: <**Insert time**>.
8. Expiration Date: <**Insert date**>.

B. AND WHEREAS Roofing Installer has contracted (either directly with Owner or indirectly as a subcontractor) to warrant said work against leaks and faulty or defective materials and workmanship for designated Warranty Period,

C. NOW THEREFORE Roofing Installer hereby warrants, subject to terms and conditions herein set forth, that during Warranty Period he will, at his own cost and expense, make or cause to be made such repairs to or replacements of said work as are necessary to correct faulty and defective work and as are necessary to maintain said work in a watertight condition.

D. This Warranty is made subject to the following terms and conditions:

1. Specifically excluded from this Warranty are damages to work and other parts of the building, and to building contents, caused by:

a. Lightning;
b. Peak gust wind speed exceeding 140 mph;
c. Fire;
d. Failure of roofing system substrate, including cracking, settlement, excessive deflection, deterioration, and decomposition;
e. Faulty construction of parapet walls, copings, chimneys, skylights, vents, equipment supports, and other edge conditions and penetrations of the work;
f. Vapor condensation on bottom of roofing; and
g. Activity on roofing by others, including construction contractors, maintenance personnel, other persons, and animals, whether authorized or unauthorized by Owner.

2. When work has been damaged by any of foregoing causes, Warranty shall be null and void until such damage has been repaired by Roofing Installer and until cost and expense thereof have been paid by Owner or by another responsible party so designated.
3. Roofing Installer is responsible for damage to work covered by this Warranty but is not liable for consequential damages to building or building contents resulting from leaks or faults or defects of work.
4. During Warranty Period, if Owner allows alteration of work by anyone other than Roofing Installer, including cutting, patching, and maintenance in connection with penetrations, attachment of other work, and positioning of anything on roof, this Warranty shall become null and void on date of said alterations, but only to the extent said alterations affect work covered by this Warranty. If Owner engages Roofing Installer to perform said alterations, Warranty shall not become null and void unless Roofing Installer, before starting said work, shall have notified Owner in writing, showing reasonable cause for claim, that said alterations would likely damage or deteriorate work, thereby reasonably justifying a limitation or termination of this Warranty.
5. During Warranty Period, if original use of roof is changed and it becomes used for, but was not originally specified for, a promenade, work deck, spray-cooled surface, flooded basin, or other use or service more severe than originally specified, this Warranty shall become null and void on date of said change, but only to the extent said change affects work covered by this Warranty.
6. Owner shall promptly notify Roofing Installer of observed, known, or suspected leaks, defects, or deterioration and shall afford reasonable opportunity for Roofing Installer to inspect work and to examine evidence of such leaks, defects, or deterioration.
7. This Warranty is recognized to be the only warranty of Roofing Installer on said work and shall not operate to restrict or cut off Owner from other remedies and resources lawfully available to Owner in cases of roofing failure. Specifically, this Warranty shall not operate to relieve Roofing Installer of responsibility for performance of original work according to requirements of the Contract Documents, regardless of whether Contract was a contract directly with Owner or a subcontract with Owner's General Contractor.

E. IN WITNESS THEREOF, this instrument has been duly executed this <**Insert day**> day of <**Insert month**>, <**Insert year**>.

1. Authorized Signature: <**Insert signature**>.
2. Name: <**Insert name**>.
3. Title: <**Insert title**>.

END OF SECTION 07610

SECTION 07620 - SHEET METAL FLASHING AND TRIM

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Manufactured Products:

a. Manufactured through-wall flashing and counterflashing].

b. Manufactured reglets and counterflashing.

2. Formed Products:

a. Formed roof drainage sheet metal fabrications.
b. Formed low-slope roof sheet metal fabrications.
c. Formed wall sheet metal fabrications.
d. Formed equipment support flashing.

B. Related Sections:
1. Section 04220 “ Concrete Unit Masonry” for installing through-wall flashing
2. Section 04813 "Brick Masonry Assemblies” for installing through-wall flashing.

3. Section 06105 "Miscellaneous Carpentry" for wood nailers, curbs, and blocking

4. Section 07720 "Roof Accessories" for set-on-type curbs, equipment supports, roof hatches, vents, and other manufactured roof accessory units.

1.3 PERFORMANCE REQUIREMENTS

A. General: Sheet metal flashing and trim assemblies as indicated shall withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Completed sheet metal flashing and trim shall not rattle, leak, or loosen, and shall remain watertight.

B. Fabricate and install copings capable of resisting the following forces according to recommendations in FMG Loss Prevention Data Sheet 1-49:

1. Wind Zone 3: For velocity pressures of 46 to 104 lbf/sq. ft. (2.20 to 4.98 kPa): 208-lbf/sq. ft. (9.96-kPa) perimeter uplift force, 312-lbf/sq. ft. (14.94-kPa) corner uplift force, and 104-lbf/sq. ft. (4.98-kPa) outward force.

C. Thermal Movements: Provide sheet metal flashing and trim that allows for thermal movements from ambient and surface temperature changes.

1. Temperature Change (Range): 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each manufactured product and accessory.

B. Shop Drawings: Show fabrication and installation layouts of sheet metal flashing and trim, including plans, elevations, expansion-joint locations, and keyed details. Distinguish between shop- and field-assembled work. Include the following:

1. Identification of material, thickness, weight, and finish for each item and location in Project.
2. Details for forming sheet metal flashing and trim, including profiles, shapes, seams, and dimensions.
3. Details for joining, supporting, and securing sheet metal flashing and trim, including layout of fasteners, cleats, clips, and other attachments. Include pattern of seams.
4. Details of termination points and assemblies, including fixed points.
5. Details of expansion joints and expansion-joint covers, including showing direction of expansion and contraction.
6. Details of edge conditions, including eaves, ridges, valleys, rakes, crickets, and counterflashings as applicable.
7. Details of special conditions.
8. Details of connections to adjoining work.
9. Detail formed flashing and trim at a scale of not less than 3 inches per 12 inches (1:5).

C. Samples for Verification: For each type of exposed finish required, prepared on Samples of size indicated below:

1. Sheet Metal Flashing: 12 inches (300 mm) long by actual width of unit, including finished seam and in required profile. Include fasteners, cleats, clips, closures, and other attachments.
2. Trim, Metal Closures, Expansion Joints, Joint Intersections, and Miscellaneous Fabrications: 12 inches (300 mm) long and in required profile. Include fasteners and other exposed accessories.
3. Accessories and Miscellaneous Materials: Full-size Sample.
4. Anodized Aluminum Samples: Samples to show full range to be expected for each color required.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified fabricator.

B. Warranty: Sample of special warranty.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance Data: For sheet metal flashing, trim, and accessories to include in maintenance manuals.

1.7 QUALITY ASSURANCE

A. Fabricator Qualifications: Shop that employs skilled workers who custom fabricate sheet metal flashing and trim similar to that required for this Project and whose products have a record of successful in-service performance.

B. Preinstallation Conference: Conduct conference at Project site.

1. Meet with Owner, Architect, Owner's insurer if applicable, Installer, and installers whose work interfaces with or affects sheet metal flashing and trim including installers of roofing materials, roof accessories, unit skylights, and roof-mounted equipment.
2. Review methods and procedures related to sheet metal flashing and trim.
3. Examine substrate conditions for compliance with requirements, including flatness and attachment to structural members.
4. Review special roof details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that will affect sheet metal flashing.
5. Document proceedings, including corrective measures and actions required, and furnish copy of record to each participant.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Do not store sheet metal flashing and trim materials in contact with other materials that might cause staining, denting, or other surface damage. Store sheet metal flashing and trim materials away from uncured concrete and masonry.

B. Protect strippable protective covering on sheet metal flashing and trim from exposure to sunlight and high humidity, except to the extent necessary for the period of sheet metal flashing and trim installation.

1.9 WARRANTY

A. Special Warranty on Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace sheet metal flashing and trim that shows evidence of deterioration of factory-applied finishes within specified warranty period.

1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:

   a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
   b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
   c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.

2. Finish Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 SHEET METALS

A. General: Protect mechanical and other finishes on exposed surfaces from damage by applying a strippable, temporary protective film before shipping.

B. Copper Sheet: ASTM B 370, cold-rolled copper sheet, H00 or H01 temper.

C. Aluminum Sheet: ASTM B 209 (ASTM B 209M), alloy as standard with manufacturer for finish required, with temper as required to suit forming operations and performance required.

1. As-Milled Finish: Standard one-side bright finish.
2. Surface: Smooth, flat.
3. Clear Anodic Finish, Coil Coated: AAMA 611, AA-M12C22A41, Class I, 0.018 mm or thicker.

2.2 UNDERLAYMENT MATERIALS

A. Felt: ASTM D 226, Type II (No. 30), asphalt-saturated organic felt, nonperforated.

B. Self-Adhering, High-Temperature Sheet: Minimum 30 to 40 mils (0.76 to 1.0 mm) thick, consisting of slip-resisting polyethylene-film top surface laminated to layer of butyl or SBS-modified asphalt adhesive, with release-paper backing; cold applied. Provide primer when recommended by underlayment manufacturer.

1. Thermal Stability: ASTM D 1970; stable after testing at 240 deg F (116 deg C).
2. Low-Temperature Flexibility: ASTM D 1970; passes after testing at minus 20 deg F (29 deg C).
3. Products: Subject to compliance with requirements, provide one of the following:

   a. Carlisle Coatings & Waterproofing Inc.; CCW WIP 300HT.
   b. Grace Construction Products, a unit of W. R. Grace & Co.; Ultra.
   c. Owens Corning; WeatherLock Metal High Temperature Underlayment.
   d. or Architect approved other.

C. Slip Sheet: Building paper, 3-lb/100 sq. ft. (0.16-kg/sq. m)minimum, rosin sized.

2.3 MISCELLANEOUS MATERIALS

A. General: Provide materials and types of fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items as required for complete sheet metal flashing and trim installation and recommended by manufacturer of primary sheet metal or manufactured item unless otherwise indicated.

B. Fasteners: Wood screws, annular threaded nails, self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads and recommended by manufacturer of primary sheet metal or manufactured item.

1. General: Blind fasteners or self-drilling screws, gasketed, with hex-washer head.

    a. Exposed Fasteners: Heads matching color of sheet metal using plastic caps or factory-applied coating.
    b. Blind Fasteners: High-strength aluminum or stainless-steel rivets suitable for metal being fastened.
    c. Spikes and Ferrules: Same material as gutter; with spike with ferrule matching internal gutter width.
2. Fasteners for Aluminum Sheet: Aluminum or Series 300 stainless steel.
3. Fasteners for Stainless-Steel Sheet: Series 300 stainless steel.
4. Fasteners for Aluminum-Zinc Alloy-Coated Steel Sheet: Hot-dip galvanized steel according to ASTM A 153/A 153M or ASTM F 2329 or Series 300 stainless steel.
5. Fasteners for Zinc Sheet: Hot-dip galvanized steel according to ASTM A 153/A 153M or ASTM F 2329 or Series 300 stainless steel.

C. Solder:

1. For Copper: ASTM B 32, Grade Sn50, 50 percent tin and 50 percent lead.
2. For Stainless Steel: ASTM B 32, Grade Sn60, with an acid flux of type recommended by stainless-steel sheet manufacturer.
3. For Zinc-Tin Alloy-Coated Stainless Steel: ASTM B 32, 100 percent tin.
4. For Zinc-Coated (Galvanized) Steel: ASTM B 32, Grade Sn50, 50 percent tin and 50 percent lead or Grade Sn60, 60 percent tin and 40 percent lead.
5. For Zinc: ASTM B 32, 40 percent tin and 60 percent lead with low antimony, as recommended by manufacturer.

D. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch (13 mm) wide and 1/8 inch (3 mm) thick.

E. Elastomeric Sealant: ASTM C 920, elastomeric polyurethane or silicone polymer sealant as recommended for compatibility with base metal; low modulus; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.

F. Butyl Sealant: ASTM C 1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for hooked-type expansion joints with limited movement.

G. Epoxy Seam Sealer: Two-part, noncorrosive, aluminum seam-cementing compound, recommended by aluminum manufacturer for exterior nonmoving joints, including riveted joints.

H. Asphalt Roofing Cement: ASTM D 4586, asbestos free, of consistency required for application.

2.4 MANUFACTURED SHEET METAL FLASHING AND TRIM

A. Through-Wall Ribbed Sheet Metal Flashing: Manufacture through-wall sheet metal flashing for embedment in masonry with ribs at 3-inch (75-mm) intervals along length of flashing to provide an integral mortar bond. Manufacture through-wall flashing with snaplock receiver on exterior face to receive counterflashing.

1. Copper: 10 oz. minimum for fully concealed flashing; 16 oz. elsewhere.

a. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

1) Cheney Flashing Company; Cheney Flashing (Dovetail).
2) Cheney Flashing Company; Cheney Flashing (Sawtooth).
3) Hohmann & Barnard, Inc.; STF Sawtooth Flashing.
4) Keystone Flashing Company, Inc.; Keystone Three-Way Interlocking Thruwall Flashing.
5) Sandell Manufacturing Company, Inc.; Pre-Formed Metal Flashing.

2. Stainless Steel: 0.016 inch thick.

a. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

1) Cheney Flashing Company; Cheney Flashing (Dovetail).
2) Cheney Flashing Company; Cheney Flashing (Sawtooth).
3) Hohmann & Barnard, Inc.; STF Sawtooth Flashing.
4) Keystone Flashing Company, Inc.; Keystone Three-Way Interlocking Thruwall Flashing.
5) Sandell Manufacturing Company, Inc.; Pre-Formed Metal Flashing.

B. Reglets: Units of type, material, and profile indicated, formed to provide secure interlocking of separate reglet and counterflashing pieces, and compatible with flashing indicated with factory-mitered and -welded corners and junctions and with interlocking counterflashing on exterior face, of same metal as reglet.

1. Basis-of-Design Product: Subject to compliance with requirements, provide Fry Reglect products or comparable product by one of the following:.
   a. Heckmann Building Products Inc.
   b. Hickman, W. P. Company.
   c. Keystone Flashing Company, Inc.
   d. National Sheet Metal Systems, Inc.

2. Material: Aluminum, 0.024 inch (0.61 mm) thick.
3. Surface-Mounted Type: Provide with slotted holes for fastening to substrate, with neoprene or other suitable weatherproofing washers, and with channel for sealant at top edge.
4. Stucco Type: Provide with upturned fastening flange and extension leg of length to match thickness of applied finish materials.
5. Concrete Type: Provide temporary closure tape to keep reglet free of concrete materials, special fasteners for attaching reglet to concrete forms, and guides to ensure alignment of reglet section ends.
6. Accessories:

   a. Flexible-Flashing Retainer: Provide resilient plastic or rubber accessory to secure flexible flashing in reglet where clearance does not permit use of standard metal counterflashing or where Drawings show reglet without metal counterflashing.
   b. Counterflashing Wind-Restraint Clips: Provide clips to be installed before counterflashing to prevent wind uplift of counterflashing lower edge.

7. Finish: Mill.

2.5 FABRICATION, GENERAL

A. General: Custom fabricate sheet metal flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, geometry, metal thickness, and other characteristics of item indicated. Fabricate items at the shop to greatest extent possible.

   1. Fabricate sheet metal flashing and trim in thickness or weight needed to comply with performance requirements, but not less than that specified for each application and metal.
   2. Obtain field measurements for accurate fit before shop fabrication.
   3. Form sheet metal flashing and trim without excessive oil canning, buckling, and tool marks and true to line and levels indicated, with exposed edges folded back to form hems.
   4. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces exposed to view.

B. Fabrication Tolerances: Fabricate sheet metal flashing and trim that is capable of installation to a tolerance of 1/4 inch in 20 feet on slope and location lines as indicated and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.

C. Fabrication Tolerances: Fabricate sheet metal flashing and trim that is capable of installation to tolerances specified in MCA's "Guide Specification for Residential Metal Roofing."

D. Sealed Joints: Form nonexpansion but movable joints in metal to accommodate elastomeric sealant.

E. Expansion Provisions: Where lapped expansion provisions cannot be used, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with butyl sealant concealed within joints.

F. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal.

G. Fabricate cleats and attachment devices of sizes as recommended by SMACNA's "Architectural Sheet Metal Manual" and by FMG Loss Prevention Data Sheet 1-49 for application, but not less than thickness of metal being secured.

H. Seams for Aluminum: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with epoxy seam sealer. Rivet joints where necessary for strength on roof side only or where they would not be visible from the ground.

I. Do not use graphite pencils to mark metal surfaces.

2.6 ROOF DRAINAGE SHEET METAL FABRICATIONS

A. Downspouts: Fabricate rectangular downspouts complete with mitered elbows. Furnish with metal hangers, from same material as downspouts, and anchors.
   1. Fabricate from the following materials:
      a. Aluminum: 0.024 inch (0.61 mm) thick.

B. Parapet Scuppers: Fabricate scuppers of dimensions required with closure flange trim to exterior, 4-inch- (100-mm-) wide wall flanges to interior, and base extending 4 inches (100 mm) beyond cant or tapered strip into field of roof. Fabricate from the following materials:
   1. Aluminum: 0.032 inch (0.81 mm) thick.

C. Conductor Heads: Fabricate conductor heads with flanged back and stiffened top edge and of dimensions and shape indicated complete with outlet tubes, exterior flange trim, and built-in overflows. Fabricate from the following materials:
   1. Aluminum: 0.032 inch (0.81 mm) thick.

2.7 LOW-SLOPE ROOF SHEET METAL FABRICATIONS

A. Roof and Roof to Wall Transition Expansion-Joint Cover: Fabricate from the following materials:
   1. Aluminum: 0.050 inch thick.

B. Base Flashing: Fabricate from the following materials:
   1. Aluminum: 0.040 inch thick.

C. Counterflashing: Fabricate from the following materials:

   1. Aluminum: 0.032 inch thick.

D. Flashing Receivers: Fabricate from the following materials:
   1. Aluminum: 0.032 inch thick.

E. Roof-Penetration Flashing: Fabricate from the following materials:
   1. Galvanized Steel: 0.028 inch thick.
   2. Aluminum-Zinc Alloy-Coated Steel: 0.028 inch thick.

F. Roof-Drain Flashing: Fabricate from the following materials:

   1. Stainless Steel: 0.016 inch thick.

2.8 WALL SHEET METAL FABRICATIONS

A. Opening Flashings in Frame Construction: Fabricate head, sill, and similar flashings to extend 6 inches. Insert extension beyond wall openings. Form head and sill flashing with 2-inch- high, end dams. Fabricate from the following materials:
   1. Aluminum: 0.032 inch thick.

2.9 MISCELLANEOUS SHEET METAL FABRICATIONS

A. Equipment Support Flashing: Fabricate from the following materials:
   1. Galvanized Steel: 0.028 inch thick.
   2. Aluminum-Zinc Alloy-Coated Steel: 0.028 inch thick.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, to verify actual locations, dimensions and other conditions affecting performance of the Work.

   1. Verify compliance with requirements for installation tolerances of substrates.
   2. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.

B. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 UNDERLAYMENT INSTALLATION

A. General: Install underlayment as indicated on Drawings.

B. Felt Underlayment: Install felt underlayment with adhesive for temporary anchorage to minimize use of mechanical fasteners under sheet metal flashing and trim. Apply in shingle fashion to shed water, with lapped joints of not less than 2 inches.

C. Self-Adhering Sheet Underlayment: Install self-adhering sheet underlayment, wrinkle free. Apply primer if required by underlayment manufacturer. Comply with temperature restrictions of underlayment manufacturer for installation; use primer rather than nails for installing underlayment at low temperatures. Apply in shingle fashion to shed water, with end laps of not less than 6 inches staggered 24 inches between courses. Overlap side edges not less than 3-1/2 inches. Roll laps with roller. Cover underlayment within 14 days.

3.3 INSTALLATION, GENERAL

A. General: Anchor sheet metal flashing and trim and other components of the Work securely in place, with provisions for thermal and structural movement. Use fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items as required to complete sheet metal flashing and trim system.

1. Install sheet metal flashing and trim true to line and levels indicated. Provide uniform, neat seams with minimum exposure of solder, welds, and sealant.
2. Install sheet metal flashing and trim to fit substrates and to result in watertight performance. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.
3. Space cleats not more than 12 inches apart. Anchor each cleat with two fasteners. Bend tabs over fasteners.
4. Install exposed sheet metal flashing and trim without excessive oil canning, buckling, and tool marks.
5. Install sealant tape where indicated.
6. Torch cutting of sheet metal flashing and trim is not permitted.
7. Do not use graphite pencils to mark metal surfaces.

B. Metal Protection: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating or by other permanent separation as recommended by SMACNA.

1. Coat back side of uncoated aluminum sheet metal flashing and trim with bituminous coating where flashing and trim will contact wood, ferrous metal, or cementitious construction.
2. Underlayment: Where installing metal flashing directly on cementitious or wood substrates, install a course of felt underlayment and cover with a slip sheet or install a course of polyethylene sheet.

C. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet with no joints allowed within 24 inches

of corner or intersection. Where lapped expansion provisions cannot be used or would not be sufficiently watertight, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with sealant concealed within joints.

D. Fastener Sizes: Use fasteners of sizes that will penetrate metal decking not less than recommended by fastener manufacturer to achieve maximum pull-out resistance.

E. Seal joints as shown and as required for watertight construction.

1. Where sealant-filled joints are used, embed hooked flanges of joint members not less than 1 inch into sealant. Form joints to completely conceal sealant. When ambient temperature at time of installation is moderate, between 40 and 70 deg F (4 and 21 deg C), set joint members for 50 percent movement each way. Adjust setting proportionately for installation at higher ambient temperatures. Do not install sealant-type joints at temperatures below 40 deg F (4 deg C).
2. Prepare joints and apply sealants to comply with requirements in Section 07920 "Joint Sealants."

F. Soldered Joints: Clean surfaces to be soldered, removing oils and foreign matter. Pre-tin edges of sheets to be soldered to a width of 1-1/2 inches , except reduce pre-tinning where pre-tinned surface would show in completed Work.
1. Do not use torches for soldering. Heat surfaces to receive solder and flow solder into joint. Fill joint completely. Completely remove flux and spatter from exposed surfaces.
2. Stainless-Steel Soldering: Tin edges of uncoated sheets using solder recommended for stainless steel and acid flux. Promptly remove acid flux residue from metal after tinning and soldering. Comply with solder manufacturer's recommended methods for cleaning and neutralization.

G. Rivets: Rivet joints in uncoated aluminum where on roof side only or where they would not be visible from the ground and where necessary for strength.

3.4 ROOF DRAINAGE SYSTEM INSTALLATION

A. General: Install sheet metal roof drainage items to produce complete roof drainage system according to SMACNA recommendations and as indicated. Coordinate installation of roof perimeter flashing with installation of roof drainage system.

B. Downspouts: Join sections with 1-1/2-inch telescoping joints.

1. Provide hangers with fasteners designed to hold downspouts securely to walls. Locate hangers at top and bottom and at approximately 60 inches o.c. in between.
2. Provide elbows at base of downspout to direct water away from building.
3. Connect downspouts to underground drainage system indicated.

C. Parapet Scuppers: Install scuppers where indicated through parapet. Continuously support scupper, set to correct elevation, and seal flanges to interior wall face, over cants or tapered edge strips, and under roofing membrane.

1. Anchor scupper closure trim flange to exterior wall and to scupper.
2. Loosely lock front edge of scupper with conductor head.
3. Seal with elastomeric sealant exterior wall scupper flanges into back of conductor head.

D. Conductor Heads: Anchor securely to wall with elevation of conductor head rim 1 inch below scupper discharge.

3.5 ROOF FLASHING INSTALLATION

A. General: Install sheet metal flashing and trim to comply with performance requirements, sheet metal manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, set units true to line, and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.

B. Retain one of first two paragraphs below for copings. Retain first paragraph if following SMACNA's recommendations; SMACNA does not include fastener spacing for the continuous cleat. Retain second if Project is FMG insured or if FMG requirements will set minimum installation standard. FMG requirements depend on specific coping configurations.

C. Copings: Anchor to resist uplift and outward forces according to recommendations in FMG Loss Prevention Data Sheet 1-49 for specified wind zone and as indicated.

1. Interlock exterior bottom edge of coping with continuous cleat anchored to substrate at the spacing required for Wind Zone 3.
2. Anchor interior leg of coping with screw fasteners and washers at the spaceing required for Wind Zone 3.

D. Pipe or Post Counterflashing: Install counterflashing umbrella with close-fitting collar with top edge flared for elastomeric sealant, extending a minimum of 4 inches (100 mm) over base flashing. Install stainless-steel draw band and tighten.

E. Counterflashing: Coordinate installation of counterflashing with installation of base flashing. Insert counterflashing in reglets or receivers and fit tightly to base flashing. Extend counterflashing 4 inches (100 mm) over base flashing. Lap counterflashing joints a minimum of 4 inches (100 mm) and bed with sealant. Secure in a waterproof manner by means of interlocking folded seam or blind rivets and sealantas indicated on the drawings.

F. Roof-Penetration Flashing: Coordinate installation of roof-penetration flashing with installation of roofing and other items penetrating roof. Seal with elastomeric or butyl sealant that is compatible with the flashing and penetration base material and clamp flashing to pipes that penetrate roof.

3.6 WALL FLASHING INSTALLATION

A. General: Install sheet metal wall flashing to intercept and exclude penetrating moisture according to SMACNA recommendations and as indicated. Coordinate installation of wall flashing with installation of wall-opening components such as windows, doors, and louvers.

B. Through-Wall Flashing: Installation of through-wall flashing is specified in Section 042200 “Concrete Unit Masonry” and Section 04813 “Brick Masonry Assemblies”

C. Reglets: Installation of reglets is specified in Section 04813 "Brick Masonry Assemblies."

D. Opening Flashings in Frame Construction: Install continuous head, sill, and similar flashings to extend 6 inches beyond wall openings.

3.7 MISCELLANEOUS FLASHING INSTALLATION

A. Equipment Support Flashing: Coordinate installation of equipment support flashing with installation of roofing and equipment. Weld or seal flashing with elastomeric sealant to equipment support member.

3.8 ERECTION TOLERANCES

A. Installation Tolerances: Shim and align sheet metal flashing and trim within installed tolerance of 1/4 inch in 20 feet (6 mm in 6 m) on slope and location lines as indicated and within 1/8-inch (3-mm) offset of adjoining faces and of alignment of matching profiles.

3.9 CLEANING AND PROTECTION

A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.

B. Clean and neutralize flux materials. Clean off excess solder.

C. Clean off excess sealants.

D. Remove temporary protective coverings and strippable films as sheet metal flashing and trim are installed unless otherwise indicated in manufacturer's written installation instructions. On completion of installation, remove unused materials and clean finished surfaces. Maintain in a clean condition during construction.

E. Replace sheet metal flashing and trim that have been damaged or that have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 07620

SECTION 07710 - MANUFACTURED ROOF SPECIALTIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:
1. Roof-edge flashings.
2. Roof-edge drainage systems.
3. Reglets and counterflashings.

B. Related Sections:

1. Section 06100 "Rough Carpentry" for wood nailers, curbs, and blocking.
2. Section 07720 "Roof Accessories" for set-on-type curbs, equipment supports, roof hatches, vents, and other manufactured roof accessory units.
3. Section 07920 "Joint Sealants" for field-applied sealants between roof specialties and adjacent materials.

1.3 PERFORMANCE REQUIREMENTS

A. General Performance: Roof specialties shall withstand exposure to weather and resist thermally induced movement without failure, rattling, leaking, or fastener disengagement due to defective manufacture, fabrication, installation, or other defects in construction.

B. FM Approvals' Listing: Manufacture and install copings that are listed in FM Approvals' "RoofNav" and approved for windstorm classification, Class 1-90. Identify materials with FM Approvals' markings.

C. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes to prevent buckling, opening of joints, hole elongation, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Provide clips that resist rotation and avoid shear stress as a result of thermal movements. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change (Range): 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.

B. Shop Drawings: For roof specialties. Include plans, elevations, expansion-joint locations, keyed details, and attachments to other work. Distinguish between plant- and field-assembled work. Include the following:

1. Details for expansion and contraction; locations of expansion joints, including direction of expansion and contraction.
2. Pattern of seams and layout of fasteners, cleats, clips, and other attachments.
3. Details of termination points and assemblies, including fixed points.
4. Details of special conditions.

C. Samples for Verification: For roof-edge drainage systems, reglets, and counterflashings made from 12-inch lengths of full-size components including fasteners, cover joints, accessories, and attachments.

1.5 INFORMATIONAL SUBMITTALS

A. Warranty: Sample of special warranty.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance Data: For roofing specialties to include in maintenance manuals.

1.7 QUALITY ASSURANCE

A. Preinstallation Conference: Conduct conference at Project site.

1. Meet with Owner, Architect, Owner's insurer if applicable, Installer, and installers whose work interfaces with or affects roof specialties including installers of roofing materials and accessories.
2. Examine substrate conditions for compliance with requirements, including flatness and attachment to structural members.
3. Review special roof details, roof drainage, and condition of other construction that will affect roof specialties.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Do not store roof specialties in contact with other materials that might cause staining, denting, or other surface damage. Store roof specialties away from uncured concrete and masonry.

B. Protect strippable protective covering on roof specialties from exposure to sunlight and high humidity, except to extent necessary for the period of roof specialties installation.

1.9 WARRANTY

1. Finish Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 EXPOSED METALS

A. Cold-rolled copper sheet, H00 or H01 temper.

1. Non-Patinated Exposed Finish: Mill.
2. Pre-Patinated Copper-Sheet Finish: Pre-patinated according to ASTM B 882.

B. Aluminum Sheet: ASTM B 209 (ASTM B 209M), alloy as standard with manufacturer for finish required, with temper to suit forming operations and performance required.

1. Surface: Smooth, flat finish.

2. Clear Anodic Finish, Coil Coated: AAMA 611, AA-M12C22A41, Class I, 0.018 mm or thicker.

C. Aluminum Extrusions: ASTM B 221 (ASTM B 221M), alloy and temper recommended by manufacturer for type of use and finish indicated, finished as follows:

1. Clear Anodic Finish, Coil Coated: AAMA 611, AA-M12C22A41, Class I, 0.018 mm or thicker.

2.2 CONCEALED METALS

A. Aluminum Sheet: ASTM B 209 (ASTM B 209M), alloy and temper recommended by manufacturer for type of use and structural performance indicated, mill finished.

B. Aluminum Extrusions: ASTM B 221 (ASTM B 221M), alloy and temper recommended by manufacturer for type of use and structural performance indicated, mill finished.

C. Stainless-Steel Sheet: ASTM A 240/A 240M or ASTM A 666, Type 304.

D. Zinc-Coated (Galvanized) Steel Sheet: ASTM A 653/A 653M, G90 (Z275) coating designation.

2.3 UNDERLAYMENT MATERIALS

A. Felt: ASTM D 226, Type II (No. 30), asphalt-saturated organic felt, nonperforated.

B. Self-Adhering, High-Temperature Sheet: Minimum 30 to 40 mils thick, consisting of slip-resisting polyethylene-film top surface laminated to layer of butyl or SBS-modified asphalt adhesive, with release-paper backing; cold applied. Provide primer when recommended by underlayment manufacturer.

1. Thermal Stability: ASTM D 1970; stable after testing at 240 deg F (116 deg C).
2. Low-Temperature Flexibility: ASTM D 1970; passes after testing at minus 20 deg F (29 deg C).
3. Products: Subject to compliance with requirements, provide one of the following:

    a. Carlisle Coatings & Waterproofing; CCW WIP 300HT.
    b. Grace Construction Products, a unit of W. R. Grace & Co.; Ultra.
    c. Owens Corning; WeatherLock Metal High Temperature Underlayment.
    d. or Architect approved other product.

C. Slip Sheet: Building paper, 3-lb/100 sq. ft. minimum, rosin sized.

2.4 MISCELLANEOUS MATERIALS

A. General: Provide materials and types of fasteners, protective coatings, sealants, and other miscellaneous items required by manufacturer for a complete installation.

B. Fasteners: Manufacturer's recommended fasteners, suitable for application and designed to meet performance requirements. Furnish the following unless otherwise indicated:
1. Fasteners for Aluminum: Aluminum or Series 300 stainless steel.
2. Fasteners for Stainless-Steel Sheet: Series 300 stainless steel.
3. Fasteners for Zinc-Coated (Galvanized) Steel Sheet: Series 300 stainless steel or hot-dip zinc-coated steel according to ASTM A 153/A 153M or ASTM F 2329.

C. Elastomeric Sealant: ASTM C 920, elastomeric polyurethane or silicone polymer sealant of type, grade, class, and use classifications required by roofing-specialty manufacturer for each application.

D. Butyl Sealant: ASTM C 1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for hooked-type expansion joints with limited movement.

E. Bituminous Coating: Cold-applied asphalt emulsion complying with ASTM D 1187.

F. Asphalt Roofing Cement: ASTM D 4586, asbestos free, of consistency required for application.

2.5 ROOF-EDGE DRAINAGE SYSTEMS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Andreas Renner KG.
2. Architectural Products Company.
3. Berger Building Products, Inc.
4. Castle Metal Products.
5. Cheney Flashing Company.
6. Hickman Company, W. P.

7. Klauer Manufacturing Company.
8. Merchant & Evans, Inc.
9. Metal-Era, Inc.
10. Metal-Fab Manufacturing, LLC.
11. National Sheet Metal Systems, Inc.
12. Perimeter Systems; a division of Southern Aluminum Finishing Company, Inc.

B. Downspouts: Plain rectangular complete with mitered elbows, manufactured from the following exposed metal. Furnish with metal hangers, from same material as downspouts, and anchors.
1. Formed Aluminum: 0.040 inch thick.

C. Parapet Scuppers: Manufactured with closure flange trim to exterior, 4-inch- wide wall flanges to interior, and base extending 4 inches beyond cant or tapered strip into field of roof.

1. Fabricate from the following exposed metal:
a. Formed Aluminum: 0.032 inch thick.

D. Conductor Heads: Manufactured conductor heads, each with flanged back and stiffened top edge and of dimensions and shape indicated, complete with outlet tube that nests into upper end of downspout.

1. Fabricate from the following exposed metal:
a. Formed Aluminum: 0.032 inch thick.

2.6 REGLETS AND COUNTERFLASHINGS

A. Basis-of-Design Product: Subject to compliance with requirements, provide Fry Reglect products or comparable product by one of the following:
1. Heckmann Building Products Inc.
2. Hickman Company, W. P.
3. Keystone Flashing Company, Inc.
4. Metal-Era, Inc.
5. Metal-Fab Manufacturing, LLC.
6. National Sheet Metal Systems, Inc.

B. Reglets: Manufactured units formed to provide secure interlocking of separate reglet and counterflashing pieces, from the following exposed metal:
1. Formed Aluminum: 0.050 inch thick.
2. Stainless Steel: 0.025 inch thick.
3. Zinc-Coated Steel: Nominal 0.028-inch thickness.
4. Corners: Factory mitered and continuously welded.
5. Surface-Mounted Type: Provide reglets with slotted holes for fastening to substrate, with neoprene or other suitable weatherproofing washers, and with channel for sealant at top edge.
6. Stucco Type, Embedded: Provide reglets with upturned fastening flange and extension leg of length to match thickness of applied finish materials.

C. Counterflashings: Manufactured units of heights to overlap top edges of base flashings by 4 inches and in lengths not exceeding 12 feet designed to snap into reglets or through-wall-flashing receiver and compress against base flashings with joints lapped, from the following exposed metal:
   1. Formed Aluminum: 0.032 inch thick.
   2. Stainless Steel: 0.025 inch thick.
   3. Zinc-Coated Steel: Nominal 0.028-inch thickness.

D. Accessories:

   1. Flexible-Flashing Retainer: Provide resilient plastic or rubber accessory to secure flexible flashing in reglet where clearance does not permit use of standard metal counterflashing or where reglet is provided separate from metal counterflashing.
   2. Counterflashing Wind-Restraint Clips: Provide clips to be installed before counterflashing to prevent wind uplift of counterflashing lower edge.

   Retain required finish in four paragraphs below. If retaining more than one, indicate locations of each on Drawings or by inserts.

E. Aluminum Finish: Clear anodic.

2.7 GENERAL FINISH REQUIREMENTS

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

C. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, to verify actual locations, dimensions, and other conditions affecting performance of the Work.

B. Examine walls, roof edges, and parapets for suitable conditions for roof specialties.

C. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 UNDERLAYMENT INSTALLATION

A. Felt Underlayment: Install with adhesive for temporary anchorage to minimize use of mechanical fasteners under roof specialties. Apply in shingle fashion to shed water, with lapped joints of not less than 2 inches

B. Self-Adhering Sheet Underlayment: Install wrinkle free. Apply primer if required by underlayment manufacturer. Comply with temperature restrictions of underlayment manufacturer for installation; use primer rather than nails for installing underlayment at low temperatures. Apply in shingle fashion to shed water. Overlap edges not less than 3-1/2 inches. Roll laps with roller. Cover underlayment within 14 days.

C. Slip Sheet: Install with tape or adhesive for temporary anchorage to minimize use of mechanical fasteners under roof specialties. Apply in shingle fashion to shed water, with lapped joints of not less than 2 inches.

3.3 INSTALLATION, GENERAL

A. General: Install roof specialties according to manufacturer's written instructions. Anchor roof specialties securely in place, with provisions for thermal and structural movement. Use fasteners, solder, protective coatings, separators, sealants, and other miscellaneous items as required to complete roof-specialty systems.

1. Install roof specialties level, plumb, true to line and elevation; with limited oil-canning and without warping, jogs in alignment, buckling, or tool marks.
2. Provide uniform, neat seams with minimum exposure of solder and sealant.
3. Install roof specialties to fit substrates and to result in watertight performance. Verify shapes and dimensions of surfaces to be covered before manufacture.
4. Torch cutting of roof specialties is not permitted.
5. Do not use graphite pencils to mark metal surfaces.

B. Metal Protection: Protect metals against galvanic action by separating dissimilar metals from contact with each other or with corrosive substrates by painting contact surfaces with bituminous coating or by other permanent separation as recommended by manufacturer.

1. Coat concealed side of uncoated aluminum roof specialties with bituminous coating where in contact with wood, ferrous metal, or cementitious construction.
2. Underlayment: Where installing metal flashing directly on cementitious or wood substrates, install a course of self-adhering, high-temperature sheet underlayment.
3. Bed flanges in thick coat of asphalt roofing cement where required by manufacturers of roof specialties for waterproof performance.

C. Expansion Provisions: Allow for thermal expansion of exposed roof specialties.

1. Space movement joints at a maximum of with no joints within 18 inches of corners or intersections unless otherwise shown on Drawings.

2. When ambient temperature at time of installation is between 40 and 70 deg F (4 and 21 deg C), set joint members for 50 percent movement each way. Adjust setting proportionately for installation at higher ambient temperatures.

D. Fastener Sizes: Use fasteners of sizes that will penetrate substrate not less than recommended by fastener manufacturer to achieve maximum pull-out resistance.

E. Seal joints with elastomeric or butyl sealant as required by roofing-specialty manufacturer.

F. Seal joints as required for watertight construction. Place sealant to be completely concealed in joint. Do not install sealants at temperatures below 40 deg F (4 deg C).

3.4 ROOF-EDGE DRAINAGE-SYSTEM INSTALLATION

A. General: Install components to produce a complete roof-edge drainage system according to manufacturer's written instructions. Coordinate installation of roof perimeter flashing with installation of roof-edge drainage system.

B. Downspouts: Join sections with manufacturer's standard telescoping joints. Provide hangers with fasteners designed to hold downspouts securely to walls and 1 inch away from walls; locate fasteners at top and bottom and at approximately 60 inches o.c.

1. Provide elbows at base of downspout to direct water away from building.

C. Splash Pans: Install where downspouts discharge on low-slope roofs. Set in elastomeric sealant.

D. Parapet Scuppers: Install scuppers through parapet where indicated. Continuously support scupper, set to correct elevation, and seal flanges to interior wall face, over cants or tapered edge strips, and under roofing membrane.

1. Anchor scupper closure trim flange to exterior wall and seal or solder to scupper.
2. Loosely lock front edge of scupper with conductor head.
3. Seal or solder exterior wall scupper flanges into back of conductor head.

E. Conductor Heads: Anchor securely to wall with elevation of conductor top edge 1 inch (25 mm) below scupper discharge.

3.5 REGLET AND COUNTERFLASHING INSTALLATION

A. Surface-Mounted Reglets: Install reglets to receive flashings where flashing without embedded reglets is indicated on Drawings. Install at height so that inserted counterflashings overlap 4 inches (100 mm) over top edge of base flashings.

B. Counterflashings: Insert counterflashings into reglets or other indicated receivers; ensure that counterflashings overlap 4 inches (100 mm) over top edge of base flashings. Lap counterflashing joints a minimum of 4 inches (100 mm) and bed with elastomeric or butyl sealant. Fit counterflashings tightly to base flashings.

3.6 CLEANING AND PROTECTION

A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.

B. Clean and neutralize flux materials. Clean off excess solder and sealants.

C. Remove temporary protective coverings and strippable films as roof specialties are installed. On completion of installation, clean finished surfaces including removing unused fasteners, metal filings, pop rivet stems, and pieces of flashing. Maintain roof specialties in a clean condition during construction.

D. Replace roof specialties that have been damaged or that cannot be successfully repaired by finish touchup or similar minor repair procedures.

END OF SECTION 07710

SECTION 07720 - ROOF ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Roof curbs.
2. Equipment supports.
3. Pipe supports.
4. Preformed flashing sleeves.

B. Related Sections:

1. Section 05500 "Metal Fabrications" for metal vertical ladders, ships' ladders, and stairs for access to roof hatches.
2. Section 05521 "Pipe and Tube Railings" for safety railing systems not attached to roof-hatch curbs.
3. Section 07620 "Sheet Metal Flashing and Trim" for shop- and field-formed metal flashing, roof-drainage systems, roof expansion-joint covers, and miscellaneous sheet metal trim and accessories.
4. Section 07710 "Manufactured Roof Specialties" for manufactured fasciae, copings, gravel stops, gutters and downspouts, and counterflashing.

1.3 PERFORMANCE REQUIREMENTS

A. General Performance: Roof accessories shall withstand exposure to weather and resist thermally induced movement without failure, rattling, leaking, or fastener disengagement due to defective manufacture, fabrication, installation, or other defects in construction.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of roof accessory indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.

B. Shop Drawings: For roof accessories. Include plans, elevations, keyed details, and attachments to other work. Indicate dimensions, loadings, and special conditions. Distinguish between plant- and field-assembled work.

C. Samples: For each exposed product and for each color and texture specified, prepared on Samples of size to adequately show color.

1.5 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Roof plans, drawn to scale, and coordinating penetrations and roof-mounted items. Show the following:

1. Size and location of roof accessories specified in this Section.
2. Method of attaching roof accessories to roof or building structure.
3. Other roof-mounted items including mechanical and electrical equipment, ductwork, piping, and conduit.
4. Required clearances.

B. Warranty: Sample of special warranty.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For roof accessories to include in operation and maintenance manuals.

1.7 COORDINATION

A. Coordinate layout and installation of roof accessories with roofing membrane and base flashing and interfacing and adjoining construction to provide a leakproof, weathertight, secure, and noncorrosive installation.

B. Coordinate dimensions with rough-in information or Shop Drawings of equipment to be supported.

1.8 WARRANTY

A. Special Warranty on Painted Finishes: Manufacturer's standard form in which manufacturer agrees to repair finishes or replace roof accessories that show evidence of deterioration of factory-applied finishes within specified warranty period.

1. Fluoropolymer Finish: Deterioration includes, but is not limited to, the following:

a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.

2. Finish Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 METAL MATERIALS

A. Zinc-Coated (Galvanized) Steel Sheet: ASTM A 653/A 653M, G90 (Z275) coating designation.
   1. Exposed Coil-Coated Finish: Prepainted by the coil-coating process to comply with ASTM A 755/A 755M. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

      a. Two-Coat Fluoropolymer Finish: AAMA 621. System consisting of primer and fluoropolymer color topcoat containing not less than 70 percent PVDF resin by weight.

   2. Baked-Enamel or Powder-Coat Finish: Immediately after cleaning and pretreating, apply manufacturer's standard two-coat, baked-on finish consisting of prime coat and thermosetting topcoat, with a minimum dry film thickness of 1 mil (0.025 mm) for topcoat. Comply with coating manufacturer's written instructions for applying and baking to achieve a minimum dry film thickness of 2 mils (0.05 mm).
   3. Concealed Finish: Pretreat with manufacturer's standard white or light-colored acrylic or polyester-backer finish consisting of prime coat and wash coat, with a minimum total dry film thickness of 0.5 mil (0.013 mm).

B. Aluminum-Zinc Alloy-Coated Steel Sheet: ASTM A 792/A 792M, AZ50 (AZM150) coated.
   1. Exposed Coil-Coated Finish: Prepainted by the coil-coating process to comply with ASTM A 755/A 755M. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

      a. Two-Coat Fluoropolymer Finish: AAMA 621. System consisting of primer and fluoropolymer color topcoat containing not less than 70 percent PVDF resin by weight.

   2. Baked-Enamel or Powder-Coat Finish: Immediately after cleaning and pretreating, apply manufacturer's standard two-coat, baked-on finish consisting of prime coat and thermosetting topcoat, with a minimum dry film thickness of 1 mil (0.025 mm) for topcoat. Comply with coating manufacturer's written instructions for applying and baking to achieve a minimum dry film thickness of 2 mils (0.05 mm).
   3. Concealed Finish: Pretreat with manufacturer's standard white or light-colored acrylic or polyester-backer finish consisting of prime coat and wash coat, with a minimum total dry film thickness of 0.5 mil (0.013 mm).

C. Aluminum Sheet: ASTM B 209 (ASTM B 209M), manufacturer's standard alloy for finish required, with temper to suit forming operations and performance required.

1. Mill Finish: As manufactured.
2. Factory Prime Coating: Where field painting is indicated, apply pretreatment and white or light-colored, factory-applied, baked-on epoxy primer coat, with a minimum dry film thickness of 0.2 mil (0.005 mm).
3. Clear Anodic Finish: AAMA 611, AA-M12C22A41, Class I, 0.018 mm or thicker.

D. Aluminum Extrusions and Tubes: ASTM B 221 (ASTM B 221M), manufacturer's standard alloy and temper for type of use, finished to match assembly where used, otherwise mill finished.

E. Stainless-Steel Sheet and Shapes: ASTM A 240/A 240M or ASTM A 666, Type 304.

F. Steel Shapes: ASTM A 36/A 36M, hot-dip galvanized according to ASTM A 123/A 123M unless otherwise indicated.

G. Steel Tube: ASTM A 500, round tube.

H. Galvanized-Steel Tube: ASTM A 500, round tube, hot-dip galvanized according to ASTM A 123/A 123M.

I. Steel Pipe: ASTM A 53/A 53M, galvanized.

2.2 MISCELLANEOUS MATERIALS

A. General: Provide materials and types of fasteners, protective coatings, sealants, and other miscellaneous items required by manufacturer for a complete installation.

B. Polyisocyanurate Board Insulation: ASTM C 1289, thickness as indicated.Wood Nailers: Softwood lumber, pressure treated with waterborne preservatives for aboveground use, acceptable to authorities having jurisdiction, containing no arsenic or chromium, and complying with AWPA C2; not less than 1-1/2 inches (38 mm) thick.

C. Underlayment:
1. Polyethylene Sheet: 6-mil- (0.15-mm-) thick polyethylene sheet complying with ASTM D 4397.
2. Slip Sheet: Building paper, 3-lb/100 sq. ft. (0.16-kg/sq. m) minimum, rosin sized.

D. Fasteners: Roof accessory manufacturer's recommended fasteners suitable for application and metals being fastened. Match finish of exposed fasteners with finish of material being fastened. Provide nonremovable fastener heads to exterior exposed fasteners. Furnish the following unless otherwise indicated:

1. Fasteners for Zinc-Coated or Aluminum-Zinc Alloy-Coated Steel: Series 300 stainless steel or hot-dip zinc-coated steel according to ASTM A 153/A 153M or ASTM F 2329.
2. Fasteners for Aluminum Sheet: Aluminum or Series 300 stainless steel.

3. Fasteners for Stainless-Steel Sheet: Series 300 stainless steel.

E. Gaskets: Manufacturer's standard tubular or fingered design of neoprene, EPDM, PVC, or silicone or a flat design of foam rubber, sponge neoprene, or cork.

F. Elastomeric Sealant: ASTM C 920, elastomeric polyurethane or silicone polymer sealant as recommended by roof accessory manufacturer for installation indicated; low modulus; of type, grade, class, and use classifications required to seal joints and remain watertight.

G. Butyl Sealant: ASTM C 1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for expansion joints with limited movement.

H. Asphalt Roofing Cement: ASTM D 4586, asbestos free, of consistency required for application.

2.3 ROOF CURBS

A. Roof Curbs: Internally reinforced roof-curb units with integral spring-type vibration isolators and capable of supporting superimposed live and dead loads, including equipment loads and other construction indicated on Drawings; with welded or mechanically fastened and sealed corner joints, integral metal cant, and integrally formed deck-mounting flange at perimeter bottom.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

    a. AES Industries, Inc.
    b. Curbs Plus, Inc.
    c. Custom Solution Roof and Metal Products.
    d. Greenheck Fan Corporation.
    e. LM Curbs.
    f. Metallic Products Corp.
    g. Milcor Inc.; Commercial Products Group of Hart & Cooley, Inc.
    h. Pate Company (The).
    i. Roof Products, Inc.
    j. Safe Air of Illinois.
    k. Thybar Corporation.
    l. Vent Products Co., Inc.

B. Size: Coordinate dimensions with roughing-in information or Shop Drawings of equipment to be supported.

C. Material: Zinc-coated (galvanized) or Aluminum-zinc alloy-coated steel sheet, 0.079 inch (2.01 mm) thick.

1. Finish: Two-coat fluoropolymer or Baked enamel or powder coat
2. Color: As selected by Architect from manufacturer's full range.

D. Material: Aluminum sheet, 0.090 inch (2.28 mm) thick.

1. Finish: where visible from grade otherwise Baked enamel or powder coat.
2. Color: As indicated by manufacturer's designations.

E. Construction:

1. Insulation: Factory insulated with 1-1/2-inch- (38-mm-) thick glass-fiber board insulation.
2. Liner: Same material as curb, of manufacturer's standard thickness and finish.
3. Factory-installed wood nailer at top of curb, continuous around curb perimeter.
4. On ribbed or fluted metal roofs, form deck-mounting flange at perimeter bottom to conform to roof profile.
5. Fabricate curbs to minimum height of 12 inches (300 mm) unless otherwise indicated.
6. Top Surface: Level around perimeter with roof slope accommodated by sloping the deck-mounting flange.
7. Sloping Roofs: Where roof slope exceeds 1:48, fabricate curb with perimeter curb height tapered to accommodate roof slope so that top surface of perimeter curb is level. Equip unit with water diverter or cricket on side that obstructs water flow.
8. Security Grille: Provide where indicated.

2.4 EQUIPMENT SUPPORTS

A. Equipment Supports: Internally reinforced metal equipment supports capable of supporting superimposed live and dead loads, including equipment loads and other construction indicated on Drawings; with welded or mechanically fastened and sealed corner joints, integral metal cant, and integrally formed deck-mounting flange at perimeter bottom.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. AES Industries, Inc.
b. Curbs Plus, Inc.
c. Custom Solution Roof and Metal Products.
d. Greenheck Fan Corporation.
e. LM Curbs.
f. Milcor Inc.; Commercial Products Group of Hart & Cooley, Inc.
g. Pate Company (The).
h. Roof Products, Inc.
i. Thybar Corporation.
j. Vent Products Co., Inc.

B. Size: Coordinate dimensions with roughing-in information or Shop Drawings of equipment to be supported.

C. Material: Zinc-coated (galvanized) or Aluminum-zinc alloy-coated steel sheet, 0.079 inch (2.01 mm) thick.

1. Finish: Two-coat fluoropolymer or Baked enamel or powder coat.
2. Color: As selected by Architect from manufacturer's full range.

D. Material: Aluminum sheet, 0.090 inch (2.28 mm) thick.

1. Finish: Baked enamel or powder coat.
2. Color: As indicated by manufacturer's designations.

E. Construction:

1. Insulation: Factory insulated with 1-1/2-inch- (38-mm-) thick glass-fiber board insulation.
2. Liner: Same material as equipment support, of manufacturer's standard thickness and finish.
3. Metal Counterflashing: Manufacturer's standard, removable, fabricated of same metal and finish as equipment support.
4. On ribbed or fluted metal roofs, form deck-mounting flange at perimeter bottom to conform to roof profile.
5. Fabricate equipment supports to minimum height of 12 inches (300 mm) unless otherwise indicated.
6. Sloping Roofs: Where roof slope exceeds 1:48, fabricate each support with height to accommodate roof slope so that tops of supports are level with each other. Equip supports with water diverters or crickets on sides that obstruct water flow.
7. Security Grille: Provide where indicated.

2.5 PREFORMED FLASHING SLEEVES

A. Exhaust Vent Flashing: Double-walled metal flashing sleeve or boot, insulation filled, with integral deck flange, 12 inches (300 mm) high, with removable metal hood and slotted metal collar.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

   a. Custom Solution Roof and Metal Products.
   b. Thaler Metal USA Inc.

2. Metal: Aluminum sheet, 0.063 inch (1.60 mm) thick .
3. Diameter: As indicated .
4. Finish: Manufacturer's standard.

B. Vent Stack Flashing: Metal flashing sleeve, uninsulated, with integral deck flange.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

    a. Custom Solution Roof and Metal Products.
    b. Milcor Inc.; Commercial Products Group of Hart & Cooley, Inc.
    c. Thaler Metal USA Inc.

2. Metal: Aluminum sheet, 0.063 inch (1.60 mm) thick .
3. Height: 7 inches (175 mm) .
4. Diameter: As indicated .
5. Finish: Manufacturer's standard.

2.6 GENERAL FINISH REQUIREMENTS

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, to verify actual locations, dimensions, and other conditions affecting performance of the Work.

B. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.

C. Verify dimensions of roof openings for roof accessories.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. General: Install roof accessories according to manufacturer's written instructions.

1. Install roof accessories level, plumb, true to line and elevation, and without warping, jogs in alignment, excessive oil canning, buckling, or tool marks.
2. Anchor roof accessories securely in place so they are capable of resisting indicated loads.
3. Use fasteners, separators, sealants, and other miscellaneous items as required to complete installation of roof accessories and fit them to substrates.

4. Install roof accessories to resist exposure to weather without failing, rattling, leaking, or loosening of fasteners and seals.

B. Metal Protection: Protect metals against galvanic action by separating dissimilar metals from contact with each other or with corrosive substrates by painting contact surfaces with bituminous coating or by other permanent separation as recommended by manufacturer.

1. Coat concealed side of uncoated aluminum roof accessories with bituminous coating where in contact with wood, ferrous metal, or cementitious construction.
2. Underlayment: Where installing roof accessories directly on cementitious or wood substrates, install a course of felt underlayment and cover with a slip sheet, or install a course of polyethylene sheet.
3. Bed flanges in thick coat of asphalt roofing cement where required by manufacturers of roof accessories for waterproof performance.

C. Roof Curb Installation: Install each roof curb so top surface is level.

D. Equipment Support Installation: Install equipment supports so top surfaces are level with each other.

E. Roof Walkway Installation:

1. Verify that locations of access and servicing points for roof-mounted equipment are served by locations of roof walkways.
2. Remove ballast from top surface of low-slope roofing at locations of contact with roof-walkway supports.
3. Install roof walkway support pads prior to placement of roof walkway support stands onto low-slope roofing.
4. Redistribute removed ballast after installation of support pads.

F. Preformed Flashing-Sleeve Installation: Secure flashing sleeve to roof membrane according to flashing-sleeve manufacturer's written instructions.

G. Seal joints with elastomeric or butylsealant as required by roof accessory manufacturer.

3.3 REPAIR AND CLEANING

A. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing according to ASTM A 780.

B. Touch up factory-primed surfaces with compatible primer ready for field painting according to Section 09911 "Exterior Painting" and Section 09912 "Interior Painting."

C. Clean exposed surfaces according to manufacturer's written instructions.

D. Clean off excess sealants.

E. Replace roof accessories that have been damaged or that cannot be successfully repaired by finish touchup or similar minor repair procedures.

END OF SECTION 07720

SECTION 07810 - APPLIED FIREPROOFING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes sprayed fire-resistive materials (SFRM).

B. Related Requirements:

1. Section 07842 "Fire-Resistive Joint Systems"

1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. LEED Submittals:

1. Product Data for Credit EQ 4.2: For paints and coatings, documentation including printed statement of VOC content.
2. Laboratory Test Reports for Credit EQ 4: For paints and coatings used inside the weatherproofing system, documentation indicating that products comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

1.4 INFORMATIONAL SUBMITTALS

A. Product certificates.

B. Evaluation reports.

C. Field quality-control reports.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: A firm or individual certified, licensed, or otherwise qualified by fireproofing manufacturer as experienced and with sufficient trained staff to install manufacturer's products according to specified requirements.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

A. Assemblies: Provide fireproofing, including auxiliary materials, according to requirements of each fire-resistance design and manufacturer's written instructions.

B. Fire-Resistance Design: Indicated on Drawings, tested according to [**ASTM E 119**] [**ASTM E 119 or UL 263**] <**Insert testing requirement**> by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Steel members are to be considered unrestrained unless specifically noted otherwise.

C. VOC Content: Products shall comply with VOC content limits of authorities having jurisdiction[**.**][**and the following VOC limits when calculated according to 40 CFR 59, Subpart D (EPA Method 24):**]

1. Flat Paints and Coatings: 50 g/L.
2. Nonflat Paints and Coatings: 150 g/L.
3. Primers, Sealers, and Undercoaters: 200 g/L.
4. Anticorrosive and Antirust Paints Applied to Ferrous Metals: 250 g/L.

D. Low-Emitting Materials: Fireproofing used within the weatherproofing system shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

E. Asbestos: Provide products containing no detectable asbestos.

2.2 SPRAYED FIRE-RESISTIVE MATERIALS

A. SFRM <**Insert drawing designation**>: Manufacturer's standard, factory-mixed, lightweight, dry formulation, complying with indicated fire-resistance design, and [**mixed with water at Project site to form a slurry or mortar before conveyance and application**] [**or**] [**conveyed in a dry state and mixed with atomized water at place of application**].

1. Products: Subject to compliance with requirements, [**provide the following**] [**provide one of the following**] [**available products that may be incorporated into the Work include, but are not limited to, the following**]:

a. Carboline Company, subsidiary of RPM International, Fireproofing Products Div.; [**AD Southwest Fireproofing Type 5GP**] [**AD Southwest Fireproofing Type 5MD**] [**AD Southwest Fireproofing Type 7GP**] [**AD Southwest Fireproofing Type 7HD**] [**Pyrocrete 40**] [**Pyrocrete 239**] [**Pyrocrete 240 High Yield**] [**Pyrocrete 241**] [**Pyrolite 15**] [**and**] [**Pyrolite 22**] <**Insert product name or designation**>.
b. Grace, W. R. & Co. - Conn.; Grace Construction Products; [**Monokote MK-6 Series**] [**Monokote Z106**] [**Monokote Z106G**] [**Monokote Z106/HY**] [**Monokote Z146**] [**Monokote Z146T**] [**Monokote Z156**] [**Monokote Z156T**] [**and**] [**Retro-Guard**] <**Insert product name or designation**>.
c. Isolatek International; [**Cafco 300**] [**Cafco 300 SB**] [**Cafco 400**] [**Cafco Blaze-Shield II**] [**Cafco Blaze-Shield HP**] [**Fendolite M-II**] [**and**] [**Fendolite TG**] <**Insert product name or designation**>.

d. Pyrok, Inc.; [**Pyrok-HD**] [**and**] [**Pyrok-MD**] <**Insert product name or designation**>.
e. Schundler Company (The); [**Classic 5 LD**] <**Insert product name or designation**>.
f. Southwest Fireproofing Products Co.; [**Type 5EF**] [**Type 5GP**] [**Type 5MD**] [**Type 7GP**] [**and**] [**Type 7HD**] <**Insert product name or designation**>.
g. <**Insert manufacturer's name; product name or designation**>.

2. Application: Designated for exterior use by a qualified testing agency acceptable to authorities having jurisdiction.
3. Bond Strength: Minimum [**150-lbf/sq. ft. (7.18-kPa)**] [**430-lbf/sq. ft. (20.59-kPa)**] [**1000-lbf/sq. ft. (47.88-kPa)**] <**Insert value**> cohesive and adhesive strength based on field testing according to ASTM E 736.
4. Density: Not less than [**15 lb/cu. ft. (240 kg/cu. m) and**] [**22 lb/cu. ft. (350 kg/cu. m) and**] [**40 lb/cu. ft. (640 kg/cu. m) and**] <**Insert requirement**> as specified in the approved fire-resistance design, according to ASTM E 605.
5. Thickness: As required for fire-resistance design indicated, measured according to requirements of fire-resistance design or ASTM E 605, whichever is thicker, but not less than 0.375 inch (9 mm).
6. Combustion Characteristics: ASTM E 136.
7. Surface-Burning Characteristics: Flame-spread and smoke-developed indexes of 10 or less according to ASTM E 84.
8. Compressive Strength: Minimum [**10 lbf/sq. in. (68.9 kPa)**] [**100 lbf/sq. in. (689 kPa)**] [**300 lbf/sq. in. (2068 kPa)**] <**Insert value**> according to ASTM E 761.
9. Corrosion Resistance: No evidence of corrosion according to ASTM E 937.
10. Deflection: No cracking, spalling, or delamination according to ASTM E 759.
11. Effect of Impact on Bonding: No cracking, spalling, or delamination according to ASTM E 760.
12. Air Erosion: Maximum weight loss of 0.025 g/sq. ft. (0.270 g/sq. m) in 24 hours according to ASTM E 859.
13. Fungal Resistance: Treat products with manufacturer's standard antimicrobial formulation to result in no growth on specimens per ASTM G 21 or rating of 10 according to ASTM D 3274 when tested according to ASTM D 3273.

2.3 AUXILIARY MATERIALS

A. General: Provide auxiliary materials that are compatible with fireproofing and substrates and are approved by UL or another testing and inspecting agency acceptable to authorities having jurisdiction for use in fire-resistance designs indicated.

B. Substrate Primers: Primers approved by fireproofing manufacturer.

C. Bonding Agent: Product approved by fireproofing manufacturer

D. Topcoat: Suitable for application over applied fireproofing; of type recommended in writing by fireproofing manufacturer for each fire-resistance design.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for substrates and other conditions affecting performance of the Work and according to each fire-resistance design.

3.2 PREPARATION

A. Cover other work subject to damage from fallout or overspray of fireproofing materials during application.

B. Prime substrates where included in fire-resistance design and where recommended in writing by fireproofing manufacturer unless compatible shop primer has been applied and is in satisfactory condition to receive fireproofing.

3.3 APPLICATION

A. Construct fireproofing assemblies that are identical to fire-resistance design indicated and products as specified, tested, and substantiated by test reports; for thickness, primers, sealers, topcoats, and other materials and procedures affecting fireproofing work.

B. Comply with fireproofing manufacturer's written instructions for mixing materials, application procedures, and types of equipment used to mix, convey, and apply fireproofing; as applicable to particular conditions of installation and as required to achieve fire-resistance ratings indicated.

C. Spray apply fireproofing to maximum extent possible. Following the spraying operation in each area, complete the coverage by trowel application or other placement method recommended in writing by fireproofing manufacturer.

D. Do not install enclosing or concealing construction until after fireproofing has been applied, inspected, and tested and corrections have been made to deficient applications.

3.4 FIELD QUALITY CONTROL

A. Special Inspections: Engage a qualified special inspector to perform the following special inspections:

1. Test and inspect as required by the IBC, 1704.10.

B. Fireproofing will be considered defective if it does not pass tests and inspections.

1. Remove and replace fireproofing that does not pass tests and inspections, and retest.
2. Apply additional fireproofing, per manufacturer's written instructions, where test results indicate insufficient thickness, and retest.

C. Prepare test and inspection reports.

3.5 CLEANING AND REPAIRING

A. Cleaning: Immediately after completing spraying operations in each containable area of Project, remove material overspray and fallout from surfaces of other construction and clean exposed surfaces to remove evidence of soiling.

B. Repair fireproofing damaged by other work before concealing it with other construction.

C. Repair fireproofing by reapplying it using same method as original installation or using manufacturer's recommended trowel-applied product.

END OF SECTION 07810

SECTION 07841 - THROUGH-PENETRATION FIRESTOP SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Penetrations in fire-resistance-rated walls.
2. Penetrations in horizontal assemblies.
3. Penetrations in smoke barriers.

1.2 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Product Schedule: For each penetration firestopping system. Include location and design designation of qualified testing and inspecting agency.

1. Where Project conditions require modification to a qualified testing and inspecting agency's illustration for a particular penetration firestopping condition, submit illustration, with modifications marked, approved by penetration firestopping manufacturer's fire-protection engineer as an engineering judgment or equivalent fire-resistance-rated assembly.

C. Installer Certificates: From Installer indicating penetration firestopping has been installed in compliance with requirements and manufacturer's written recommendations.

D. Product test reports.

1.3 QUALITY ASSURANCE

A. Installer Qualifications: A firm that has been approved by FM Global according to FM Global 4991, "Approval of Firestop Contractors," or been evaluated by UL and found to comply with its "Qualified Firestop Contractor Program Requirements."

B. Fire-Test-Response Characteristics: Penetration firestopping shall comply with the following requirements:

1. Penetration firestopping tests are performed by UL .
2. Penetration firestopping is identical to those tested per testing standard referenced in "Penetration Firestopping" Article. Provide rated systems bearing marking of qualified testing and inspection agency.

C. Preinstallation Conference: Conduct conference at Project site .

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following :
   1. Grace Construction Products.
   2. Hilti, Inc.
   3. Johns Manville.
   4. 3M Fire Protection Products.
   5. Tremco, Inc.; Tremco Fire Protection Systems Group.
   6. USG Corporation.

2.2 PENETRATION FIRESTOPPING

A. Provide penetration firestopping that is produced and installed to resist spread of fire according to requirements indicated, resist passage of smoke and other gases, and maintain original fire-resistance rating of construction penetrated. Penetration firestopping systems shall be compatible with one another, with the substrates forming openings, and with penetrating items if any.

B. Penetrations in Fire-Resistance-Rated Walls: Ratings determined per ASTM E 814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch wg.

   1. F-Rating: Not less than the fire-resistance rating of constructions penetrated.

C. Penetrations in Horizontal Assemblies: Ratings determined per ASTM E 814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch wg.

   1. F-Rating: At least 1 hour, but not less than the fire-resistance rating of constructions penetrated.
   2. T-Rating: At least 1 hour, but not less than the fire-resistance rating of constructions penetrated except for floor penetrations within the cavity of a wall.

D. Penetrations in Smoke Barriers: Provide penetration firestopping with ratings determined per UL 1479.

   1. L-Rating: Not exceeding 5.0 cfm/sq. ft. of penetration opening at 0.30-inch wg at both ambient and elevated temperatures.

E. Exposed Penetration Firestopping: Provide products with flame-spread and smoke-developed indexes of less than 25 and 450, respectively, as determined per ASTM E 84.

F. Accessories: Provide components for each penetration firestopping system that are needed to install fill materials and to maintain ratings required. Use only those components specified by penetration firestopping manufacturer and approved by qualified testing and inspecting agency for firestopping indicated.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements for opening configurations, penetrating items, substrates, and other conditions affecting performance of the Work.

B. Install penetration firestopping to comply with manufacturer's written installation instructions and published drawings for products and applications indicated.

C. Install forming materials and other accessories of types required to support fill materials during their application and in the position needed to produce cross-sectional shapes and depths required to achieve fire ratings indicated.

1. After installing fill materials and allowing them to fully cure, remove combustible forming materials and other accessories not indicated as permanent components of firestopping.

D. Install fill materials for firestopping by proven techniques to produce the following results:

1. Fill voids and cavities formed by openings, forming materials, accessories, and penetrating items as required to achieve fire-resistance ratings indicated.
2. Apply materials so they contact and adhere to substrates formed by openings and penetrating items.
3. For fill materials that will remain exposed after completing the Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

3.2 IDENTIFICATION

A. Identify penetration firestopping with preprinted metal or plastic labels. Attach labels permanently to surfaces adjacent to and within 6 inches of firestopping edge so labels will be visible to anyone seeking to remove penetrating items or firestopping. Use mechanical fasteners or self-adhering-type labels with adhesives capable of permanently bonding labels to surfaces on which labels are placed. Include the following information on labels:

1. The words "Warning - Penetration Firestopping - Do Not Disturb. Notify Building Management of Any Damage."
2. Contractor's name, address, and phone number.
3. Designation of applicable testing and inspecting agency.
4. Date of installation.
5. Manufacturer's name.
6. Installer's name.

3.3 FIELD QUALITY CONTROL

A. Owner will engage a qualified testing agency to perform tests and inspections.

B. Where deficiencies are found or penetration firestopping is damaged or removed because of testing, repair or replace penetration firestopping to comply with requirements.

C. Proceed with enclosing penetration firestopping with other construction only after inspection reports are issued and installations comply with requirements.

3.4 PENETRATION FIRESTOPPING SCHEDULE

A. Where UL-classified systems are indicated, they refer to system numbers in UL's "Fire Resistance Directory" under product Category XHEZ.

B. Firestopping with No Penetrating Items:

1. UL-Classified Systems: C-AJ- F-A- F-C- W-J- W-L- 0001-0999.

C. Firestopping for Metallic Pipes, Conduit, or Tubing:

1. UL-Classified Systems: C-AJ- F-A- F-C- F-E- W-J- W-L- 1001-1999.

D. Firestopping for Nonmetallic Pipe, Conduit, or Tubing:

1. UL-Classified Systems: C-AJ- F-A- F-C- F-E- W-J- W-L- 2001-2999.

E. Firestopping for Electrical Cables:

1. UL-Classified Systems: C-AJ- F-A- F-C- F-E- W-J- W-L- 3001-3999.

F. Firestopping for Cable Trays with Electric Cables:

1. UL-Classified Systems: C-AJ- F-A- F-C- W-J- W-L- 4001-4999.

G. Firestopping for Insulated Pipes:

1. UL-Classified Systems: C-AJ- F-A- F-C- F-E- W-J- W-L- 5001-5999.

H. Firestopping for Miscellaneous Electrical Penetrants:

1. UL-Classified Systems: C-AJ- F-A- W-J- 6001-6999.

I. Firestopping for Miscellaneous Mechanical Penetrants:

1. UL-Classified Systems: C-AJ- F-A- F-C- F-E- W-J- W-L- 7001-7999.

J. Firestopping for Groupings of Penetrants:

1. UL-Classified Systems: C-AJ- F-A- F-C- F-E- W-J- W-L- 8001-8999.

END OF SECTION 07841

SECTION 07842 - FIRE-RESISTIVE JOINT SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Joints in or between fire-resistance-rated constructions.

B. Related Sections:

1. Section 05811 "Architectural Joint Systems" for fire-resistive architectural joint systems.
2. Section 07841 "Through-Penetration Firestop Systems" for penetrations in fire-resistance-rated walls, horizontal assemblies, and smoke barriers.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Product Schedule: For each fire-resistive joint system. Include location and design designation of qualified testing agency.

1. Where Project conditions require modification to a qualified testing agency's illustration for a particular fire-resistive joint system condition, submit illustration, with modifications marked, approved by fire-resistive joint system manufacturer's fire-protection engineer as an engineering judgment or equivalent fire-resistance-rated assembly.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified Installer.

B. Installer Certificates: From Installer indicating fire-resistive joint systems have been installed in compliance with requirements and manufacturer's written recommendations.

C. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for fire-resistive joint systems.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: A firm that has been approved by FM Global according to FM Global 4991, "Approval of Firestop Contractors," or been evaluated by UL and found to comply with UL's "Qualified Firestop Contractor Program Requirements."

B. Fire-Test-Response Characteristics: Fire-resistive joint systems shall comply with the following requirements:
   1. Fire resistive joint system tests are performed by UL

C. Pre-installation conference: Conduct conference at project site

1.6 PROJECT CONDITIONS

A. Environmental Limitations: Do not install fire-resistive joint systems when ambient or substrate temperatures are outside limits permitted by fire-resistive joint system manufacturers or when substrates are wet due to rain, frost, condensation, or other causes.

B. Install and cure fire-resistive joint systems per manufacturer's written instructions using natural means of ventilation or, where this is inadequate, forced-air circulation.

1.7 COORDINATION

A. Coordinate construction of joints to ensure that fire-resistive joint systems are installed according to specified requirements.

B. Coordinate sizing of joints to accommodate fire-resistive joint systems.

PART 2 - PRODUCTS

2.1 FIRE-RESISTIVE JOINT SYSTEMS

A. Where required, provide fire-resistive joint systems that are produced and installed to resist spread of fire according to requirements indicated, resist passage of smoke and other gases, and maintain original fire-resistance rating of assemblies in or between which fire-resistive joint systems are installed. Fire-resistive joint systems shall accommodate building movements without impairing their ability to resist the passage of fire and hot gases.

B. Joints in or between Fire-Resistance-Rated Construction: Provide fire-resistive joint systems with ratings determined per ASTM E 1966 or UL 2079:

   1. Joints include those installed in or between fire-resistance-rated walls floor or floor/ceiling assemblies and roofs or roof/ceiling assemblies.
   2. Fire-Resistance Rating: Equal to or exceeding the fire-resistance rating of construction they will join.
   3. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

      a. A/D Fire Protection Systems Inc.

b. CEMCO.
c. Fire Trak Corp.
d. Grace Construction Products.
e. Hilti, Inc.
f. Nelson Firestop Products.
g. NUCO Inc.
h. Passive Fire Protection Partners.
i. RectorSeal Corporation.
j. Specified Technologies Inc.
k. 3M Fire Protection Products.
l. Tremco, Inc.; Tremco Fire Protection Systems Group.
m. USG Corporation.

C. Accessories: Provide components of fire-resistive joint systems, including primers and forming materials, that are needed to install fill materials and to maintain ratings required. Use only components specified by fire-resistive joint system manufacturer and approved by the qualified testing agency for systems indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements for joint configurations, substrates, and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Cleaning: Clean joints immediately before installing fire-resistive joint systems to comply with fire-resistive joint system manufacturer's written instructions and the following requirements:

1. Remove from surfaces of joint substrates foreign materials that could interfere with adhesion of fill materials.
2. Clean joint substrates to produce clean, sound surfaces capable of developing optimum bond with fill materials. Remove loose particles remaining from cleaning operation.
3. Remove laitance and form-release agents from concrete.

B. Priming: Prime substrates where recommended in writing by fire-resistive joint system manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.

C. Masking Tape: Use masking tape to prevent fill materials of fire-resistive joint system from contacting adjoining surfaces that will remain exposed on completion of the Work and that would otherwise be permanently stained or damaged by such contact or by cleaning methods used to remove stains. Remove tape as soon as possible without disturbing fire-resistive joint system's seal with substrates.

3.3 INSTALLATION

A. General: Install fire-resistive joint systems to comply with manufacturer's written installation instructions and published drawings for products and applications indicated.

B. Install forming materials and other accessories of types required to support fill materials during their application and in position needed to produce cross-sectional shapes and depths required to achieve fire ratings indicated.

1. After installing fill materials and allowing them to fully cure, remove combustible forming materials and other accessories not indicated as permanent components of fire-resistive joint system.

C. Install fill materials for fire-resistive joint systems by proven techniques to produce the following results:

1. Fill voids and cavities formed by joints and forming materials as required to achieve fire-resistance ratings indicated.
2. Apply fill materials so they contact and adhere to substrates formed by joints.
3. For fill materials that will remain exposed after completing the Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

3.4 IDENTIFICATION

3.5 FIELD QUALITY CONTROL

A. Inspecting Agency: Owner will engage a qualified testing agency to perform tests and inspections.

B. Where deficiencies are found or fire-resistive joint systems are damaged or removed due to testing, repair or replace fire-resistive joint systems so they comply with requirements.

C. Proceed with enclosing fire-resistive joint systems with other construction only after inspection reports are issued and installations comply with requirements.

3.6 CLEANING AND PROTECTING

A. Clean off excess fill materials adjacent to joints as the Work progresses by methods and with cleaning materials that are approved in writing by fire-resistive joint system manufacturers and that do not damage materials in which joints occur.

B. Provide final protection and maintain conditions during and after installation that ensure fire-resistive joint systems are without damage or deterioration at time of Substantial Completion. If damage or deterioration occurs despite such protection, cut out and remove damaged or deteriorated fire-resistive joint systems immediately and install new materials to produce fire-resistive joint systems complying with specified requirements.

END OF SECTION 07842

SECTION 07920 - JOINT SEALANTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Silicone joint sealants.
2. Urethane joint sealants.
3. Polysulfide joint sealants.
4. Latex joint sealants.
5. Solvent-release-curing joint sealants.
6. Preformed joint sealants.
7. Acoustical joint sealants.

B. Related Sections:

1. Section 08800 "Glazing" for glazing sealants.
2. Section 08912 "Structural-Sealant-Glazed Curtain Walls" for structural and other glazing sealants.
3. Section 09250 "Gypsum Board" for sealing perimeter joints.
4. Section 09310 "Ceramic Tile" for sealing tile joints.
5. Section 09511 "Acoustical Panel Ceilings" and Section 09512 "Acoustical Tile Ceilings" for sealing edge moldings at perimeters with acoustical sealants.

1.3 ACTION SUBMITTALS

A. Product Data: For each joint-sealant product indicated.

B. Samples for Initial Selection: Manufacturer's color charts consisting of strips of cured sealants showing the full range of colors available for each product exposed to view.

C. Samples for Verification: For each kind and color of joint sealant required, provide Samples with joint sealants in 1/2-inch- (13-mm-) wide joints formed between two 6-inch- (150-mm-) long strips of material matching the appearance of exposed surfaces adjacent to joint sealants.

D. Joint-Sealant Schedule: Include the following information:

1. Joint-sealant application, joint location, and designation.
2. Joint-sealant manufacturer and product name.
3. Joint-sealant formulation.
4. Joint-sealant color.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified Installer.

B. Product Certificates: For each kind of joint sealant and accessory, from manufacturer.

C. Sealant, Waterproofing, and Restoration Institute (SWRI) Validation Certificate: For each sealant specified to be validated by SWRI's Sealant Validation Program.

D. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, indicating that sealants comply with requirements.

E. Field-Adhesion Test Reports: For each sealant application tested.

F. Warranties: Sample of special warranties.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of units required for this Project.

B. Source Limitations: Obtain each kind of joint sealant from single source from single manufacturer.

C. Product Testing: Test joint sealants using a qualified testing agency.

1. Testing Agency Qualifications: An independent testing agency qualified according to ASTM C 1021 to conduct the testing indicated.
2. Test according to SWRI's Sealant Validation Program for compliance with requirements specified by reference to ASTM C 920 for adhesion and cohesion under cyclic movement, adhesion-in-peel, and indentation hardness.

1.6 PROJECT CONDITIONS

A. Do not proceed with installation of joint sealants under the following conditions:

1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer or are below 40 deg F (5 deg C).
2. When joint substrates are wet.
3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.

4. Where contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

1.7 WARRANTY

A. Special Installer's Warranty: Manufacturer's standard form in which Installer agrees to repair or replace joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.

1. Warranty Period: Two years from date of Substantial Completion.

B. Special Manufacturer's Warranty: Manufacturer's standard form in which joint-sealant manufacturer agrees to furnish joint sealants to repair or replace those that do not comply with performance and other requirements specified in this Section within specified warranty period.

1. Warranty Period: two years from date of Substantial Completion.

C. Special warranties specified in this article exclude deterioration or failure of joint sealants from the following:

1. Movement of the structure caused by structural settlement or errors attributable to design or construction resulting in stresses on the sealant exceeding sealant manufacturer's written specifications for sealant elongation and compression.
2. Disintegration of joint substrates from natural causes exceeding design specifications.
3. Mechanical damage caused by individuals, tools, or other outside agents.
4. Changes in sealant appearance caused by accumulation of dirt or other atmospheric contaminants.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint-sealant manufacturer, based on testing and field experience.

B. VOC Content of Interior Sealants: Sealants and sealant primers used inside the weatherproofing system shall comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):

1. Architectural Sealants: 250 g/L.
2. Sealant Primers for Nonporous Substrates: 250 g/L.
3. Sealant Primers for Porous Substrates: 775 g/L.

C. Low-Emitting Interior Sealants: Sealants and sealant primers used inside the weatherproofing system shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

D. Liquid-Applied Joint Sealants: Comply with ASTM C 920 and other requirements indicated for each liquid-applied joint sealant specified, including those referencing ASTM C 920 classifications for type, grade, class, and uses related to exposure and joint substrates.

1. Suitability for Immersion in Liquids. Where sealants are indicated for Use I for joints that will be continuously immersed in liquids, provide products that have undergone testing according to ASTM C 1247. Liquid used for testing sealants is deionized water, unless otherwise indicated.

E. Stain-Test-Response Characteristics: Where sealants are specified to be nonstaining to porous substrates, provide products that have undergone testing according to ASTM C 1248 and have not stained porous joint substrates indicated for Project.

F. Suitability for Contact with Food: Where sealants are indicated for joints that will come in repeated contact with food, provide products that comply with 21 CFR 177.2600.

G. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range.

2.2 SILICONE JOINT SEALANTS

A. Single-Component, Nonsag, Neutral-Curing Silicone Joint Sealant: ASTM C 920, Type S, Grade NS, Class 100/50, for Use NT.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. Dow Corning Corporation; 790.
b. GE Advanced Materials - Silicones; SilPruf LM SCS2700.
c. Tremco Incorporated; Spectrem 1 or Tremsil 600.

2.3 LATEX JOINT SEALANTS

A. Latex Joint Sealant: Acrylic latex or siliconized acrylic latex, ASTM C 834, Type OP, Grade NF.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. BASF Building Systems; Sonolac.
b. Bostik, Inc.; Chem-Calk 600.

c. May National Associates, Inc.; Bondaflex 600.
d. Pecora Corporation; AC-20+.
e. Schnee-Morehead, Inc.; SM 8200.
f. Tremco Incorporated; Tremflex 834.

2.4 ACOUSTICAL JOINT SEALANTS

A. Acoustical Joint Sealant: Manufacturer's standard nonsag, paintable, nonstaining latex sealant complying with ASTM C 834. Product effectively reduces airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. Pecora Corporation; AC-20 FTR.
b. USG Corporation; SHEETROCK Acoustical Sealant.

2.5 JOINT SEALANT BACKING

A. General: Provide sealant backings of material that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.

B. Cylindrical Sealant Backings: ASTM C 1330, Type C (closed-cell material with a surface skin) , and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.

C. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint. Provide self-adhesive tape where applicable.

2.6 MISCELLANEOUS MATERIALS

A. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.

B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants to joint substrates.

C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint-sealant performance.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions and the following requirements:

1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
2. Clean porous joint substrate surfaces by brushing, grinding, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining after cleaning operations above by vacuuming or blowing out joints with oil-free compressed air. Porous joint substrates include the following:

    a. Concrete.
    b. Unglazed surfaces of ceramic tile.

3. Remove laitance and form-release agents from concrete.
4. Clean nonporous joint substrate surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants. Nonporous joint substrates include the following:

    a. Metal.
    b. Glass.
    c. Glazed surfaces of ceramic tile.

B. Joint Priming: Prime joint substrates where recommended by joint-sealant manufacturer or as indicated by preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.

C. Masking Tape: Use masking tape where required to prevent contact of sealant or primer with adjoining surfaces that otherwise would be permanently stained or

damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.3 INSTALLATION OF JOINT SEALANTS

A. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.

B. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.

C. Install sealant backings of kind indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.

1. Do not leave gaps between ends of sealant backings.
2. Do not stretch, twist, puncture, or tear sealant backings.
3. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.

D. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.

E. Install sealants using proven techniques that comply with the following and at the same time backings are installed:

1. Place sealants so they directly contact and fully wet joint substrates.
2. Completely fill recesses in each joint configuration.
3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.

F. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified in subparagraphs below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.

1. Remove excess sealant from surfaces adjacent to joints.
2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
3. Provide flush joint profile where indicated per Figure 8B in ASTM C 1193.

    a. Use masking tape to protect surfaces adjacent to recessed tooled joints.

G. Acoustical Sealant Installation: At sound-rated assemblies and elsewhere as indicated, seal construction at perimeters, behind control joints, and at openings and penetrations with a continuous bead of acoustical sealant. Install acoustical sealant at both faces of partitions at perimeters and through penetrations. Comply with ASTM C 919 and with manufacturer's written recommendations.

3.4 FIELD QUALITY CONTROL

A. Field-Adhesion Testing: Field test joint-sealant adhesion to joint substrates as follows:

1. Extent of Testing: Test completed and cured sealant joints as follows:

   a. Perform 10 tests for the first 50 feet of joint length for each kind of sealant and joint substrate.
   b. Perform 1 test for each 1000 feet (300 m) of joint length thereafter or 1 test per each floor per elevation.

2. Test Method: Test joint sealants according to Method A, Field-Applied Sealant Joint Hand Pull Tab, in Appendix X1 in ASTM C 1193 or Method A, Tail Procedure, in ASTM C 1521.

   a. For joints with dissimilar substrates, verify adhesion to each substrate separately; extend cut along one side, verifying adhesion to opposite side. Repeat procedure for opposite side.

3. Inspect tested joints and report on the following:

   a. Whether sealants filled joint cavities and are free of voids.
   b. Whether sealant dimensions and configurations comply with specified requirements.
   c. Whether sealants in joints connected to pulled-out portion failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each kind of product and joint substrate. Compare these results to determine if adhesion passes sealant manufacturer's field-adhesion hand-pull test criteria.

4. Record test results in a field-adhesion-test log. Include dates when sealants were installed, names of persons who installed sealants, test dates, test locations, whether joints were primed, adhesion results and percent elongations, sealant fill, sealant configuration, and sealant dimensions.
5. Repair sealants pulled from test area by applying new sealants following same procedures used originally to seal joints. Ensure that original sealant surfaces are clean and that new sealant contacts original sealant.

B. Evaluation of Field-Adhesion Test Results: Sealants not evidencing adhesive failure from testing or noncompliance with other indicated requirements will be considered satisfactory. Remove sealants that fail to adhere to joint substrates during testing or to comply with other requirements. Retest failed applications until test results prove sealants comply with indicated requirements.

3.5 CLEANING

A. Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

3.6 PROTECTION

A. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from original work.

3.7 JOINT-SEALANT SCHEDULE

A. Silicone Joint Sealants

1. Joint Locations:

a. Joints between window frame and wall construction
b. Joints in ceramic tile

B. Latex Joint Sealants: exterior joint in vertical and horizontal nontraffic surfaces

1. Joint Locations:

a. Between lapsiding
b. Between cement board and stucco

C. Acoustical Joint Sealant: interior joints in vertical surfaces and horizontal non traffic surfaces

1. Joint Locations:

a. Between acoustical tile ceiling perimeter
b. Continuous at each interior wall stud

END OF SECTION 07920

DIVISION 08

SECTION 08110 - STEEL DOORS AND FRAMES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Standard hollow metal doors and frames.

B. Related Sections

1. Division 4 Section "Unit Masonry Assemblies" for embedding anchors for hollow metal work into masonry construction.
2. Division 8 Section "Door Hardware" for door hardware for hollow metal doors.
3. Division 9 Sections "Exterior Painting" and "Interior Painting" for field painting hollow metal doors and frames.
4. Division 16 Sections for electrical connections including conduit and wiring for door controls and operators.

1.3 DEFINITIONS

A. Minimum Thickness: Minimum thickness of base metal without coatings.

B. Standard Hollow Metal Work: Hollow metal work fabricated according to ANSI/SDI A250.8.

1.4 PERFORMANCE REQUIREMENTS

A. Structural Loads:

1. Wind Loads: .

a. Basic Wind Speed: 130 mph .

B. Uniform Load: A static air design load of 86 psf (4118 Pa) with steel reinforcing (+60 / -65 psf without steel reinforcing) shall be applied in the positive and negative direction in accordance with DCBCCO Protocol PA 202 and ASTM E 330. There shall be no deflection in excess of l/180 of the span of any framing member. At a structural test load equal to 1.5 times the specified design load, no glass breakage or permanent set in the framing members in excess of 0.4% of their clear spans shall occur.

C. Impact Resistance: Large Missile, tested in accordance with DCBCCO Protocols PA 201, PA 203, SBCCI SSTD-12, ANSI A250.13 and ASTM E 1886.

1.5 SUBMITTALS

A. Product Data: For each type of product indicated. Include construction details, material descriptions, core descriptions, fire-resistance rating, and finishes.

B. Shop Drawings: Include the following:

1. Elevations of each door design.
2. Details of doors, including vertical and horizontal edge details and metal thicknesses.
3. Frame details for each frame type, including dimensioned profiles and metal thicknesses.
4. Locations of reinforcement and preparations for hardware.
5. Details of each different wall opening condition.
6. Details of anchorages, joints, field splices, and connections.
7. Details of accessories.
8. Details of moldings, removable stops, and glazing.
9. Details of conduit and preparations for power, signal, and control systems.

C. Other Action Submittals:

1. Schedule: Provide a schedule of hollow metal work prepared by or under the supervision of supplier, using same reference numbers for details and openings as those on Drawings. Coordinate with door hardware schedule.

D. Oversize Construction Certification: For assemblies required to be fire rated and exceeding limitations of labeled assemblies.

E. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for each type of hollow metal door and frame assembly.

1.6 QUALITY ASSURANCE

A. Source Limitations: Obtain hollow metal work from single source from single manufacturer.

B. Fire-Rated Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at positive pressure according to NFPA 252 .

C. Fire-Rated, Borrowed-Light Frame Assemblies: Assemblies complying with NFPA 80 that are listed and labeled, by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated, based on testing according to NFPA 257 or UL 9 . Label each individual glazed lite.

D. Smoke-Control Door Assemblies: Comply with NFPA 105 or UL 1784 .

E. Preinstallation Conference: Conduct conference at Project site .

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver hollow metal work palletized, wrapped, or crated to provide protection during transit and Project-site storage. Do not use nonvented plastic.

1. Provide additional protection to prevent damage to finish of factory-finished units.

B. Deliver welded frames with two removable spreader bars across bottom of frames, tack welded to jambs and mullions.

C. Store hollow metal work under cover at Project site. Place in stacks of five units maximum in a vertical position with heads up, spaced by blocking, on minimum 4-inch- high wood blocking. Do not store in a manner that traps excess humidity.

1. Provide minimum 1/4-inch space between each stacked door to permit air circulation.

1.8 PROJECT CONDITIONS

A. Field Measurements: Verify actual dimensions of openings by field measurements before fabrication.

1.9 COORDINATION

A. Coordinate installation of anchorages for hollow metal frames. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors. Deliver such items to Project site in time for installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis-of-Design Product: Subject to compliance with requirements, provide Ceco Door Products; an Assa Abloy Group company: Marine-Tech door system or comparable product by one of the following:

1. Amweld Building Products, LLC.
2. Benchmark; a division of Therma-Tru Corporation.
3. Curries Company; an Assa Abloy Group company.
4. Deansteel Manufacturing Company, Inc.
5. Firedoor Corporation.
6. Fleming Door Products Ltd.; an Assa Abloy Group company.
7. Habersham Metal Products Company.
8. Karpen Steel Custom Doors & Frames.
9. Kewanee Corporation (The).
10. Mesker Door Inc.
11. Pioneer Industries, Inc.
12. Security Metal Products Corp.
13. Steelcraft; an Ingersoll-Rand company.
14. Windsor Republic Doors.

2.2 MATERIALS

A. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B; with minimum G60 or A60 metallic coating.

B. Frame Anchors: ASTM A 591/A 591M, Commercial Steel (CS), 40Z coating designation; mill phosphatized.

1. For anchors built into exterior walls, steel sheet complying with ASTM A 1008/A 1008M or ASTM A 1011/A 1011M, hot-dip galvanized according to ASTM A 153/A 153M, Class B.

C. Inserts, Bolts, and Fasteners: Hot-dip galvanized according to ASTM A 153/A 153M.

D. Powder-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hollow metal frames of type indicated.

E. Grout: ASTM C 476, except with a maximum slump of 4 inches, as measured according to ASTM C 143/C 143M.

F. Mineral-Fiber Insulation: ASTM C 665, Type I (blankets without membrane facing); consisting of fibers manufactured from slag or rock wool with 6- to 12-lb/cu. ft. density; with maximum flame-spread and smoke-development indexes of 25 and 50, respectively; passing ASTM E 136 for combustion characteristics.

G. Bituminous Coating: Cold-applied asphalt mastic, SSPC-Paint 12, compounded for 15-mil dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.

2.3 STANDARD HOLLOW METAL DOORS

A. General: Provide doors of design indicated, not less than thickness indicated; fabricated with smooth surfaces, without visible joints or seams on exposed faces unless otherwise indicated. Comply with ANSI/SDI A250.8.

1. Design: Flush panel .
2. Core Construction: Manufacturer's standard fiberglass batting with vertical steel-stiffener core.

a. Fire Door Core: As required to provide fire-protection ratings indicated.
b. Thermal-Rated (Insulated) Doors: Where indicated, provide doors fabricated with thermal-resistance value (R-value) of not less than 4.0 deg F x h x sq. ft./Btu when tested according to ASTM C 1363.

1) Locations: Exterior doors .

3. Vertical Edges for Single-Acting Doors: Manufacturer's standard.

a. Beveled Edge: 1/8 inch in 2 inches.

4. Vertical Edges for Double-Acting Doors: Round vertical edges with 2-1/8-inch radius.

5. Top and Bottom Edges: Closed with flush or inverted 0.042-inch- thick, end closures or channels of same material as face sheets.
6. Tolerances: Comply with SDI 117, "Manufacturing Tolerances for Standard Steel Doors and Frames."

B. Exterior Doors: Face sheets fabricated from metallic-coated steel sheet. Provide doors complying with requirements indicated below by referencing ANSI/SDI A250.8 for level and model and ANSI/SDI A250.4 for physical performance level:
1. Level 4 and Physical Performance Level A (Maximum Duty), Model 1 (Full Flush) .

C. Interior Doors: Face sheets fabricated from metallic-coated sheet . Provide doors complying with requirements indicated below by referencing ANSI/SDI A250.8 for level and model and ANSI/SDI A250.4 for physical performance level:
1. Level 4 and Physical Performance Level A (Maximum Duty), Model 1 (Full Flush) .

D. Hardware Reinforcement: Fabricate according to ANSI/SDI A250.6 with reinforcing plates from same material as door face sheets.

E. Fabricate concealed stiffeners and hardware reinforcement from either cold- or hot-rolled steel sheet.

2.4 STANDARD HOLLOW METAL FRAMES

A. General: Comply with ANSI/SDI A250.8 and with details indicated for type and profile.

B. Exterior Frames: Fabricated from metallic-coated steel sheet.

1. Fabricate frames with mitered or coped corners.
2. Fabricate frames as full profile welded unless otherwise indicated.
3. Frames for Level 4 Steel Doors: 0.067-inch- thick steel sheet.

C. Interior Frames: Fabricated from metallic-coated sheet .

1. Fabricate frames with mitered or coped corners.
2. Fabricate frames as full profile welded unless otherwise indicated.
3. Frames for Level 4 Steel Doors: 0.067-inch- thick steel sheet.
4. Frames for Wood Doors: 0.067-inch- thick steel sheet.

D. Hardware Reinforcement: Fabricate according to ANSI/SDI A250.6 with reinforcement plates from same material as frames.

2.5 FRAME ANCHORS

A. Jamb Anchors:

1. Masonry Type: Adjustable strap-and-stirrup or T-shaped anchors to suit frame size, not less than 0.042 inch thick, with corrugated or perforated straps not less than 2 inches wide by 10 inches long; or wire anchors not less than 0.177 inch thick.
2. Stud-Wall Type: Designed to engage stud, welded to back of frames; not less than 0.042 inch thick.
3. Compression Type for Drywall Slip-on Frames: Adjustable compression anchors.

4. Postinstalled Expansion Type for In-Place Concrete or Masonry: Minimum 3/8-inch-diameter bolts with expansion shields or inserts. Provide pipe spacer from frame to wall, with throat reinforcement plate, welded to frame at each anchor location.

B. Floor Anchors: Formed from same material as frames, not less than 0.042 inch thick, and as follows:

1. Monolithic Concrete Slabs: Clip-type anchors, with two holes to receive fasteners.
2. Separate Topping Concrete Slabs: Adjustable-type anchors with extension clips, allowing not less than 2-inch height adjustment. Terminate bottom of frames at finish floor surface.

2.6 HOLLOW METAL PANELS

A. Provide hollow metal panels of same materials, construction, and finish as specified for adjoining hollow metal work.

2.7 LOUVERS

A. Provide louvers for interior doors, where indicated, that comply with SDI 111C, with blades or baffles formed of 0.020-inch- thick, cold-rolled steel sheet set into 0.032-inch- thick steel frame.

1. Sightproof Louver: Stationary louvers constructed with inverted V-shaped or Y-shaped blades.
2. Fire-Rated Automatic Louvers: Louvers constructed with movable blades closed by actuating fusible link, and listed and labeled for use in fire-rated door assemblies of type and fire-resistance rating indicated by same testing and inspecting agency that established fire-resistance rating of door assembly.

2.8 ACCESSORIES

A. Mullions and Transom Bars: Join to adjacent members by welding or rigid mechanical anchors.

B. Ceiling Struts: Minimum 1/4-inch-thick by 1-inch- wide steel.

C. Grout Guards: Formed from same material as frames, not less than 0.016 inch thick.

2.9 FABRICATION

A. Fabricate hollow metal work to be rigid and free of defects, warp, or buckle. Accurately form metal to required sizes and profiles, with minimum radius for thickness of metal. Where practical, fit and assemble units in manufacturer's plant. To ensure proper assembly at Project site, clearly identify work that cannot be permanently factory assembled before shipment.

B. Tolerances: Fabricate hollow metal work to tolerances indicated in ANSI/NAAMM-HMMA 861.

C. Hollow Metal Doors:

1. Exterior Doors: Provide weep-hole openings in bottom of exterior doors to permit moisture to escape. Seal joints in top edges of doors against water penetration.

2. Astragals: Provide overlapping astragal on one leaf of pairs of doors where required by NFPA 80 for fire-performance rating or where indicated. Extend minimum 3/4 inch beyond edge of door on which astragal is mounted.

D. Hollow Metal Frames: Where frames are fabricated in sections due to shipping or handling limitations, provide alignment plates or angles at each joint, fabricated of same thickness metal as frames.

1. Welded Frames: Weld flush face joints continuously; grind, fill, dress, and make smooth, flush, and invisible.
2. Frames: Provide closed tubular members with no visible face seams or joints, fabricated from same material as door frame. Fasten members at crossings and to jambs by butt welding.
3. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.
4. Grout Guards: Weld guards to frame at back of hardware mortises in frames to be grouted.
5. Floor Anchors: Weld anchors to bottom of jambs and mullions with at least four spot welds per anchor.
6. Jamb Anchors: Provide number and spacing of anchors as follows:

    a. Masonry Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c. and as follows:

        1) Two anchors per jamb up to 60 inches high.
        2) Three anchors per jamb from 60 to 90 inches high.
        3) Four anchors per jamb from 90 to 120 inches high.
        4) Four anchors per jamb plus 1 additional anchor per jamb for each 24 inches or fraction thereof above 120 inches high.

    b. Stud-Wall Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c. and as follows:

        1) Three anchors per jamb up to 60 inches high.
        2) Four anchors per jamb from 60 to 90 inches high.
        3) Five anchors per jamb from 90 to 96 inches high.
        4) Five anchors per jamb plus 1 additional anchor per jamb for each 24 inches or fraction thereof above 96 inches high.
        5) Two anchors per head for frames above 42 inches wide and mounted in metal-stud partitions.

    c. Compression Type: Not less than two anchors in each jamb.
    d. Postinstalled Expansion Type: Locate anchors not more than 6 inches from top and bottom of frame. Space anchors not more than 26 inches o.c.

7. Door Silencers: Except on weather-stripped doors, drill stops to receive door silencers as follows. Keep holes clear during construction.

    a. Single-Door Frames: Drill stop in strike jamb to receive three door silencers.
    b. Double-Door Frames: Drill stop in head jamb to receive two door silencers.

E. Fabricate concealed stiffeners, edge channels, and hardware reinforcement from either cold- or hot-rolled steel sheet.

F. Hardware Preparation: Factory prepare hollow metal work to receive templated mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping according to the Door Hardware Schedule and templates furnished as specified in Division 8 Section "Door Hardware."

1. Locate hardware as indicated, or if not indicated, according to ANSI/SDI A250.8 .
2. Reinforce doors and frames to receive nontemplated, mortised and surface-mounted door hardware.
3. Comply with applicable requirements in ANSI/SDI A250.6 and ANSI/DHI A115 Series specifications for preparation of hollow metal work for hardware.
4. Coordinate locations of conduit and wiring boxes for electrical connections with Division 16 Sections.

2.10 STEEL FINISHES

A. Prime Finish: Apply manufacturer's standard primer immediately after cleaning and pretreating.

1. Shop Primer: Manufacturer's standard, fast-curing, lead- and chromate-free primer complying with ANSI/SDI A250.10 acceptance criteria; recommended by primer manufacturer for substrate; compatible with substrate and field-applied coatings despite prolonged exposure.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Examine roughing-in for embedded and built-in anchors to verify actual locations before frame installation.

C. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Remove welded-in shipping spreaders installed at factory. Restore exposed finish by grinding, filling, and dressing, as required to make repaired area smooth, flush, and invisible on exposed faces.

B. Prior to installation, adjust and securely brace welded hollow metal frames for squareness, alignment, twist, and plumbness to the following tolerances:

1. Squareness: Plus or minus 1/16 inch, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
2. Alignment: Plus or minus 1/16 inch, measured at jambs on a horizontal line parallel to plane of wall.

3. Twist: Plus or minus 1/16 inch, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
4. Plumbness: Plus or minus 1/16 inch, measured at jambs on a perpendicular line from head to floor.

C. Drill and tap doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.

3.3 INSTALLATION

A. General: Install hollow metal work plumb, rigid, properly aligned, and securely fastened in place; comply with Drawings and manufacturer's written instructions.

B. Hollow Metal Frames: Install hollow metal frames of size and profile indicated. Comply with ANSI/SDI A250.11 .

1. Set frames accurately in position, plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces, leaving surfaces smooth and undamaged.

    a. At fire-protection-rated openings, install frames according to NFPA 80.
    b. Where frames are fabricated in sections because of shipping or handling limitations, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces.
    c. Install frames with removable glazing stops located on secure side of opening.
    d. Install door silencers in frames before grouting.
    e. Remove temporary braces necessary for installation only after frames have been properly set and secured.
    f. Check plumbness, squareness, and twist of frames as walls are constructed. Shim as necessary to comply with installation tolerances.
    g. Field apply bituminous coating to backs of frames that are filled with grout containing antifreezing agents.

2. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor, and secure with postinstalled expansion anchors.

    a. Floor anchors may be set with powder-actuated fasteners instead of postinstalled expansion anchors if so indicated and approved on Shop Drawings.

3. Metal-Stud Partitions: Solidly pack mineral-fiber insulation behind frames.
4. Masonry Walls: Coordinate installation of frames to allow for solidly filling space between frames and masonry with grout.
5. Concrete Walls: Solidly fill space between frames and concrete with grout. Take precautions, including bracing frames, to ensure that frames are not deformed or damaged by grout forces.
6. In-Place Concrete or Masonry Construction: Secure frames in place with postinstalled expansion anchors. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.
7. In-Place Gypsum Board Partitions: Secure frames in place with postinstalled expansion anchors through floor anchors at each jamb. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.
8. Ceiling Struts: Extend struts vertically from top of frame at each jamb to overhead structural supports or substrates above frame unless frame is anchored to masonry or to

other structural support at each jamb. Bend top of struts to provide flush contact for securing to supporting construction. Provide adjustable wedged or bolted anchorage to frame jamb members.

9. Installation Tolerances: Adjust hollow metal door frames for squareness, alignment, twist, and plumb to the following tolerances:

    a. Squareness: Plus or minus 1/16 inch, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
    b. Alignment: Plus or minus 1/16 inch, measured at jambs on a horizontal line parallel to plane of wall.
    c. Twist: Plus or minus 1/16 inch, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
    d. Plumbness: Plus or minus 1/16 inch, measured at jambs at floor.

C. Hollow Metal Doors: Fit hollow metal doors accurately in frames, within clearances specified below. Shim as necessary.

1. Non-Fire-Rated Standard Steel Doors:

    a. Jambs and Head: 1/8 inch plus or minus 1/16 inch.
    b. Between Edges of Pairs of Doors: 1/8 inch plus or minus 1/16 inch.
    c. Between Bottom of Door and Top of Threshold: Maximum 3/8 inch.
    d. Between Bottom of Door and Top of Finish Floor (No Threshold): Maximum 3/4 inch.

2. Fire-Rated Doors: Install doors with clearances according to NFPA 80.
3. Smoke-Control Doors: Install doors according to NFPA 105 .

3.4 ADJUSTING AND CLEANING

A. Final Adjustments: Check and readjust operating hardware items immediately before final inspection. Leave work in complete and proper operating condition. Remove and replace defective work, including hollow metal work that is warped, bowed, or otherwise unacceptable.

B. Remove grout and other bonding material from hollow metal work immediately after installation.

C. Prime-Coat Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touchup of compatible air-drying, rust-inhibitive primer.

D. Metallic-Coated Surfaces: Clean abraded areas and repair with galvanizing repair paint according to manufacturer's written instructions.

END OF SECTION 08110

SECTION 08121 - HOLLOW METAL FRAMES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes hollow-metal frames and sound control frames

B. Related Requirements:
   1. Section 081416 "Flush Wood Doors" for wood doors installed in hollow-metal frames.
   2. Section 08800 “Glazing” for glazing in hollow metal frame sidelights and interior windows

1.3 DEFINITIONS

A. Minimum Thickness: Minimum thickness of base metal without coatings according to NAAMM-HMMA 803 or SDI A250.8.

1.4 COORDINATION

A. Coordinate anchorage installation for hollow-metal frames. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors. Deliver such items to Project site in time for installation.

1.5 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.6 ACTION SUBMITTALS

A. Product Data: For each type of product.

   1. Include construction details, material descriptions, fire-resistance ratings, and finishes.

B. Shop Drawings: Include the following:

1. Frame details for each frame type, including dimensioned profiles and metal thicknesses.
2. Locations of reinforcement and preparations for hardware.
3. Details of each different wall opening condition.
4. Details of anchorages, joints, field splices, and connections.
5. Details of moldings, removable stops, and glazing.
6. Details of conduit and preparations for power, signal, and control systems.

C. Schedule: Provide a schedule of hollow-metal work prepared by or under the supervision of supplier, using same reference numbers for details and openings as those on Drawings. Coordinate with final Door Hardware Schedule.

1.7 QUALITY ASSURANCE

A. STC Rating: Not less than as scheduled and as determined by ASTM E 413 when tested in an operable condition according to ASTM E 90 and ASTM E 1408. Manufacturer shall have testing lab documentation of STC rating.

1.8 INFORMATIONAL SUBMITTALS

A. Product Test Reports: For each type of frame assembly, for tests performed by a qualified testing agency.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Deliver hollow-metal work palletized, packaged, or crated to provide protection during transit and Project-site storage. Do not use nonvented plastic.

1. Provide additional protection to prevent damage to factory-finished units.

B. Deliver welded frames with two removable spreader bars across bottom of frames, tack welded to jambs and mullions.

C. Store hollow-metal work vertically under cover at Project site with head up. Place on minimum 4-inch- (102-mm-) high wood blocking. Provide minimum 1/4-inch (6-mm) space between each unit to permit air circulation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Amweld International, LLC.
2. Apex Industries, Inc.
3. Ceco Door Products; an Assa Abloy Group company.
4. Curries Company; an Assa Abloy Group company.
5. Custom Metal Products.
6. DKS Steel Door & Frame Sys. Inc.
7. Fleming-Baron Door Products.
8. J/R Metal Frames Manufacturing, Inc.
9. MPI Group, LLC (The).
10. North American Door Corp.
11. Philipp Manufacturing Co (The).
12. Premier Products, Inc.
13. Republic Doors and Frames.
14. Steelcraft; an Ingersoll-Rand company.

B. Sound Control Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. AMBICO Limited
2. Eggers Industries
3. Krieger Specialty Products Company
4. Marshfield DoorSystems, Inc.
5. Overly Door Company

C. Source Limitations: Obtain hollow-metal work from single source from single manufacturer. Sound Control Doors and Frames are to be obtained from single source from single manufacturer.

2.2 REGULATORY REQUIREMENTS

A. Fire-Rated Assemblies: Complying with NFPA 80 and listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction for fire-protection ratings and temperature-rise limits indicated, based on testing at positive pressure according to NFPA 252 or UL 10C.

1. Smoke- and Draft-Control Assemblies: Provide an assembly with gaskets listed and labeled for smoke and draft control by a qualified testing agency acceptable to authorities having jurisdiction, based on testing according to UL 1784 and installed in compliance with NFPA 105.

2.3 INTERIOR FRAMES

A. Construct interior frames to comply with the standards indicated for materials, fabrication, hardware locations, hardware reinforcement, tolerances, and clearances, and as specified.

B. Standard-Duty Frames: SDI A250.8, Level 1. Closets (not including janitor's closet) and interior windows.

1. Physical Performance: Level C according to SDI A250.4.
2. Materials: Uncoated, cold-rolled steel sheet, minimum thickness of 0.042 inch (1.0 mm).
3. Construction: Full profile welded.
4. Exposed Finish: Prime.

C. Heavy-Duty Frames: SDI A250.8, Level 2. at all other locations.

1. Physical Performance: Level B according to SDI A250.4.
2. Materials: Uncoated steel sheet, minimum thickness of 0.053 inch (1.3 mm).
3. Construction: Full profile welded.
4. Exposed Finish: Prime.

D. Sound-Control Frames
1. Description Fabricate sound-control door frames with corners mitered, reinforced, and continuously welded full depth and width of frame. Fabricate according to ANSI/NAAMM-HMMA 865.
   a. Weld frames according to NAAMM-HMMA 820.
   b. Exterior Frames: Fabricate from metallic-coated steel sheet 0.079-inch (2.01-mm) nominal thickness, or thicker as required to provide STC rating indicated.
   c. Interior Frames: Fabricate from cold-rolled steel sheet unless otherwise indicated, 0.075-inch (1.90-mm) nominal thickness, or thicker as required to provide STC rating indicated.
   d. Hardware Reinforcement: Fabricate according to ANSI/NAAMM-HMMA 865 of same material as face sheets.

2.4 FRAME ANCHORS

A. Jamb Anchors:
1. Stud-Wall Type: Designed to engage stud, welded to back of frames; not less than 0.042 inch (1.0 mm) thick.

B. Floor Anchors: Formed from same material as frames, minimum thickness of 0.042 inch (1.0 mm), and as follows:

1. Monolithic Concrete Slabs: Clip-type anchors, with two holes to receive fasteners.

2. Separate Topping Concrete Slabs: Adjustable-type anchors with extension clips, allowing not less than 2-inch (51-mm) height adjustment. Terminate bottom of frames at finish floor surface.

2.5 MATERIALS

A. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B; suitable for exposed applications.

B. Hot-Rolled Steel Sheet: ASTM A 1011/A 1011M, Commercial Steel (CS), Type B; free of scale, pitting, or surface defects; pickled and oiled.

C. Sound Control Frames: Materials

1. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B, suitable for exposed applications.
2. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B, with G60 (Z180) zinc (galvanized) or A40 (ZF120) zinc-iron-alloy (galvannealed) coating designation.
3. Mineral-Fiber Insulation: Insulation composed of rock-wool fibers, slag-wool fibers, or glass fibers.

D. Frame Anchors: ASTM A 879/A 879M, Commercial Steel (CS), 04Z (12G) coating designation; mill phosphatized.

1. For anchors built into exterior walls, steel sheet complying with ASTM A 1008/A 1008M or ASTM A 1011/A 1011M, hot-dip galvanized according to ASTM A 153/A 153M, Class B.

E. Inserts, Bolts, and Fasteners: Hot-dip galvanized according to ASTM A 153/A 153M.

F. Power-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hollow-metal frames of type indicated.

G. Grout: ASTM C 476, except with a maximum slump of 4 inches (102 mm), as measured according to ASTM C 143/C 143M.

H. Mineral-Fiber Insulation: ASTM C 665, Type I (blankets without membrane facing); consisting of fibers manufactured from slag or rock wool with 6- to 12-lb/cu. ft. (96- to 192-kg/cu. m) density; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively; passing ASTM E 136 for combustion characteristics.

I. Glazing: Comply with requirements in Section 088000 "Glazing."

2.6 FABRICATION

A. Fabricate hollow-metal work to be rigid and free of defects, warp, or buckle. Accurately form metal to required sizes and profiles, with minimum radius for metal thickness. Where practical, fit and assemble units in manufacturer's plant. To ensure proper assembly at Project site, clearly identify work that cannot be permanently factory assembled before shipment.

B. Sound-Control Steel Door Fabrication:

1. Seamless Edge Construction: Fabricate doors with faces joined at vertical edges by welding; welds shall be ground, filled, and dressed to make them invisible and to provide a smooth, flush surface.
2. Exterior Doors: Close top edges flush and seal joints against water penetration. Provide weep-hole openings in bottom of exterior doors to permit moisture to escape.
3. Glazed Lites: Factory install glazed lites according to requirements of tested assembly to achieve STC rating indicated. Provide fixed stops and moldings welded on secure side of door.
4. Hardware Preparation: Factory prepare sound-control doors to receive templated mortised hardware, according to the Door Hardware Schedule and templates furnished as specified in Section 08710 "Door Hardware”

    a. Reinforce doors to receive nontemplated mortised and surface-mounted door hardware.
    b. Locate door hardware as indicated, or if not indicated, according to NAAMM-HMMA 831, "Recommended Hardware Locations for Custom Hollow Metal Doors and Frames."

5. Tolerances: Fabricate doors to tolerances indicated in ANSI/NAAMM-HMMA 865.

C. Hollow-Metal Frames: Where frames are fabricated in sections due to shipping or handling limitations, provide alignment plates or angles at each joint, fabricated of same thickness metal as frames.

1. Sidelight Frames: Provide closed tubular members with no visible face seams or joints, fabricated from same material as door frame. Fasten members at crossings and to jambs by butt welding.
2. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.
3. Grout Guards: Weld guards to frame at back of hardware mortises in frames to be grouted.
4. Floor Anchors: Weld anchors to bottoms of jambs with at least four spot welds per anchor; however, for slip-on drywall frames, provide anchor clips or countersunk holes at bottoms of jambs.
5. Jamb Anchors: Provide number and spacing of anchors as follows:

a. Stud-Wall Type: Locate anchors not more than 18 inches (457 mm) from top and bottom of frame. Space anchors not more than 32 inches (813 mm) o.c. and as follows:

1) Three anchors per jamb up to 60 inches (1524 mm) high.
2) Four anchors per jamb from 60 to 90 inches (1524 to 2286 mm) high.
3) Five anchors per jamb from 90 to 96 inches (2286 to 2438 mm) high.
4) Five anchors per jamb plus one additional anchor per jamb for each 24 inches (610 mm) or fraction thereof above 96 inches (2438 mm) high.

b. Compression Type: Not less than two anchors in each frame.
c. Postinstalled Expansion Type: Locate anchors not more than 6 inches (152 mm) from top and bottom of frame. Space anchors not more than 26 inches (660 mm) o.c.

6. Head Anchors: Two anchors per head for frames more than 42 inches (1067 mm) wide and mounted in metal-stud partitions.
7. Door Silencers: Except on weather-stripped frames, drill stops to receive door silencers as follows. Keep holes clear during construction.

a. Single-Door Frames: Drill stop in strike jamb to receive three door silencers.
b. Double-Door Frames: Drill stop in head jamb to receive two door silencers.

D. Hardware Preparation: Factory prepare hollow-metal work to receive templated mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping according to SDI A250.6, the Door Hardware Schedule, and templates.

1. Reinforce frames to receive nontemplated, mortised, and surface-mounted hardware.
2. Comply with applicable requirements in SDI A250.6 and BHMA A156.115 for preparation of hollow-metal work for hardware.

E. Stops and Moldings: Provide stops and moldings around glazed lites and louvers where indicated. Form corners of stops and moldings with miteredhairline joints.

1. Single Glazed Lites: Provide fixed stops and moldings welded on secure side of hollow-metal work.
2. Multiple Glazed Lites: Provide fixed and removable stops and moldings so that each glazed lite is capable of being removed independently.
3. Provide fixed frame moldings on outside of exterior and on secure side of interior frames.
4. Provide loose stops and moldings on inside of hollow-metal work.
5. Coordinate rabbet width between fixed and removable stops with glazing and installation types indicated.

2.7 STEEL FINISHES

A. Prime Finish: Clean, pretreat, and apply manufacturer's standard primer.

1. Shop Primer: Manufacturer's standard, fast-curing, lead- and chromate-free primer complying with SDI A250.10; recommended by primer manufacturer for substrate; compatible with substrate and field-applied coatings despite prolonged exposure.

B. Sound Control Frame Finishes:

1. Prime Finish: Apply manufacturer's standard primer complying with ANSI/SDI A250.10.
2. Factory-Applied Paint Finish: Manufacturer's standard primer and finish coats, complying with ANSI/SDI A250.3.

a. Color and Gloss: As selected by Architect from manufacturer's full range.

2.8 ACCESSORIES

A. Mullions and Transom Bars: Join to adjacent members by welding or rigid mechanical anchors.

B. Grout Guards: Formed from same material as frames, not less than 0.016 inch (0.4 mm) thick.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Examine roughing-in for embedded and built-in anchors to verify actual locations before frame installation.

C. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Remove welded-in shipping spreaders installed at factory. Restore exposed finish by grinding, filling, and dressing, as required to make repaired area smooth, flush, and invisible on exposed faces.

B. Drill and tap frames to receive nontemplated, mortised, and surface-mounted hardware.

3.3 INSTALLATION

A. General: Install hollow-metal work plumb, rigid, properly aligned, and securely fastened in place. Comply with Drawings and manufacturer's written instructions.

B. Hollow-Metal Frames: Install hollow-metal frames of size and profile indicated. Comply with SDI A250.11 or NAAMM-HMMA 840 as required by standards specified.

1. Set frames accurately in position; plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces, leaving surfaces smooth and undamaged.

    a. At fire-rated openings, install frames according to NFPA 80.
    b. Where frames are fabricated in sections because of shipping or handling limitations, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces.
    c. Install frames with removable stops located on secure side of opening.
    d. Install door silencers in frames before grouting.
    e. Remove temporary braces necessary for installation only after frames have been properly set and secured.
    f. Check plumb, square, and twist of frames as walls are constructed. Shim as necessary to comply with installation tolerances.

2. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor, and secure with postinstalled expansion anchors.

    a. Floor anchors may be set with power-actuated fasteners instead of postinstalled expansion anchors if so indicated and approved on Shop Drawings.

3. Metal-Stud Partitions: Solidly pack mineral-fiber insulation inside frames.
4. Installation Tolerances: Adjust hollow-metal door frames for squareness, alignment, twist, and plumb to the following tolerances:

    a. Squareness: Plus or minus 1/16 inch (1.6 mm), measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
    b. Alignment: Plus or minus 1/16 inch (1.6 mm), measured at jambs on a horizontal line parallel to plane of wall.

c. Twist: Plus or minus 1/16 inch (1.6 mm), measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
d. Plumbness: Plus or minus 1/16 inch (1.6 mm), measured at jambs at floor.

C. Sound Control Frames: Install sound-control door frames in sizes and profiles indicated.

1. Set frames accurately in position; plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces, leaving surfaces smooth and undamaged.

   a. Where frames are fabricated in sections due to shipping or handling limitations, field splice at approved locations by welding face joint continuously; grind, fill, and dress; make splice smooth, flush, and invisible on exposed faces.
   b. Install sound-control frames with removable glazing stops located on secure side of opening.
   c. Remove temporary braces only after frames or bucks have been properly set and secured.
   d. Check squareness, twist, and plumbness of frames as walls are constructed. Shim as necessary to comply with installation tolerances.

2. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor and secure with postinstalled expansion anchors or powder-actuated fasteners.
3. Metal-Stud Partitions: Solidly pack mineral-fiber insulation behind frames.
4. In-Place Gypsum Board Partitions: Secure frames in place with postinstalled expansion anchors through floor anchors at each jamb. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.
5. Ceiling Struts: Extend struts vertically from top of frame at each jamb to supporting construction above, unless frame is anchored to masonry or to other structural support at each jamb. Bend top of struts to provide flush contact for securing to supporting construction above. Provide adjustable wedged or bolted anchorage to frame jamb members.
6. Installation Tolerances: Adjust sound-control door frames for squareness, alignment, twist, and plumbness as indicated in ANSI/NAAMM-HMMA 865.
7.

D. Glazing: Comply with installation requirements in Section 08800 "Glazing" and with hollow-metal manufacturer's written instructions.

1. Secure stops with countersunk flat- or oval-head machine screws spaced uniformly not more than 9 inches (230 mm) o.c. and not more than 2 inches (51 mm) o.c. from each corner.

2. For Sound Control Door Assemblies comply with installation requirements in Section 08800 "Glazing" and with manufacturer's written instructions

3.4 ADJUSTING AND CLEANING

A. Final Adjustments: Remove and replace defective work, including hollow-metal work that is warped, bowed, or otherwise unacceptable.

B. Remove grout and other bonding material from hollow-metal work immediately after installation.

C. Prime-Coat Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touchup of compatible air-drying, rust-inhibitive primer.

D. Touchup Painting: Cleaning and touchup painting of abraded areas of paint are specified in painting Sections.

END OF SECTION 08121

SECTION 08211 - FLUSH WOOD DOORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Solid-core doors with wood-veneer faces.

2. Sound Control Doors
3. Factory finishing flush wood doors.
4. Factory machining for hardware.

B. Related Sections:
1. Section 08110 “Hollow metal frames” for metal door frames that are to receive flush wood doors.
2. Section 0871 “Door Hardware” for door hardware.
3. Section 08800 "Glazing" for glass view panels in flush wood doors.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of door indicated. Include details of core and edge construction, louvers, and trim for openings.

B. Shop Drawings: Indicate location, size, and hand of each door; elevation of each kind of door; construction details not covered in Product Data; location and extent of hardware blocking; and other pertinent data.

1. Indicate dimensions and locations of mortises and holes for hardware.
2. Indicate dimensions and locations of cutouts.
3. Indicate requirements for veneer matching.
4. Indicate doors to be factory finished and finish requirements.
5. Indicate fire-protection ratings for fire-rated doors.
6. Indicate sound control doors including details, seals, anchorages and accessories

C. Samples for Initial Selection: For factory-finished doors.

1.4 INFORMATIONAL SUBMITTALS

A. Warranty: Sample of special warranty.

1.5 QUALITY ASSURANCE

A. Source Limitations: Obtain flush wood doors from single manufacturer.

B. Quality Standard: In addition to requirements specified, comply with AWI's "Architectural Woodwork Quality Standards Illustrated."

1. Provide AWI Quality Certification Labels or an AWI letter of licensing for Project indicating that doors comply with requirements of grades specified.

C. Fire-Rated Wood Doors: Doors complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at positive pressure according to NFPA 252 or UL 10C.

D. STC Rating: Not less than as scheduled and as determined by ASTM E 413 when tested in an operable condition according to ASTM E 90 and ASTM E 1408. Manufacturer shall have testing lab documentation of STC rating.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Comply with requirements of referenced standard and manufacturer's written instructions.

B. Package doors individually in plastic bags or cardboard cartons.

C. Mark each door on bottom rail with opening number used on Shop Drawings.

1.7 PROJECT CONDITIONS

A. Environmental Limitations: Do not deliver or install doors until spaces are enclosed and weathertight, wet work in spaces is complete and dry, and HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.

1.8 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace doors that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

   a. Warping (bow, cup, or twist) more than 1/4 inch (6.4 mm) in a 42-by-84-inch (1067-by-2134-mm) section.
   b. Telegraphing of core construction in face veneers exceeding 0.01 inch in a 3-inch (0.25 mm in a 76.2-mm) span.

2. Warranty shall also include installation and finishing that may be required due to repair or replacement of defective doors.
3. Warranty Period for Solid-Core Interior Doors: Life of installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Algoma Hardwoods, Inc.
2. Chappell Door Co.
3. Eagle Plywood & Door Manufacturing, Inc .
4. Eggers Industries.
5. Graham; an Assa A bloy Group company.
6. Haley Brothers, Inc.
7. Ideal Architectural Doors & Plywood.
8. Marlite.
9. Marshfield Door Systems, Inc.
10. Mohawk Flush Doors, Inc.; a Masonite company.
11. Oshkosh Architectural Door Company.
12. Poncraft Door Company.
13. VT Industries Inc.

B. Sound Control Doors Manufacturer: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. AMBICO Limited
2. Eggers Industries
3. Krieger Specialty Products Company
4. Marshfield DoorSystems, Inc.
5. Overly Door Company

C. Source Limitations: Sound Control Doors and Frames are to be obtained from single source from single manufacturer.

2.2 DOOR CONSTRUCTION, GENERAL

A. WDMA I.S.1-A Performance Grade:

1. Heavy Duty unless otherwise indicated.
2. Extra Heavy Duty: Classrooms, public toilets janitor's closets, exits.
3. Standard Duty: Closets (not including janitor's closets).

B. Structural-Composite-Lumber-Core Doors:

1. Structural Composite Lumber: WDMA I.S.10.

   a. Screw Withdrawal, Face: 700 lbf (3100 N).
   b. Screw Withdrawal, Edge: 400 lbf (1780 N).

C. Sound Control Doors: Where scheduled: Solid core wood doors constructed as described in this section, except as required to provide acoustical rating identical to listed manufacturer’s door tested per ASTM E90 using scheduled door gasket and door bottom.

1. Counseling Room Doors: STC rating no less than 46
2. Daycare Classroom Entry Doors: STC rating no less than 45
3. Daycare Restroom Doors: STC rating no less than 45
4. Daycare Infant Classroom Doors: STC rating no less 46
5. Training Rooms: STC rating no less than 45
6. Design: Flush panel.
7. Core Construction: Manufacturer's standard sound control door core construction designed and tested for the specified STC rating.
   a. Fire Door Core: As required to provide fire-protection level specified.
8. Vertical Edges: Beveled both edges, 1/8 inch in 2 inches (3 mm in 50 mm).

D. Glazing in Sound Control Doors: Vision panels to be designed and tested by the Manufacturer to meet the specified STC rating and comply with requirements in Division 08 Section “Glazing”

E. Fire-Protection-Rated Doors: Provide core specified or mineral core as needed to provide fire-protection rating indicated.

1. Edge Construction: Provide edge construction with intumescent seals concealed by outer stile. Comply with specified requirements for exposed edges.
2. Pairs: Provide fire-retardant stiles that are listed and labeled for applications indicated without formed-steel edges and astragals. Provide stiles with concealed intumescent seals. Comply with specified requirements for exposed edges.

F. Mineral-Core Doors:

1. Core: Noncombustible mineral product complying with requirements of referenced quality standard and testing and inspecting agency for fire-protection rating indicated.
2. Blocking: Provide composite blocking with improved screw-holding capability approved for use in doors of fire-protection ratings indicated as needed to eliminate through-bolting hardware.

3. Edge Construction: At hinge stiles, provide laminated-edge construction with improved screw-holding capability and split resistance. Comply with specified requirements for exposed edges.

2.3 VENEERED-FACED DOORS FOR TRANSPARENT FINISH

A. Interior Solid-Core Doors:

1. Grade: Premium, with Grade A faces.
2. Species: White oak.
3. Cut: Quarter sliced.
4. Match between Veneer Leaves: Slip match.
5. Assembly of Veneer Leaves on Door Faces: Balance match.
6. Pair and Set Match: Provide for doors hung in same opening or separated only by mullions.
7. Room Match: Match door faces within each separate room or area of building. Corridor-door faces do not need to match where they are separated by 20 feet (6 m) or more.
8. Room Match: Provide door faces of compatible color and grain within each separate room or area of building.

9. Core: Either glued wood stave or structural composite lumber.
10. Construction: Five or seven plies. Stiles and rails are bonded to core, then entire unit abrasive planed before veneering.
11. Construction: Seven plies, either bonded or nonbonded construction.
12. WDMA I.S.1-A Performance Grade: As indicated.

2.4 LOUVERS AND LIGHT FRAMES

A. Wood Louvers: Door manufacturer's standard solid-wood louvers unless otherwise indicated.

1. Wood Species: Same species as door faces.

B. Metal Louvers:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. Air Louvers Inc.

b. Anemostat; a Mestek company.
c. Hiawatha Incorporated.
d. L & L Louvers, Inc.
e. LL Building Products, Inc.; a division of GAF Materials Corporation.
f. Louvers & Dampers, Inc.; a Mestek company.
g. McGill Architectural Products.

2. Blade Type: Vision-proof, inverted V.
3. Metal and Finish: Extruded aluminum with Class II, clear anodic finish, AA-M12C22A31.

C. Louvers for Fire-Rated Doors: Metal louvers with fusible link and closing device, listed and labeled for use in doors with fire-protection rating of 1-1/2 hours and less.

1. Manufacturers: Subject to compliance with requirements, [**provide products by one of the following**] [**available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following**]:

a. Air Louvers Inc.
b. Anemostat; a Mestek company.
c. Hiawatha Incorporated.
d. L & L Louvers, Inc.
e. LL Building Products, Inc.; a division of GAF Materials Corporation.
f. Louvers & Dampers, Inc.; a Mestek company.
g. McGill Architectural Products.

2. Metal and Finish: Hot-dip galvanized steel, 0.040 inch (1.0 mm) thick, with baked-enamel- or powder-coated finish.

D. Wood Beads for Light Openings in Wood Doors: Provide manufacturer's standard wood beads as follows unless otherwise indicated.

1. Wood Species: Same species as door faces.
2. Profile: Flush rectangular beads.
3. At wood-core doors with 20-minute fire-protection ratings, provide wood beads and metal glazing clips approved for such use.

E. Wood-Veneered Beads for Light Openings in Fire-Rated Doors: Manufacturer's standard wood-veneered noncombustible beads matching veneer species of door faces and approved for use in doors of fire-protection rating indicated. Include concealed metal glazing clips where required for opening size and fire-protection rating indicated.

2.5 FABRICATION

A. Factory fit doors to suit frame-opening sizes indicated. Comply with clearance requirements of referenced quality standard for fitting unless otherwise indicated.

1. Comply with requirements in NFPA 80 for fire-rated doors.

B. Factory machine doors for hardware that is not surface applied. Locate hardware to comply with DHI-WDHS-3. Comply with final hardware schedules, door frame Shop Drawings, DHI A115-W series standards, and hardware templates.

1. Coordinate with hardware mortises in metal frames to verify dimensions and alignment before factory machining.

C. Openings: Cut and trim openings through doors in factory.

1. Light Openings: Trim openings with moldings of material and profile indicated.
2. Glazing: Factory install glazing in doors indicated to be factory finished. Comply with applicable requirements in Section 08800 "Glazing."
3. Louvers: Factory install louvers in prepared openings.

D. Sound-Control Door Fabrication

1. Glazed Lites; Factory install glazed lites according to requirements of tested assembly to achieve STC rating indicated. Provide fixed stops and moldings welded on secure side of door. Doors with factory installed glass to include all of the required glazing material and allow for independent removal of each pane of glass.

2. Locate door hardware as indicated, or it not indicated, according to DHI WDHS.3, “Recommended Locations for Architectural Hardware for Wood Flush Doors.”

2.6 FACTORY FINISHING

A. General: Comply with referenced quality standard for factory finishing. Complete fabrication, including fitting doors for openings and machining for hardware that is not surface applied, before finishing.

1. Finish faces, all four edges, edges of cutouts, and mortises. Stains and fillers may be omitted on top and bottom edges, edges of cutouts, and mortises.

B. Finish doors at factory.

C. Transparent Finish:

1. Grade: Premium.
2. Finish: AWI conversion varnish or catalyzed polyurethane system.
3. Effect: Semifilled finish, produced by applying an additional finish coat to partially fill the wood pores.
4. Sheen: Satin.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine doors and installed door frames before hanging doors.

1. Verify that frames comply with indicated requirements for type, size, location, and swing characteristics and have been installed with level heads and plumb jambs.
2. Reject doors with defects.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Hardware: For installation, see Section 08710 "Door Hardware" and Section 08712 "Door Hardware (Descriptive Specification)."

B. Fit sound-control doors accurately in frames, within clearances as indicated in ANSI/NAAMM-HMMA 865

C. Installation Instructions: Install doors to comply with manufacturer's written instructions and the referenced quality standard, and as indicated.

1. Install fire-rated doors in corresponding fire-rated frames according to NFPA 80.

D. Job-Fitted Doors: Align and fit doors in frames with uniform clearances and bevels as indicated below; do not trim stiles and rails in excess of limits set by manufacturer or permitted for fire-rated doors. Machine doors for hardware. Seal edges of doors, edges of cutouts, and mortises after fitting and machining.

1. Clearances: Provide 1/8 inch (3.2 mm) at heads, jambs, and between pairs of doors. Provide 1/8 inch (3.2 mm) from bottom of door to top of decorative floor finish or covering unless otherwise indicated. Where threshold is shown or scheduled, provide 1/4 inch (6.4 mm) from bottom of door to top of threshold unless otherwise indicated.

a. Comply with NFPA 80 for fire-rated doors.

E. Factory-Finished Doors: Restore finish before installation if fitting or machining is required at Project site.

3.3 ADJUSTING

A. Operation: Rehang or replace doors that do not swing or operate freely.

B. Finished Doors: Replace doors that are damaged or that do not comply with requirements. Doors may be repaired or refinished if work complies with requirements and shows no evidence of repair or refinishing.

END OF SECTION 08211

SECTION 08311 ACCESS DOORS AND FRAMES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Access doors and frames for walls and ceilings.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, materials, individual components and profiles, and finishes.

B. Shop Drawings:

1. Include plans, elevations, sections, details, and attachments to other work.

2. Detail fabrication and installation of access doors and frames for each type of substrate.

PART 2 - PRODUCTS

2.1 ACCESS DOORS AND FRAMES FOR WALLS AND CEILINGS

A. Manufacturers: Subject to compliance with requirements, available manufactures offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Acudor Products, Inc.

2. Babcock-Davis.

3. Jensen Industries; Div. of Broan-Nutone, LLC.

4. Karp Associates, Inc.

5. MIFAB, Inc.

6. Milcor Inc.

7. Williams Bros. Corporation of America (The).

B. Source Limitations: Obtain access doors and frame from single source from single manufacturer.

C. Flush Access Doors with Concealed Flanges:

1. Assembly Description: Fabricate door to fit flush to frame. Provide frame with gypsum board or plaster beads as required for concealed flange installation.

2. Locations: Wall and ceiling.

3. Size: As indicated on Drawings and required for access to concealed spaces and building systems.

4. Metallic Coated Steel Sheet for Door: Nominal 0.060 inch, 16 gage.

a. Finish: Factory prime

5. Frame Material: Same material and thickness as door.

6. Hinges: Manufacturer's standard.

7. Hardware: Lock.

D. Hardware:

1. Lock: As indicated by Architect

a. Lock Preparation: Prepare door panel to accept cylinder specified in Division 08 Section "Door Hardware."

2.2 MATERIALS

A. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B; with minimum G60 or A 60 metallic coating.

B. Frame Anchors: Same type as door face.

C. Inserts, Bolts, and Anchor Fasteners: Hot-dip galvanized steel according to ASTM A 153/A 153M or ASTM F 2329.

2.3 FABRICATION

A. General: Provide access door and frame assemblies manufactured as integral units ready for installation.

B. Metal Surfaces: For metal surfaces exposed to view in the completed Work, provide materials with smooth, flat surfaces without blemishes. Do not use materials with exposed pitting, seam marks, roller marks, rolled trade names, or roughness.

C. Door and Frames: Grind exposed welds smooth and flush adjacent surfaces. Furnish attachment devices and fasteners of type required to secure access doors to types of supports indicated.

1. For concealed flanges with drywall bead, provide edge trim for gypsum board and gypsum base securely attached to perimeter of frames.

2. Provide mounting holes in frames for attachment of units to metal or wood framing.

D. Latching Mechanisms: Furnish number required to hold doors in flush, smooth plane when closed.

1. For cylinder locks, furnish two keys per lock and key all locks alike.

2. For recessed panel doors, provide access sleeves for each locking device. Furnish plastic grommets and install in holes cut through finish.

2.4 FINISHES

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

C. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

D. Metallic-Coated-Steel Finishes:

1. Factory Prime: Apply manufacturer's standard, fast-curing, lead- and chromate-free, universal primer immediately after surface preparation and pretreatment.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates for compliance with requirements for installation tolerances and other conditions affecting performances of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Comply with manufacturer's written instructions for installing access doors and frames.

B. Install doors flush with adjacent finish surfaces or recessed to receive finish material.

3.3 ADJUSTING

A. Adjust doors and hardware, after installation, for proper operation.

B. Remove and replace doors and frames that are warped, bowed, or otherwise damaged.

END OF SECTION

SECTION 08331 – COILING OVERHEAD COUNTER DOOR

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:
   1. Fire-rated coiling counter doors.

B. Related Sections:

   1. Section 05501 "Metal Fabrications" for miscellaneous steel supports.
   2. Section 09911 "Exterior Painting" and Section 09912 "Interior Painting" for finish painting of factory-primed doors.

1.3 PERFORMANCE REQUIREMENTS

A. Delegated Design: Design overhead coiling doors, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

   1. Deflection Limits: Design overhead coiling doors to withstand design wind load without evidencing permanent deformation or disengagement of door components.

B. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified Operation Cycles: Provide overhead coiling door components and operators capable of operating for not less than number of cycles indicated for each door. One operation cycle is complete when a door is opened from the closed position to the fully open position and returned to the closed position.

C. Fire Door Construction: Conform to UL 10B

D. Installed Fire Door Assembly: Conform to NFPA 80

1.4 ACTION SUBMITTALS

A. Product Data: For each type and size of overhead coiling door and accessory. Include the following:

   1. Construction details, material descriptions, dimensions of individual components, profiles for slats, and finishes.
   2. Rated capacities, operating characteristics, electrical characteristics, and furnished accessories.

3. For fire-rated doors, description of fire-release system including testing and resetting instructions.

B. Shop Drawings: For each installation and for special components not dimensioned or detailed in manufacturer's product data. Include plans, elevations, sections, details, and attachments to other work.

1. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
2. Show locations of replaceable fusible links.
3. Wiring Diagrams: For power, signal, and control wiring.

C. Samples for Initial Selection: Manufacturer's finish charts showing full range of colors and textures available for units with factory-applied finishes.

1. Include similar Samples of accessories involving color selection.

D. Samples for Verification: For each type of exposed finish required, prepared on Samples of size indicated below.

1. Curtain Slats: 12 inches (305 mm) long[**, including vision window secured to slat**].
2. Bottom Bar: 6 inches (150 mm) long[**with sensor edge**].
3. Guides: 6 inches (150 mm) long.
4. Brackets: 6 inches (150 mm) square.
5. Hood: 6 inches (150 mm) square.
6. Laminate-Clad Counter Panel Product: 6 inches (150 mm) square; for each type, color, pattern, and surface finish; laminated to core.

E. Delegated-Design Submittal: For overhead coiling doors indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1. Detail fabrication and assembly of seismic restraints.
2. Summary of forces and loads on walls and jambs.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified Installer.

B. Oversize Construction Certification: For door assemblies required to be fire-rated and that exceed size limitations of labeled assemblies.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance Data: For overhead coiling doors to include in maintenance manuals.

1.7 QUALITY ASSURANCE

A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for both installation and maintenance of units required for this Project.

B. Manufacturer Qualifications: Manufacturer shall provide a coiling door system capable of withstanding positive and negative design loads as required by local building code for 20,000 cycles.

C. Source Limitations: Obtain overhead coiling doors from single source from single manufacturer.

1. Obtain operators and controls from overhead coiling door manufacturer.

D. Fire-Rated Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at as close to neutral pressure as possible according to [**NFPA 252**] [**UBC Standard 7-2**] [**or**] [**UL 10B**].

1. Oversize Fire-Rated Door Assemblies: For units exceeding sizes of tested assemblies, provide certification by a qualified testing agency that doors comply with standard construction requirements for tested and labeled fire-rated door assemblies except for size.
2. Temperature-Rise Limit: [**Where indicated**] [**At vertical exit enclosures and exit passageways**], provide doors that have a maximum transmitted temperature end point of not more than 450 deg F (250 deg C) above ambient after 30 minutes of standard fire-test exposure.
3. Smoke Control: [**In corridors and smoke barriers**, provide doors that are listed and labeled with the letter "S" on the fire-rating label by a qualified testing agency for smoke- and draft-control based on testing according to [**UBC Standard 7-2**] [**UL 1784**]; with maximum air-leakage rate of 3.0 cfm/sq. ft. (0.01524 cu. m/s x sq. m) of door opening at 0.10 inch wg (24.9 Pa) for both ambient and elevated temperature tests.

E. Sound-Control Doors: Assemblies that have been fabricated and tested to control the passage of sound and have minimum certified STC rating according to ASTM E 413.

F. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

G. Regulatory Requirements: Comply with applicable provisions in [**the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines**] [**and**] [**ICC/ANSI A117.1**].

1.8 WARRANTY

A. Provide an original of the manufacturer’s limited warranty against manufacturing defects and product workmanship
1. Rolling Steel Door Warranty: 5 years

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis of Design: Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work includes, but are not limited to the following:
1. C.H.I Overhead Doors 7500
2. Cornell Counter Fire Door

B. Construction:
   1. Guides: Bolted together to form guide channel and mounting surface.
   2. End Locks: Galvanized malleable iron, attached to every other slat providing a wearing surface and preventing movement.
   3. Head Plate: Rectangular steel plate, with precision sealed ball bearings supporting drive side axle.
   4. Barrel Assembly: Steel pipe, sized for maximum deflection, with threaded rings or lugs welded to barrel assembly for curtain attachment.
   5. Springs: Counterbalanced torsion springs, grease packed and mounted on steel torsion shafts, designed for minimum 20,000 cycles

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates areas and conditions, with Installer present, for compliance with requirements for substrate construction and other conditions affecting performance of the Work.

B. Examine locations of electrical connections.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install overhead coiling doors and operating equipment complete with necessary hardware, anchors, inserts, hangers, and equipment supports; according to manufacturer's written instructions and as specified.

B. Install overhead coiling doors, hoods, and operators at the mounting locations indicated for each door.

C. Accessibility: Install overhead coiling doors, switches, and controls along accessible routes in compliance with regulatory requirements for accessibility.

D. Fire-Rated Doors: Install according to NFPA 80.

E. Smoke-Control Doors: Install according to NFPA 80 and NFPA 105.

3.3 STARTUP SERVICE

A. Engage a factory-authorized service representative to perform startup service.

   1. Perform installation and startup checks according to manufacturer's written instructions.
   2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
   3. Test door closing when activated by detector or alarm-connected fire-release system. Reset door-closing mechanism after successful test.

3.4 ADJUSTING

A. Adjust hardware and moving parts to function smoothly so that doors operate easily, free of warp, twist, or distortion.

B. Lubricate bearings and sliding parts as recommended by manufacturer.

C. Adjust seals to provide weathertight fit around entire perimeter.

3.5 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain overhead coiling doors.

END OF SECTION 08331

SECTION 08334 - OVERHEAD COILING FABRIC FIRE BARRIERS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

Smoke detector-activated, overhead coiling fabric fire barrier:

1. Section 05501 “Metal Fabrications” for misc. steel supports
2. Section 08311 “Access Doors & Frames” for access doors for fire and smoke curtain
3. Section 16 Sections for 120 V and control circuit power including conduit, boxes, conductors, wiring devices and emergency power
4. Section 15 Sections for provision of smoke detectors

1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site

1.3 COORDINATION

A. Coordinate fire- and smoke-protective curtain assemblies with power, signal, fire-alarm, and smoke-detection systems specified in Division 15 and Division 16.

B. Coordinate smoke-protective curtain assemblies with ceilings for operational clearances and maintenance access requirements.

C. Coordinate smoke-protective curtain assemblies with walls for support requirements, rating continuity above ceilings, and recessed wall switches.

D. Coordinate requirements for metal supports required for fire- and smoke-protective curtain assemblies.

1.4 ACTION SUBMITTALS

A. Product Data: For each type and size of overhead coiling fabric fire barrier and accessory.

B. Shop Drawings: for each installation and special components not dimensioned or detailed in manufacturers product data.

1. Include points of attachment and their corresponding static and dynamic loads imposed on structure
2. Detail fabrication and assembly of fire-protective curtain assemblies.
3. Show locations of controls, locking devices,, detectors or replaceable fusible links, and other accessories.
4. Include diagrams for power, signal, and control wiring.

1.5 INFORMATIONAL SUBMITTALS

A. Evaluation Reports: For curtain assemblies, from ICC-ES.

B. Field quality-control reports.

C. Sample warranty.

1.6 CLOSEOUT SUBMITTALS

A. Operation and maintenance data

1.7 QUALITY ASSURANCE

A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer for both installation and maintenance of units required for this Project.

B. Fire-Door Assembly: Assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at as close to neutral pressure as possible according to NFPA 252 or UL10B

C. Smoke Control: Where indicated, provide doors that are listed and labeled with the letter “S” on the fire-rating label by a qualified testing agency for smoke-and draft-control based on testing according to UL1784; with air-leakage rate of 3.0 cfm/sq. ft of door opening at 0.10-inch wg for both ambient and elevated temperature tests

1.8 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of curtain assemblies that fail in materials or workmanship within specified warranty period.

1. Warranty Period: Two years from date of Substantial Completion.

2. Warranty shall also include installation that may be required due to repair or replacement of defective overhead coiling fabric fire barrier.

3. Extended Maintenance Agreement: Perform minimum semi-annual inspection, testing and maintenance on each smoke containment system as required by the manufacturer’s warranty, code agency evaluation reports, and as required by local authorities having jurisdiction.
   a. Backup battery: tested per manufacturer’s operation and Maintenance Manual
   b. Provide written report of inspection, testing and maintenance

PART 2 - PRODUCTS

2.1 MANUFACTURERS, GENERAL

A. Source Limitations: Obtain fire-protective barrier from single source from single manufacturer.

1. Obtain operators and controls from fire-protective curtain manufacturer.

2. Basis of Design: Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work includes, but are not limited to the following:
   a. Smoke Guard Fire and Smoke Systems
   b. Stoebick Fire Curtain
   c. Cornell Smokeshield

2.2 OVERHEAD COILING FABRIC FIRE AND SMOKE BARRIER ASSEMBLY

A. Fire-Rated Fire Barrier Assembly: Overhead fire-rated coiling fabric assembly formed with curtain of fire barrier material with egress door, side guide assembly, rewind motor, and controls

B. Operation Cycles: Door components and operators capable of operating for not less that 10,000.

C. Fire Rating: UL10D, 120 minute.

D. Fabric Fire Barrier Material: Glass filament fabrics of glass fibers material coated on one side with a polyester polyurethane latex, with steel wire reinforcement, with manufacturer's standard bottom bar.

E. Casing: Manufacturer's standard , with fixed bearing curtain tube, mounted above ceiling to secondary supports specified in Section 05501 "Metal Fabrications"

F. Side Guide Assembly: Manufacturer's standard galvanized guides of configuration suitable for application; primed for field finishing

2.3 ELECTRIC DOOR OPERATORS

A. General: Electric door operator assembly of size and capacity recommended and provided by door manufacturer for curtain and operations-cycles requirement specified, with electric motor and factory-prewired motor controls, starter, gear-reduction unit, solenoid-operated brake, clutch, control stations, control devices, and accessories required for proper operation:
   1. Comply with NFPA

B. Electric Door Operator:
   1. Electric components, devices, and accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application
   2. Safety: Listed according to UL 325 by a qualified testing agency for commercial or industrial use.
   3. Rewind motor: Tubular type, fail safe operation;120V AC
   4. Motor Exposure: Interior
   5. Control Station(s): Interior mounted; UL Standard No. 864; located as directed by Architect
   6. Control equipment complying with NEMA ICS 1, NEMA ICS2, and NEMA ICS 6, with NFPA 70 Class 2 control circuit, maximum 24-V ac or dc

2.4 CURTAIN

A. Smoke Seals: Equip each fire-rated door with replaceable smoke-seal perimeter gaskets or brushes for smoke and draft control as required for door listing and labeling by a qualified testing agency

B. Automatic-Closing Device for Fire-Rated Fabric Fire Barrier: Equip each fire-rated curtain with an automatic-closing device complying with NFPA 80 and an easily tested and reset release mechanism. Automatic-closing device shall be designed for activation by the following:
   1. Manufacturer's standard UL-labeled smoke detector and door-holder-release device
   2. Manufacturer's standard UL-labeled heat detector ad door holder-release devices
   3. Building fire-detection, smoke-detection, and alarm system.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates upon which work will be installed
   1. Verify that related work performed under other sections are complete and in accordance with Shop Drawingss
   2. Verify all wall surfaces are acceptable for installation of smoke containment system components.

B. Coordinate with responsible entity to perform corrective work on unsatisfactory substrates

C. Coordinate electrical interface and connection with Division 16

D. Coordinate interface and connection with fire alarm system

E. Commencement of work by installer is acceptance of substrate

3.2 INSTALLATION

A. Examine locations of electrical connections.

B. Install overhead coiling fabric fire barriers and operating equipment complete with necessary hardware, anchors, inserts, hangers, and equipment supports; according to manufacturer's written instructions and as specified.

C. Fire-Rated Doors: Install according to NFPA 80

D. Smoke-Control Doors: Install according to NFPA 80 and NFPA 105

E. Power-Operated Doors: Install according to UL 325

F. Install anchorage devices to securely fasten assembly to substrate and building framing without distortion or stress.

G. Securely brace components suspended from structure.

H. Fit and align assembly, including vertical guides, level and plumb, to provide smooth operation.

I. Adjust fire-protective curtain assemblies to function smoothly, as recommended by manufacturer.

J. Adjust hardware and moving parts to function smoothly so that doors operate easily, free of warp, twist, or distortion. Lubricate bearings and sliding parts as recommended by manufacturer. Adjust seals to provide tight fit around entire perimeter.

3.3 FIELD QUALITY CONTROL

A. Field Test: Follow manufacturer's cycle test procedures.
   1. Notify Owner's Representative, local Fire Marshal and alarm sub-contractor minimum one week in advance of scheduled testing
   2. Complete maintenance service record.

3.4 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain overhead coiling smoke curtains.

B. Screen Replacement Notice: Inform Owner's Representative that smoke containment screen requires replacement following exposure to temperatures exceeding 200 degrees

3.5 MAINTENANCE

A. Engage a manufacturer's authorized service representative to test, adjust, and maintain the fire-protective assemblies once per year as required by NFPA 80.

END OF SECTION 083344

SECTION 08411 - ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Exterior and interior storefront framing.
2. Storefront framing for punched openings.
3. Exterior and interior manual-swing entrance doors.
4. Sun Control Devices

B. Related Sections:
1. Section 08911 "Glazed Aluminum Curtain Walls" for curtain-wall systems that mechanically retain glazing on four sides.

1.3 DEFINITIONS

A. ADA/ABA Accessibility Guidelines: U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disability Act (ADA) and Architectural Barriers Act (ABA) Accessibility Guidelines for Buildings and Facilities."

1.4 PERFORMANCE REQUIREMENTS

A. General Performance: Aluminum-framed systems shall withstand the effects of the following performance requirements without exceeding performance criteria or failure due to defective manufacture, fabrication, installation, or other defects in construction:

1. Movements of supporting structure indicated on Drawings including, but not limited to, story drift and deflection from uniformly distributed and concentrated live loads.
2. Dimensional tolerances of building frame and other adjacent construction.
3. Failure includes the following:

a. Deflection exceeding specified limits.
b. Thermal stresses transferring to building structure.
c. Framing members transferring stresses, including those caused by thermal and structural movements to glazing.

d. Noise or vibration created by wind and by thermal and structural movements.
e. Loosening or weakening of fasteners, attachments, and other components.
f. Sealant failure.
g. Failure of operating units.

B. Delegated Design: Design aluminum-framed systems, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

C. Structural Loads:

1. Wind Loads: As indicated on Drawings..

a. Basic Wind Speed: as indicated on drawings130 mph.
b. Importance Factor: as indicated on drawings1.0.
c. Exposure Category: B

D. Deflection of Framing Members:

1. Deflection Normal to Wall Plane: Limited to edge of glass in a direction perpendicular to glass plane shall not exceed L/175 of the glass edge length for each individual glazing lite or an amount that restricts edge deflection of individual glazing lites to 3/4 inch (19 mm), whichever is less.
2. Deflection Parallel to Glazing Plane: Limited to L/360 of clear span or 1/8 inch (3.2 mm), whichever is smaller Insert deflection limit.

E. Structural-Test Performance: Provide aluminum-framed systems tested according to ASTM E 330 as follows:

1. When tested at positive and negative wind-load design pressures, systems do not evidence deflection exceeding specified limits.
2. When tested at 150 percent of positive and negative wind-load design pressures, systems, including anchorage, do not evidence material failures, structural distress, and permanent deformation of main framing members exceeding 0.2 percent of span.
3. Test Durations: As required by design wind velocity, but not fewer than 10 seconds.

F. Windborne-Debris-Impact-Resistance Performance: Provide aluminum-framed systems that pass missile-impact and cyclic-pressure tests when tested according to ASTM E 1886 and testing information in ASTM E 1996.

1. Large-Missile Impact: For aluminum-framed systems located within 30 feet (9.1 m) of grade.

G. Air Infiltration: Provide aluminum-framed systems with maximum air leakage through fixed glazing and framing areas of 0.06 cfm/sq. ft. (0.03 L/s per sq. m) of fixed wall area when tested according to ASTM E 283 at a minimum static-air-pressure difference of 1.57 lbf/sq. ft. (75 Pa).

H. Water Penetration under Static Pressure: Provide aluminum-framed systems that do not evidence water penetration through fixed glazing and framing areas when tested according to ASTM E 331 at a minimum static-air-pressure difference of 20 percent of positive wind-load design pressure, but not less than 6.24 lbf/sq. ft. (300 Pa).

I. Thermal Movements: Provide aluminum-framed systems that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change (Range): 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.
2. Test Performance: No buckling; stress on glass; sealant failure; excess stress on framing, anchors, and fasteners; or reduction of performance when tested according to AAMA 501.5.

    a. High Exterior Ambient-Air Temperature: That which produces an exterior metal-surface temperature of 180 deg F (82 deg C).
    b. Low Exterior Ambient-Air Temperature: 0 deg F (minus 18 deg C).

3. Interior Ambient-Air Temperature: 75 deg F (24 deg C).

J. Condensation Resistance: Provide aluminum-framed systems with fixed glazing and framing areas having condensation-resistance factor (CRF) of not less than 45 when tested according to AAMA 1503.

K. Thermal Conductance: Provide aluminum-framed systems with fixed glazing and framing areas having an average U-factor of not more than 0.57 Btu/sq. ft. x h x deg F (3.23 W/sq. m x K) when tested according to AAMA 1503.

L. Sound Transmission: Provide aluminum-framed systems with fixed glazing and framing areas having the following sound-transmission characteristics:

1. Sound Transmission Class (STC): Minimum 26 STC when tested for laboratory sound transmission loss according to ASTM E 90 and determined by ASTM E 413.

M. Structural Sealant: Capable of withstanding tensile and shear stresses imposed by aluminum-framed systems without failing adhesively or cohesively. When tested for preconstruction adhesion and compatibility, cohesive failure of sealant shall occur before adhesive failure.

1. Adhesive failure occurs when sealant pulls away from substrate cleanly, leaving no sealant material behind.
2. Cohesive failure occurs when sealant breaks or tears within itself but does not separate from each substrate because sealant-to-substrate bond strength exceeds sealant's internal strength.

N. Structural-Sealant Joints: Designed to produce tensile or shear stress of less than 20 psi (138 kPa).

O. Sun Control Devices:
1. Combined load on sunshade configurations to be determined in accordance with ASCE 7 or applicable code requirements. Combined load consists of wind, snow and ice loads.
2. Design sunshade configurations to withstand stresses due to combined load. Stresses resulting from thermal expansion/contraction, shall not cause permanent deformation of sunshade assemblies or disengagement from the glazed system.
3. The assembled sunshade shall be capable of supporting the specified combined load without damage, permanent deformation, or disengagement from the glazed system mullion.
4. Blade deflection shall not exceed L/120 of span length.
5. Submit test reports verifying compliance with each test requirement required by the project.
6. Shading Performance: Design of standard configurations will allow for negligible direct sunlight to show through the blades based on project location, latitude, altitude, building orientation, surrounding conditions, and aesthetic requirements, except for round, diamond and square louver styles.
7. Thermal Movement: Allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures:
a. Temperature Change (Range): 120 deg F (49 deg C), ambient; 180 deg F (82 deg C), material surfaces.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for aluminum-framed systems.

B. Shop Drawings: For aluminum-framed systems. Include plans, elevations, sections, details, and attachments to other work.

1. Include details of provisions for system expansion and contraction and for drainage of moisture in the system to the exterior.
2. For entrance doors, include hardware schedule and indicate operating hardware types, functions, quantities, and locations.

C. Samples for Initial Selection: For units with factory-applied color finishes.

D. Samples for Verification: For each type of exposed finish required, in manufacturer's standard sizes.

E. Other Action Submittals:

1. Entrance Door Hardware Schedule: Prepared by or under the supervision of supplier, detailing fabrication and assembly of entrance door hardware, as well as procedures and diagrams. Coordinate final entrance door hardware schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of entrance door hardware.

F. Delegated-Design Submittal: For aluminum-framed systems indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1. Detail fabrication and assembly of aluminum-framed systems.
2. Include design calculations.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified Installer and testing agency.

B. Welding certificates.

C. Preconstruction Test Reports: For sealant.

D. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for aluminum-framed systems, indicating compliance with performance requirements.

E. Source quality-control reports.

F. Quality-Control Program for Structural-Sealant-Glazed System: Include reports.

G. Field quality-control reports.

H. Warranties: Sample of special warranties.

1.7 CLOSEOUT SUBMITTALS

A. Maintenance Data: For aluminum-framed systems to include in maintenance manuals.

1.8 QUALITY ASSURANCE

A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of units required for this Project.

B. Manufacturer Qualifications: A manufacturer capable of fabricating exterior sunshades, and glazed aluminum curtain wall and storefront systems that meet or exceed performance requirments.

C. Testing Agency Qualifications: Qualified according to ASTM E 699 for testing indicated.

D. Engineering Responsibility: Prepare data for aluminum-framed systems, including Shop Drawings, based on testing and engineering analysis of manufacturer's standard units in systems similar to those indicated for this Project.

E. Quality-Control Program for Structural-Sealant-Glazed System: Develop quality control program specifically for Project. Document quality-control procedures and verify results for aluminum-framed systems. Comply with ASTM C 1401 recommendations including, but not limited to, system material-qualification procedures, preconstruction sealant-testing program, procedures for system fabrication and installation, and intervals of reviews and checks.

F. Product Options: Information on Drawings and in Specifications establishes requirements for systems' aesthetic effects and performance characteristics. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction. Performance characteristics are indicated by criteria subject to verification by one or more methods including preconstruction testing, field testing, and in-service performance.

1. Do not revise intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If revisions are proposed, submit comprehensive explanatory data to Architect for review.

G. Preconstruction Sealant Testing: For structural-sealant-glazed systems, perform sealant manufacturer's standard tests for compatibility with and adhesion of each material that will come in contact with sealants and each condition required by aluminum-framed systems.

1. Test a minimum five samples each of metal, glazing, and other material.
2. Prepare samples using techniques and primers required for installed systems.
3. For materials that fail tests, determine corrective measures necessary to prepare each material to ensure compatibility with and adhesion of sealants including, but not limited to, specially formulated primers. After performing these corrective measures on the minimum number of samples required for each material, retest materials.

H. Accessible Entrances: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines and ICC/ANSI A117.1.

I. Source Limitations for Aluminum-Framed Systems and Sun Control Devices: Obtain from single source from single manufacturer.

J. Structural-Sealant Glazing: Comply with ASTM C 1401, "Guide for Structural Sealant Glazing" for design and installation of structural-sealant-glazed systems.

K. Structural-Sealant Joints: Design reviewed and approved by structural-sealant manufacturer.

L. Welding Qualifications: Qualify procedures and personnel according to AWS D1.2, "Structural Welding Code - Aluminum."

M. Mock-ups: Build Mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution

1. Build mockups for type(s) of sunshade elevation with storefront system indicated, in location(s) as shown on Drawings. Mock up should be considered a true representation of actual installation.

1.9 PROJECT CONDITIONS

A. Field Measurements: Verify actual locations of structural supports for aluminum-framed systems by field measurements before fabrication and indicate measurements on Shop Drawings.

1.10 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of aluminum-framed systems that do not comply with requirements or that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

   a. Structural failures including, but not limited to, excessive deflection.
   b. Noise or vibration caused by thermal movements.
   c. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
   d. Adhesive or cohesive sealant failures.
   e. Water leakage through fixed glazing and framing areas.
   f. Failure of operating components.

2. Warranty Period: Five years from date of Substantial Completion.

B. Special Finish Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components on which finishes do not comply with requirements or that fail in materials or workmanship within specified warranty period. Warranty does not include normal weathering.

1. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Storefront System Basis-of-Design Product: Subject to compliance with requirements, provide Kawneer North America System IR 501 or comparable product by one of the following:

1. Arcadia, Inc.
2. Arch Aluminum & Glass Co., Inc.
3. CMI ArchitecturalCommercial Architectural Products, Inc.

4. EFCO Corporation.
5. Kawneer North America; an Alcoa company.
6. Leed Himmel Industries, Inc.
7. Pittco Architectural Metals, Inc.
8. TRACO.
9. Tubelite.
10. United States Aluminum.
11. Vistawall Architectural Products; The Vistawall Group; a Bluescope Steel company.
12. YKK AP America Inc.

B. Sun Control Device Basis-of-Design Product: Subject to compliance with requirements, provide Kawneer North America System Versoliel SunShade Outrigger System or comparable product by one of the following:

1. Arcadia, Inc.
2. Arch Aluminum & Glass Co., Inc.
3. CMI ArchitecturalCommercial Architectural Products, Inc.
4. EFCO Corporation.
5. Kawneer North America; an Alcoa company.
6. Leed Himmel Industries, Inc.
7. Pittco Architectural Metals, Inc.
8. TRACO.
9. Tubelite.
10. United States Aluminum.

2.2 MATERIALS

A. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.

1. Sheet and Plate: ASTM B 209 (ASTM B 209M).
2. Extruded Bars, Rods, Profiles, and Tubes: ASTM B 221 (ASTM B 221M).
3. Extruded Structural Pipe and Tubes: ASTM B 429.
4. Structural Profiles: ASTM B 308/B 308M.
5. Welding Rods and Bare Electrodes: AWS A5.10/A5.10M.

B. Steel Reinforcement: Manufacturer's standard zinc-rich, corrosion-resistant primer, complying with SSPC-PS Guide No. 12.00; applied immediately after surface preparation and pretreatment. Select surface preparation methods according to recommendations in SSPC-SP COM and prepare surfaces according to applicable SSPC standard.

1. Structural Shapes, Plates, and Bars: ASTM A 36/A 36M.
2. Cold-Rolled Sheet and Strip: ASTM A 1008/A 1008M.

3. Hot-Rolled Sheet and Strip: ASTM A 1011/A 1011M.

2.3 SUN CONTROL DEVICES MATERIAL

A. Aluminum Extrusions: Alloy and temper recommended by glazed aluminum curtain wall and storefront system manufacturer for strength, corrosion resistance, and application of required finish and not less than 0.070” wall thickness at any location for the main frame and complying with ASTM B 221: 6063-T6, 6105-T5, or 6061-T6 alloy and temper.

B. Thermal Barrier: When applied on a thermally broken captured system, sunshade shall be thermally isolated from the interior aluminum mullions by a nominal 0.25” thick low conductance material.

C. Aluminum sheet alloy: Shall meet the requirements of ASTM B209.

D. Sealant: For sealants required within fabricated sunshade system, provide permanently elastic, non-shrinking, and non-migrating type recommended by sealant manufacturer for joint size and movement.

E. Tolerances: Reference to tolerances for wall thickness and other cross-sectional dimensions of glazed curtain wall and storefront members members are nominal and in compliance with AA Aluminum Standards and Data.

2.4 FRAMING SYSTEMS

A. Framing Members: Manufacturer's standard extruded-aluminum framing members of thickness required and reinforced as required to support imposed loads.

1. Construction: Thermally broken .
2. Glazing System: Retained by structural sealant at vertical edges and mechanically with gaskets at horizontal edges.
3. Glazing Plane: As indicated by manufacturer .

B. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with nonstaining, nonferrous shims for aligning system components.

C. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding fasteners and accessories compatible with adjacent materials.

1. Use self-locking devices where fasteners are subject to loosening or turning out from thermal and structural movements, wind loads, or vibration.
2. Reinforce members as required to receive fastener threads.
3. Use exposed fasteners with countersunk Phillips screw heads, finished to match framing system.

D. Concealed Flashing: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding flashing compatible with adjacent materials.

E. Framing System Gaskets and Sealants: Manufacturer's standard, recommended by manufacturer for joint type.

2.5 GLAZING SYSTEMS

A. Glazing: As specified in Section 08800 "Glazing."

B. Glazing Gaskets: Manufacturer's standard compression types; replaceable, molded or extruded, of profile and hardness required to maintain watertight seal.

C. Spacers and Setting Blocks: Manufacturer's standard elastomeric type.

D. Bond-Breaker Tape: Manufacturer's standard TFE-fluorocarbon or polyethylene material to which sealants will not develop adhesion.

E. Glazing Sealants: For structural-sealant-glazed systems, as recommended by manufacturer for joint type, and as follows:

1. Structural Sealant: ASTM C 1184, single-component neutral-curing silicone formulation that is compatible with system components with which it comes in contact, specifically formulated and tested for use as structural sealant and approved by a structural-sealant manufacturer for use in aluminum-framed systems indicated.
   a. Color: Black.

2. Weatherseal Sealant: ASTM C 920 for Type S, Grade NS, Class 25, Uses NT, G, A, and O; single-component neutral-curing formulation that is compatible with structural sealant and other system components with which it comes in contact; recommended by structural-sealant, weatherseal-sealant, and aluminum-framed-system manufacturers for this use.
   a. Color: Matching structural sealant.

2.6 ENTRANCE DOOR SYSTEMS

A. Entrance Doors: Manufacturer's standard glazed entrance doors for manual-swing operation.

1. Door Construction: 1-3/4-inch (44.5-mm) overall thickness, with minimum 0.125-inch- (3.2-mm-) thick, extruded-aluminum tubular rail and stile members. Mechanically fasten corners with reinforcing brackets that are deeply penetrated and fillet welded or that incorporate concealed tie rods.

   a. Thermal Construction: High-performance plastic connectors separate aluminum members exposed to the exterior from members exposed to the interior.

2. Door Design: Medium stile; 3 1/2-inch nominal width.

a. Accessible Doors: Smooth surfaced for width of door in area within 10 inches (255 mm) above floor or ground plane.

3. Glazing Stops and Gaskets: Beveled, snap-on, extruded-aluminum stops and preformed gaskets.

a. Provide nonremovable glazing stops on outside of door.

2.7 ENTRANCE DOOR HARDWARE

A. General: Provide entrance door hardware and entrance door hardware sets indicated in door and frame schedule for each entrance door to comply with requirements in this Section.

1. Entrance Door Hardware Sets: Provide quantity, item, size, finish or color indicated, and named manufacturers' products .
2. Sequence of Operation: Provide electrified door hardware function, sequence of operation, and interface with other building control systems indicated.
3. Opening-Force Requirements:

a. Egress Doors: Not more than 15 lbf (67 N) to release the latch and not more than 30 lbf (133 N)to set the door in motion and not more than 15 lbf (67 N) to open the door to its minimum required width.
b. Accessible Interior Doors: Not more than 5 lbf (22.2 N) to fully open door.

B. Designations: Requirements for design, grade, function, finish, size, and other distinctive qualities of each type of entrance door hardware are indicated in "Entrance Door Hardware Sets" Article. Products are identified by using entrance door hardware designations as follows:

C. Opening-Force Requirements:
1. Latches and Exit Devices: Not more than 15 lbf (67 N) required to release latch.

D. Pivot Hinges: BHMA A156.4, Grade 1.

1. Offset-Pivot Hinges: Provide top, bottom, and intermediate offset pivots at each door leaf.

E. Butt Hinges: BHMA A156.1, Grade 1, radius corner.

1. Nonremovable Pins: Provide set screw in hinge barrel that, when tightened into a groove in hinge pin, prevents removal of pin while entrance door is closed.
2. Exterior Hinges: Stainless steel, with stainless-steel pin.
3. Quantities:

a. For doors up to 87 inches (2210 mm) high, provide 3 hinges per leaf.
b. For doors more than 87 and up to 120 inches (2210 and up to 3048 mm) high, provide 4 hinges per leaf.

F. Mortise Auxiliary Locks: BHMA A156.5, Grade 1.

G. Panic Exit Devices: BHMA A156.3, Grade 1, listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for panic protection, based on testing according to UL 305.

H. Cylinders: As specified in Section 08710 "Door Hardware."

1. Keying: Master key system. Permanently inscribe each key with a visual key control number and include notation "DO NOT DUPLICATE".

I. Strikes: Provide strike with black-plastic dust box for each latch or lock bolt; fabricated for aluminum framing.

J. Operating Trim: BHMA A156.6.

K. Removable Mullions: BHMA A156.3, extruded aluminum.

1. When used with panic exit devices, provide removable mullions listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for panic protection, based on testing according to UL 305. Use only mullions that have been tested with exit devices to be used.

L. Closers: BHMA A156.4, Grade 1, with accessories required for a complete installation, sized as required by door size, exposure to weather, and anticipated frequency of use; adjustable to meet field conditions and requirements for opening force.

M. Concealed Overhead Holders: BHMA A156.8, Grade 1.

N. Door Stops: BHMA A156.16, Grade 1, floor or wall mounted, as appropriate for door location indicated, with integral rubber bumper.

O. Weather Stripping: Manufacturer's standard replaceable components.

1. Compression Type: Made of ASTM D 2000, molded neoprene, or ASTM D 2287, molded PVC.
2. Sliding Type: AAMA 701, made of wool, polypropylene, or nylon woven pile with nylon-fabric or aluminum-strip backing.

P. Weather Sweeps: Manufacturer's standard exterior-door bottom sweep with concealed fasteners on mounting strip.

Q. Silencers: BHMA A156.16, Grade 1.

R. Thresholds: BHMA A156.21, raised thresholds beveled with a slope of not more than 1:2, with maximum height of 1/2 inch (13 mm).

S. Finger Guards: Manufacturer's standard collapsible neoprene or PVC gasket anchored to frame hinge-jamb at center-pivoted doors.

2.8 SUNSHADES

A. Sun Shade Members: Manufacturer's standard extruded or formed-aluminum framing members of thickness required and reinforced as required to support imposed loads.

B. Fasteners and accessories: Nonmagnetic stainless steel to be non-corrosive and compatible with aluminum members, anchors, and other components

C. Perimeter anchors: When steel anchors are used, provide insulation between steel material and aluminum material to prevent galvanic action

2.9 ACCESSORY MATERIALS

A. Joint Sealants: For installation at perimeter of aluminum-framed systems, as specified in Section 07920 "Joint Sealants."

B. Bituminous Paint for Sunshade: Cold-applied asphalt-mastic paint complying with SSPC-Paint 12 requirements except containing no asbestos, formulated for 30-mil thickness per coat.

2.10 FABRICATION

A. Form or extrude aluminum shapes before finishing.

B. Weld in concealed locations to greatest extent possible to minimize distortion or discoloration of finish. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.

C. Framing Members, General: Fabricate components that, when assembled, have the following characteristics:

1. Profiles that are sharp, straight, and free of defects or deformations.
2. Accurately fitted joints with ends coped or mitered.
3. Means to drain water passing joints, condensation within framing members, and moisture migrating within the system to exterior.
4. Physical and thermal isolation of glazing from framing members.
5. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.
6. Provisions for field replacement of glazing from exterior.
7. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.

D. Mechanically Glazed Framing Members: Fabricate for flush glazing without projecting stops.

E. Structural-Sealant-Glazed Framing Members: Include accommodations for using temporary support device to retain glazing in place while structural sealant cures.

F. Entrance Door Frames: Reinforce as required to support loads imposed by door operation and for installing entrance door hardware.

1. At exterior doors, provide compression weather stripping at fixed stops.
2. At interior doors, provide silencers at stops to prevent metal-to-metal contact. Install three silencers on strike jamb of single-door frames and two silencers on head of frames for pairs of doors.

G. Entrance Doors: Reinforce doors as required for installing entrance door hardware.

1. At pairs of exterior doors, provide sliding-type weather stripping retained in adjustable strip and mortised into door edge.
2. At exterior doors, provide weather sweeps applied to door bottoms.

H. Entrance Door Hardware Installation: Factory install entrance door hardware to the greatest extent possible. Cut, drill, and tap for factory-installed entrance door hardware before applying finishes.

I. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.

2.11 ALUMINUM FINISHES

A. Clear Anodic Finish: AAMA 611, AA-M12C22A41, Class I, 0.018 mm or thicker.

2.12 SOURCE QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to evaluate structural-sealant-glazed systems.

B. Structural-Sealant-Glazed Systems: Perform quality-control procedures complying with ASTM C 1401 recommendations, including, but not limited to, system material-qualification procedures, sealant testing, and system fabrication reviews and checks.

C. Structural-sealant-glazed system will be considered defective if it does not pass tests and inspections.

D. Prepare test and inspection reports.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. General:

1. Comply with manufacturer's written instructions.
2. Do not install damaged components.
3. Fit joints to produce hairline joints free of burrs and distortion.
4. Rigidly secure nonmovement joints.
5. Install anchors with separators and isolators to prevent metal corrosion and electrolytic deterioration.
6. Seal joints watertight unless otherwise indicated.

B. Metal Protection:

1. Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or applying sealant or tape, or by installing nonconductive spacers as recommended by manufacturer for this purpose.
2. Where aluminum will contact concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.

C. Install components to drain water passing joints, condensation occurring within framing members, and moisture migrating within the system to exterior.

D. Set continuous sill members and flashing in full sealant bed as specified in Section 07920 "Joint Sealants" to produce weathertight installation.

E. Install components plumb and true in alignment with established lines and grades, and without warp or rack.

F. Install glazing as specified in Section 08800 "Glazing."

1. Structural-Sealant Glazing:

a. Prepare surfaces that will contact structural sealant according to sealant manufacturer's written instructions to ensure compatibility and adhesion. Preparation includes, but is not limited to, cleaning and priming surfaces.
b. Install weatherseal sealant according to Section 07920 "Joint Sealants" and according to sealant manufacturer's written instructions to produce

weatherproof joints. Install joint filler behind sealant as recommended by sealant manufacturer.

G. Entrance Doors: Install doors to produce smooth operation and tight fit at contact points.

1. Exterior Doors: Install to produce weathertight enclosure and tight fit at weather stripping.
2. Field-Installed Entrance Door Hardware: Install surface-mounted entrance door hardware according to entrance door hardware manufacturers' written instructions using concealed fasteners to greatest extent possible.

H. Install perimeter joint sealants as specified in Section 07920 "Joint Sealants" to produce weathertight installation.

3.3 ERECTION TOLERANCES

A. Install aluminum-framed systems to comply with the following maximum erection tolerances:

1. Location and Plane: Limit variation from true location and plane to 1/8 inch in 12 feet (3 mm in 3.7 m); 1/4 inch (6 mm) over total length.
2. Alignment:

a. Where surfaces abut in line, limit offset from true alignment to 1/16 inch (1.5 mm).
b. Where surfaces meet at corners, limit offset from true alignment to 1/32 inch (0.8 mm).

B. Diagonal Measurements: Limit difference between diagonal measurements to 1/8 inch (3 mm).

3.4 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified independent testing and inspecting agency to perform field tests and inspections.

B. Testing Services: Testing and inspecting of representative areas to determine compliance of installed systems with specified requirements shall take place as follows and in successive phases as indicated on Drawings. Do not proceed with installation of the next area until test results for previously completed areas show compliance with requirements.

1. Structural-Sealant Compatibility and Adhesion: Structural sealant shall be tested according to recommendations in ASTM C 1401.

a. Destructive Test Method A, "Hand Pull Tab (Destructive)," in ASTM C 1401, Appendix X2, shall be used.

1) A minimum of six areas on each building face shall be tested.
2) Repair installation areas damaged by testing.

2. Structural-Sealant Glazing Inspection: After installation of aluminum-framed systems is complete, structural-sealant glazing shall be inspected and evaluated according to recommendations in ASTM C 1401.
3. Air Infiltration: Areas shall be tested for air leakage of 1.5 times the rate specified for laboratory testing under "Performance Requirements" Article, but not more than 0.09 cfm/sq. ft. (0.03 L/s per sq. m), of fixed wall area when tested according to ASTM E 783 at a minimum static-air-pressure difference of 1.57 lbf/sq. ft. (75 Pa) .
4. Water Penetration: Areas shall be tested according to ASTM E 1105 at a minimum uniform static-air-pressure difference of 0.67 times the static-air-pressure difference specified for laboratory testing under "Performance Requirements" Article, but not less than 4.18 lbf/sq. ft. (200 Pa), and shall not evidence water penetration.
5. Water Spray Test: Before installation of interior finishes has begun, a minimum area of 75 feet (23 m) by 1 story of aluminum-framed systems designated by Architect shall be tested according to AAMA 501.2 and shall not evidence water penetration.

C. Repair or remove work if test results and inspections indicate that it does not comply with specified requirements.

D. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

E. Aluminum-framed assemblies will be considered defective if they do not pass tests and inspections.

F. Prepare test and inspection reports.

3.5 ADJUSTING

A. Adjust operating entrance door hardware to function smoothly as recommended by manufacturer.

1. For entrance doors accessible to people with disabilities, adjust closers to provide a 3-second closer sweep period for doors to move from a 70-degree open position to 3 inches (75 mm) from the latch, measured to the leading door edge.

END OF SECTION 08411

SECTION 08520 - ALUMINUM WINDOWS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes aluminum windows for exterior locations.

B. Related Requirements:

1. Section 08411 "Aluminum-Framed Entrances and Storefronts" for coordinating finish among aluminum fenestration units.

2. Section 07920 “Joint Sealants” for watertight installation of Units

3. Section 08800 “ Glazing” for glazing requirements

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site

1. Review, discuss and coordinate the interrelationship of aluminum windows with other exterior wall components. Include provisions for anchorage, flashing, sealing perimeters and protecting finishes.

2. Review and discuss the sequence of work required to construct a watertight and weathertight exterior building envelope.

3. Inspect and discuss the condition of substrate and other preparatory work performed by other trades.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, glazing and fabrication methods, dimensions of individual components and profiles, hardware, and finishes for aluminum windows.

B. Shop Drawings: Include plans, elevations, sections, hardware, accessories, insect screens, operational clearances, and details of installation, including anchor, flashing, and sealant installation.

C. Samples: For each exposed product and for each color specified, 2 by 4 inches in size.

D. Samples for Verification: For aluminum windows and components required, showing full range of color variations for finishes, and prepared on Samples of size indicated below:

1. Exposed Finishes: 2 by 4 inches

2. Exposed Hardware: Full-size units.

E. Product Schedule: For aluminum windows. Use same designations indicated on Drawings.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For manufacturer and Installer.

B. Product Test Reports: For each type of aluminum window, for tests performed by a qualified testing agency.

C. Field quality-control reports.

D. Sample Warranties: For manufacturer's warranties.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: A manufacturer capable of fabricating aluminum windows that meet or exceed performance requirements indicated and of documenting this performance by test reports, and calculations.

B. Installer Qualifications: An installer acceptable to aluminum window manufacturer for installation of units required for this Project.

C. Mockups: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Build mockup of typical wall area as shown on Drawings.
2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.

1.7 WARRANTY

A. Manufacturer's Warranty: Manufacturer agrees to repair or replace aluminum windows that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Failure to meet performance requirements.
b. Structural failures including excessive deflection, water leakage, condensation, and air infiltration.
c. Faulty operation of movable sash and hardware.
d. Deterioration of materials and finishes beyond normal weathering.
e. Failure of insulating glass.

2. Warranty Period:

a. Window: 5 years from date of Substantial Completion.
b. Glazing Units: Five years from date of Substantial Completion.
c. Aluminum Finish: **10** years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis-of-Design Product - Fixed and Horizontal SlidingWindow: Subject to compliance with requirements, provide Kawneer North America Window Isolock 8225TL/8430 or comparable product by one of the following:

1. All Seasons Window & Door Mfg., Inc.; All Seasons Commercial Division, Inc.
2. Boyd Aluminum Manufacturing.
3. Custom Window Company.
4. DeSCo Architectural IncEFCO Corporation; a Pella company.
5. EXTECH Exterior Technologies, Inc.
6. Fleetwood Windows & Doors.
7. Gerkin Windows and Doors.
8. Graham Architectural Products Corp.
9. Mannix Exterior Wall Systems, Inc.
10. Peerless Products Inc.
11. Quaker Windows Products Co.Thermal Windows, IncTRACO.
12. Wausau Window and Wall Systems.
13. Winco.
14. YKK AP America Inc.

B. Casement and Projected Window – Basis of Design Product: Subject to compliance with requirements, provide Kawneer North America Window Isolock 8225TLor comparable product by one of the following:

1. All Seasons Window & Door Mfg., Inc.; All Seasons Commercial Division, Inc.
2. Boyd Aluminum Manufacturing.
3. Custom Window Company.
4. DeSCo Architectural Inc.EFCO Corporation; a Pella company.
5. EXTECH Exterior Technologies, Inc.
6. Fleetwood Windows & Doors.
7. Gerkin Windows and Doors.
8. Graham Architectural Products Corp.
9. Mannix Exterior Wall Systems, Inc.
10. Peerless Products Inc.
11. Quaker Windows Products Co.Thermal Windows, Inc.
12. TRACO.
13. Wausau Window and Wall Systems.
14. Winco.
15. YKK AP America Inc.

C. Source Limitations: Obtain aluminum windows from single source from single manufacturer.

2.2 WINDOW PERFORMANCE REQUIREMENTS

A. Product Standard: Comply with AAMA/WDMA/CSA 101/I.S.2/A440 for definitions and minimum standards of performance, materials, components, accessories, and fabrication unless more stringent requirements are indicated.

1. Window Certification: AMMA certified with label attached to each window.

B. Performance Class and Grade: AAMA/WDMA/CSA 101/I.S.2/A440-05 as follows:

1. Minimum Performance Class: HC (Heavy Commercial)AAMA/WDMA/CSA 101/I.S.2/A440 establishes a gateway Performance Grade for windows to qualify for each Performance Class. The gateway Performance Grade is 15 for Class R, 25 for Class LC, 30 for Class CW, and 40 for Class HC. For a particular project, the minimum Performance Grade for windows is typically based on the design pressure.
2. Minimum Performance Grade: 70

C. Thermal Transmittance: NFRC 100 maximum whole-window U-factor of.70 Btu/hr/sf/deg F

D. Solar Heat-Gain Coefficient (SHGC): NFRC 200 maximum whole-window SHGC of **0.30**

E. Condensation-Resistance Factor (CRF): Provide aluminum windows tested for thermal performance according to AAMA 1503, showing a CRF not less than 49.

F. Thermal Movements: Provide aluminum windows, including anchorage, that allow for thermal movements resulting from the following maximum change (range) in ambient

and surface temperatures by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

G. Sound Transmission Class (STC): Rated for not less than 34 STC when tested for laboratory sound transmission loss according to ASTM E 90 and determined by ASTM E 413.

H. Windborne-Debris Resistance: Capable of resisting impact from windborne debris based on testing glazed windows identical to those specified, according to ASTM D 1886 and testing information in ASTM D 1996 Miami Dade County, and requirements of authorities having jurisdiction. Provide aluminum windows which have been manufactured, fabricated and installed to withstand required uniform loads and maintain (manufacturer's performance criteria) without defects, damage , or failure

I. Forced Entry Resistance: Windows shall conform to ASTM F588, Performance Level 10, or AAMA 1302.5

2.3 ALUMINUM WINDOWS

A. Operating Types: Provide the following operating types in locations indicated on Drawings:

1. Casement: Project **out**Awning: Project out.

2. Horizontal sliding.
3. Horizontal slidingFixed.

B. Frames and Sashes: Aluminum extrusions complying with AAMA/WDMA/CSA 101/I.S.2/A440.

1. Material Standard: ASTM B221, G.S. 10A-T5; 6063-T5 alloy and temper

2. Frame Depth: Not less than 4" (101.6 mm)

3. Member Wall Thickness:
   a. Master Frame member: wall thickness not less than .070"
   b. Sash Member: wall thickness not less than .070". Horizontal sash members shall be tubular construction.
   c. Meeting rail shall have continuous interlock with double weather stripping

4. Dimensions: Reference to dimensions for wall thickness and other cross-sectional dimensions of window members are nominal and in compliance with ANSI H35.2-1990

5. Mullions and Cover Plates: Extruded aluminum of 6063-T5 alloy and temper of profile and dimensions indicated on drawings. Mullions shall provide shall provide structural properties to resist wind pressure required by performance criteria and standards.

6. Thermal Barrier:
   a. Frame thermal barrier and seal shall be installed per the manufacturer's written instructions
   b. Sash thermal barrier and seal shall be installed per manufacturer's written instructions

C. Insulating-Glass Units: ASTM E 774**,** certified through IGCC as complying with requirements of IGCC. Glass thickness and type shall be in accordance with manufacturer's recommendations for prescribed design pressure. Factory glazing shall be in accordance with manufacturer's standard requirements.

1. Glass: ASTM C 1036, Type 1, Class 1, q3.

   a. Tint: Gray
   b. Kind: Fully tempered where indicated on Drawings and at Hazardous locations: ASTM C1048

2. Lites: Single
3. Filling: Fill space between glass lites with air
4. Low-E Coating: magnetic sputtered vacuum deposition process
5. Manufacturer's Standards: Glazing Method shall be a wet/dry type glazed in accordance with manufacturer's standards. Exterior glazing shall be pre-shimmed glazing tape. Interior glazing shall be snap-in type 0.062" glazing beads and a compression gasket of dense elastomer in accordance with ASTM C864

D. Hardware, General: Provide manufacturer's standard hardware fabricated from aluminum, stainless steel, carbon steel complying with AAMA 907, or other corrosion-resistant material compatible with adjacent materials; designed to smoothly operate, tightly close, and securely lock windows, and sized to accommodate sash weight and dimensions.

1. Exposed Hardware Color and Finish: As selected by Architect from manufacturer's full range .

E. Projected Window Hardware:

1. Gear-Type Rotary Operators: Complying with AAMA 901 when tested according to ASTM E 405, Method A. Provide operators that function without requiring the removal of interior screens or using screen wickets.

   a. Type and Style: As selected by Architect from manufacturer's full range of types and styles

2. Hinges: [Non-friction type, not less than two per sash]
3. Lock: [**Lift-type throw, cam-action lock with keeper**] [**Lever handle and cam-action lock with keeper**] [**Dual lever handles, tie rod, and cam-action lock with keepers**] [**Key-operated custodial lock with keeper and removable handle**] [**Concealed multipoint lock operated by single lever handle or lift-type throw**] <**Insert requirements**>.

F. Horizontal-Sliding Window Hardware:

1. Sill Cap/Track: Extruded-aluminum track with natural anodized finish, or Manufacturer's standard of dimensions and profile indicated; designed to comply with performance requirements indicated and to drain to the exterior.
2. Locks and Latches: Allow unobstructed movement of the sash across adjacent sash in direction indicated and operated from the inside only. Provide custodial locks.
3. Roller Assemblies: Low-friction design.
4.

G. Weather Stripping: Provide full-perimeter weather stripping for each operable sash unless otherwise indicated.

H. Fasteners: Noncorrosive and compatible with window members, trim, hardware, anchors, and other components.

1. Exposed Fasteners: Do not use exposed fasteners to the greatest extent possible. For application of hardware, use fasteners that match finish hardware being fastened.

2.4 ACCESSORIES

A. Integral Ventilating System/Device: Where indicated, provide weather-stripped, adjustable, horizontal fresh-air vent, with a free airflow slot, full width of window sash as recommended by the manufacturer when open, complying with AAMA/WDMA/CSA 101/I.S.2/A440. Equip vent bar with an integral insect screen, removable for cleaning.

B. Subsills: Thermally broken extruded-aluminum subsills in configurations indicated on Drawings.

C. Column Covers: Extruded-aluminum profiles in sizes and configurations indicated on Drawings.

D. Interior Trim: Extruded-aluminum profiles in sizes and configurations indicated on Drawings.

E. Panning Trim: Extruded-aluminum profiles in sizes and configurations indicated on Drawings.

F. Receptor System: Two-piece, snap-together, thermally broken, extruded-aluminum receptor system that anchors windows in place.

2.5 INSECT SCREENS

A. General: Fabricate insect screens to integrate with window frame. Provide screen for each operable exterior sash. Screen wickets are not permitted.

1. Type and Location: [**Full, inside for project-out**] [**Full, outside for project-in**] [**Full, outside for double-hung**] [Half, outside for single-hung] [**Full, outside for sliding**] [**Half, outside for sliding**] sashes.

B. Aluminum Frames: Manufacturer's standard aluminum alloy complying with SMA 1004 or SMA 1201. Fabricate frames with mitered or coped joints or corner extrusions, concealed fasteners, and removable PVC spline/anchor concealing edge of frame.

1. Tubular Framing Sections and Cross Braces: Roll formed from aluminum sheet.

C. Glass-Fiber Mesh Fabric: [**18-by-14 (1.1-by-1.4-mm) or 18-by-16 (1.0-by-1.1-mm)**] [**20-by-20 (0.85-by-0.85-mm) or 20-by-30 (0.85-by-0.42-mm)**] <**Insert type**> mesh of PVC-coated, glass-fiber threads; woven and fused to form a fabric mesh resistant to corrosion, shrinkage, stretch, impact damage, and weather deterioration. Comply with ASTM D 3656.

1. Mesh Color: [Manufacturer's standard] <**Insert color**>.

D. Aluminum Wire Fabric: 18-by-16 (1.1-by-1.3-mm) mesh of 0.011-inch- (0.28-mm-) diameter, coated aluminum wire.

1. Wire-Fabric Finish: [Natural bright] [**Charcoal gray**] [**Black**] <**Insert finish**>.

2.6 FABRICATION

A. Fabricate aluminum windows in sizes indicated. Include a complete system for assembling components and anchoring windows.

B. Glaze aluminum windows in the factory.

C. Weather strip each operable sash to provide weathertight installation.

D. Weep Holes: Provide weep holes and internal passages to conduct infiltrating water to exterior.

E. Provide water-shed members above side-hinged sashes and similar lines of natural water penetration.

F. Mullions: Provide mullions and cover plates, matching window units, complete with anchors for support to structure and installation of window units. Allow for erection tolerances and provide for movement of window units due to thermal expansion and building deflections, as indicated. Provide mullions and cover plates capable of withstanding design wind loads of window units.

G. Complete fabrication, assembly, finishing, hardware application, and other work in the factory to greatest extent possible. Disassemble components only as necessary for shipment and installation.

2.7 GENERAL FINISH REQUIREMENTS

A. Comply with NAAMM's "Metal Finishes Manual" for recommendations for applying and designating finishes.

B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

C. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.8 ALUMINUM FINISHES

A. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.

B.

C. Class I, Clear Anodic Finish: AA-M12C22A41 (Mechanical Finish: nonspecular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class I, clear coating 0.018 mm or thicker) complying with AAMA 611.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine openings, substrates, structural support, anchorage, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Verify rough opening dimensions, levelness of sill plate, and operational clearances.

C. Examine wall flashings, vapor retarders, water and weather barriers, and other built-in components to ensure weathertight window installation.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Comply with manufacturer's written instructions for installing windows, hardware, accessories, and other components. For installation procedures and requirements not addressed in manufacturer's written instructions, comply with installation requirements in ASTM E 2112.

B. Install windows level, plumb, square, true to line, without distortion or impeding thermal movement, anchored securely in place to structural support, and in proper relation to wall flashing and other adjacent construction to produce weathertight construction.

C. Install windows and components to drain condensation, water penetrating joints, and moisture migrating within windows to the exterior.

D. Separate aluminum and other corrodible surfaces from sources of corrosion or electrolytic action at points of contact with other materials.

E. Set continuous sill members & flashing in full sealant bed as specified in Section 07920 “Joint Sealants” to produce watertight installation.

F. Where aluminum will contact concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.

3.3 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

1. Testing and inspecting agency will interpret tests and state in each report whether tested work complies with or deviates from requirements.

B. Testing Services: Testing and inspecting of installed windows shall take place as follows:

1. Testing Methodology: Testing of windows for air infiltration and water resistance shall be performed according to AAMA 502, including reference to ASTM E 783 for Air Infiltration Test and ASTM E 1105 Water Infiltration Test.
2. Air-Infiltration Testing:

a. Test Pressure: That required to determine compliance with AAMA/WDMA/CSA 101/I.S.2/A440 performance class indicated.

b. Allowable Air-Leakage Rate: 1.5 times the applicable AAMA/WDMA/CSA 101/I.S.2/A440 rate for product type and performance class rounded down to one decimal place or 01.5 cfm per foot of crack length, which ever is greater

3. Water-Resistance Testing:

a. Test Pressure: Two-thirds times test pressure required to determine compliance with AAMA/WDMA/CSA 101/I.S.2/A440 performance grade indicated but not less than 6.24 psf
b. Allowable Water Infiltration: No water penetration.

4. Testing Extent: Three windows of each type as selected by Architect and a qualified independent testing and inspecting agency. Windows shall be tested after perimeter sealants have cured.
5. Test Reports: Prepared according to AAMA 502.

C. Remove and replace noncomplying windows and retest as specified above.

D. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

E. Prepare test and inspection reports.

3.4 ADJUSTING, CLEANING, AND PROTECTION

A. Adjust operating sashes and hardware for a tight fit at contact points and weather stripping for smooth operation and weathertight closure.

B. Clean exposed surfaces immediately after installing windows. Avoid damaging protective coatings and finishes. Remove excess sealants, glazing materials, dirt, and other substances.

1. Keep protective films and coverings in place until final cleaning.

C. Clean installed products in accordance with manufacturer’s instructions prior to owner’s acceptance.

D. Remove and replace glass that has been broken, chipped, cracked, abraded, or damaged during construction period.

E. Protect window surfaces from contact with contaminating substances resulting from construction operations. If contaminating substances do contact window surfaces, remove contaminants immediately according to manufacturer's written instructions. Remove and replace damaged aluminum windows at no extra cost.

END OF SECTION 08520

SECTION 08710 – DOOR HARDWARE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes commercial door hardware for the following:

1. Swinging doors.
2. Sliding doors.
3. Other doors to the extent indicated.

B. Door hardware includes, but is not necessarily limited to, the following:

1. Mechanical door hardware.
2. Electromechanical door hardware.
3. Cylinders specified for doors in other sections.

C. Related Sections:

1. Division 08 Section “Door Hardware Schedule”.
2. Division 08 Section “Hollow Metal Doors and Frames”.
3. Division 08 Section “Flush Wood Doors”.
4. Division 08 Section “Aluminum-Framed Entrances and Storefronts”.
5. Division 08 Section “Access Control Hardware”.

D. Codes and References: Comply with the version year adopted by the Authority Having Jurisdiction.

1. ANSI A117.1 - Accessible and Usable Buildings and Facilities.
2. ANSI/SDI A250.13 - Testing and Rating of Severe Windstorm Resistant Components for Swing Door Assemblies.
3. ICC/IBC - International Building Code.
4. NFPA 70 - National Electrical Code.
5. NFPA 80 - Fire Doors and Windows.
6. NFPA 101 - Life Safety Code.
7. NFPA 105 - Installation of Smoke Door Assemblies.
8. State Building Codes, Local Amendments.

E. Standards: All hardware specified herein shall comply with the following industry standards:

1. ANSI/BHMA Certified Product Standards - A156 Series
2. UL10C – Positive Pressure Fire Tests of Door Assemblies

1.3 SUBMITTALS

A. Product Data: Manufacturer's product data sheets including installation details, material descriptions, dimensions of individual components and profiles, operational descriptions and finishes.

B. Door Hardware Schedule: Prepared by or under the supervision of supplier, detailing fabrication and assembly of door hardware, as well as procedures and diagrams. Coordinate the final Door Hardware Schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.

1. Format: Comply with scheduling sequence and vertical format in DHI's "Sequence and Format for the Hardware Schedule."

2. Organization: Organize the Door Hardware Schedule into door hardware sets indicating complete designations of every item required for each door or opening. Organize door hardware sets in same order as in the Door Hardware Sets at the end of Part 3. Submittals that do not follow the same format and order as the Door Hardware Sets will be rejected and subject to resubmission.

3. Content: Include the following information:

    a. Type, style, function, size, label, hand, and finish of each door hardware item.
    b. Manufacturer of each item.
    c. Fastenings and other pertinent information.
    d. Location of door hardware set, cross-referenced to Drawings, both on floor plans and in door and frame schedule.
    e. Explanation of abbreviations, symbols, and codes contained in schedule.
    f. Mounting locations for door hardware.
    g. Door and frame sizes and materials.
    h. Warranty information for each product.

4. Submittal Sequence: Submit the final Door Hardware Schedule at earliest possible date, particularly where approval of the Door Hardware Schedule must precede fabrication of other work that is critical in the Project construction schedule. Include Product Data, Samples, Shop Drawings of other work affected by door hardware, and other information essential to the coordinated review of the Door Hardware Schedule.

C. Shop Drawings: Details of electrified access control hardware indicating the following:

1. Wiring Diagrams: Upon receipt of approved schedules, submit detailed system wiring diagrams for power, signaling, monitoring, communication, and control of the access

control system electrified hardware. Differentiate between manufacturer-installed and field-installed wiring. Include the following:

a. Elevation diagram of each unique access controlled opening showing location and interconnection of major system components with respect to their placement in the respective door openings.
b. Complete (risers, point-to-point) access control system block wiring diagrams.
c. Wiring instructions for each electronic component scheduled herein.

2. Electrical Coordination: Coordinate with related sections the voltages and wiring details required at electrically controlled and operated hardware openings.

D. Keying Schedule: After a keying meeting with the owner has taken place prepare a separate keying schedule detailing final instructions. Submit the keying schedule in electronic format. Include keying system explanation, door numbers, key set symbols, hardware set numbers and special instructions. Owner must approve submitted keying schedule prior to the ordering of permanent cylinders/cores.

E. Informational Submittals:

1. Hurricane Resistant Openings: Exterior hurricane opening assemblies to be tested according to ASTM E330, ASTM E1886, ASTM E1996 standards, and certified by a qualified independent third party testing agency acceptable to authority having jurisdiction, with labeling indicating compliance with the wind load and design pressure level requirements specified for the Project.

2. Product Test Reports: Indicating compliance with cycle testing requirements, based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified independent testing agency.

F. Operating and Maintenance Manuals: Provide manufacturers operating and maintenance manuals for each item comprising the complete door hardware installation in quantity as required in Division 01, Closeout Submittals.

1.4 QUALITY ASSURANCE

A. Hardware Supplier and Hardware Installer must obtain a license with the Louisiana Office of State Fire Marshall in accordance to RS 40:1464 and RS 40:1664.

B. Manufacturers Qualifications: Engage qualified manufacturers with a minimum 5 years of documented experience in producing hardware and equipment similar to that indicated for this Project and that have a proven record of successful in-service performance.

C. Installer Qualifications: A minimum 3 years documented experience installing both standard and electrified door hardware similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.

D. Door Hardware Supplier Qualifications: Experienced commercial door hardware distributors with a minimum 5 years documented experience supplying both mechanical and electromechanical hardware installations comparable in material, design, and extent to that indicated for this Project. Supplier recognized as a factory direct distributor by the manufacturers of the primary materials with a warehousing facility in Project's vicinity.

E. Source Limitations: Obtain each type and variety of door hardware specified in this section from a single source unless otherwise indicated.

1. Electrified modifications or enhancements made to a source manufacturer's product line by a secondary or third party source will not be accepted.

2. Provide electromechanical door hardware from the same manufacturer as mechanical door hardware, unless otherwise indicated.

F. Hurricane Resistant Exterior Openings: Provide exterior door hardware as complete and tested assemblies, or component assemblies, including approved doors and frames specified under Section 081113 "Hollow Metal Doors and Frames", to meet the wind loads, design pressures, debris impact resistance, and glass and glazing requirements applicable to the Project.

1. Test units according to ASTM E330, ASTM E1886, ASTM E1996 standards, certified by a qualified independent third party testing agency acceptable to authority having jurisdiction, and bearing a third party certification agency permanent label indicting windstorm approved product.

G. Each unit to bear third party permanent label demonstrating compliance with the referenced standards.

H. Keying Conference: Conduct conference to comply with requirements in Division 01 Section "Project Meetings." Keying conference to incorporate the following criteria into the final keying schedule document:

1. Function of building, purpose of each area and degree of security required.
2. Plans for existing and future key system expansion.
3. Requirements for key control storage and software.
4. Installation of permanent keys, cylinder cores and software.
5. Address and requirements for delivery of keys.

I. Pre-Submittal Conference: Conduct coordination conference in compliance with requirements in Division 01 Section "Project Meetings" with attendance by representatives of Supplier(s), Installer(s), and Contractor(s) to review proper methods and the procedures for receiving, handling, and installing door hardware.

1. Prior to installation of door hardware, conduct a project specific training meeting to instruct the installing contractors' personnel on the proper installation and adjustment of their respective products. Product training to be attended by installers of door hardware (including electromechanical hardware) for aluminum, hollow metal and wood doors. Training will include the use of installation manuals, hardware schedules, templates and physical product samples as required.

2. Inspect and discuss electrical roughing-in, power supply connections, and other preparatory work performed by other trades.
3. Review sequence of operation narratives for each unique access controlled opening.
4. Review and finalize construction schedule and verify availability of materials.
5. Review the required inspecting, testing, commissioning, and demonstration procedures

J. At completion of installation, provide written documentation that components were applied to manufacturer's instructions and recommendations and according to approved schedule.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Inventory door hardware on receipt and provide secure lock-up and shelving for door hardware delivered to Project site. Do not store electronic access control hardware, software or accessories at Project site without prior authorization.

B. Tag each item or package separately with identification related to the final Door Hardware Schedule, and include basic installation instructions with each item or package.

C. Deliver, as applicable, permanent keys, cylinders, cores, access control credentials, software and related accessories directly to Owner via registered mail or overnight package service. Instructions for delivery to the Owner shall be established at the "Keying Conference".

1.6 COORDINATION

A. Templates: Obtain and distribute to the parties involved templates for doors, frames, and other work specified to be factory prepared for installing standard and electrified hardware. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing hardware to comply with indicated requirements.

B. Door Hardware and Electrical Connections: Coordinate the layout and installation of scheduled electrified door hardware and related access control equipment with required connections to source power junction boxes, low voltage power supplies, detection and monitoring hardware, and fire and detection alarm systems.

C. Door and Frame Preparation: Doors and corresponding frames are to be prepared, reinforced and pre-wired (if applicable) to receive the installation of the specified electrified, monitoring, signaling and access control system hardware without additional in-field modifications.

1.7 WARRANTY

A. General Warranty: Reference Division 01, General Requirements. Special warranties specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.

B. Warranty Period: Written warranty, executed by manufacturer(s), agreeing to repair or replace components of standard and electrified door hardware that fails in materials or workmanship

within specified warranty period after final acceptance by the Owner. Failures include, but are not limited to, the following:

1. Structural failures including excessive deflection, cracking, or breakage.
2. Faulty operation of the hardware.
3. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
4. Electrical component defects and failures within the systems operation.

C. Standard Warranty Period: One year from date of Substantial Completion, unless otherwise indicated.

D. Special Warranty Periods:

1. Ten years for mortise locks and latches.
2. Seven years for heavy duty cylindrical (bored) locks and latches.
3. Twenty five years for manual surface door closer bodies.
4. Two years for electromechanical door hardware.

1.8 MAINTENANCE SERVICE

A. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of door hardware.

PART 2 - PRODUCTS

2.1 SCHEDULED DOOR HARDWARE

A. General: Provide door hardware for each door to comply with requirements in Door Hardware Sets and each referenced section that products are to be supplied under.

B. Designations: Requirements for quantity, item, size, finish or color, grade, function, and other distinctive qualities of each type of door hardware are indicated in the Door Hardware Sets at the end of Part 3. Products are identified by using door hardware designations, as follows:

1. Named Manufacturer's Products: Product designation and manufacturer are listed for each door hardware type required for the purpose of establishing requirements. Manufacturers' names are abbreviated in the Door Hardware Schedule.

C. Substitutions: Requests for substitution and product approval for inclusive mechanical and electromechanical door hardware in compliance with the specifications must be submitted in writing and in accordance with the procedures and time frames outlined in Division 01, Substitution Procedures. Approval of requests is at the discretion of the architect, owner, and their designated consultants.

2.2 HANGING DEVICES

A. Hinges: ANSI/BHMA A156.1 certified butt hinges with number of hinge knuckles and other options as specified in the Door Hardware Sets.

1. Quantity: Provide the following hinge quantity:

a. Two Hinges: For doors with heights up to 60 inches.
b. Three Hinges: For doors with heights 61 to 90 inches.
c. Four Hinges: For doors with heights 91 to 120 inches.
d. For doors with heights more than 120 inches, provide 4 hinges, plus 1 hinge for every 30 inches of door height greater than 120 inches.

2. Hinge Size: Provide the following, unless otherwise indicated, with hinge widths sized for door thickness and clearances required:

a. Widths up to 3’0”: 4-1/2” standard or heavy weight as specified.
b. Sizes from 3’1” to 4’0”: 5” standard or heavy weight as specified.

3. Hinge Weight and Base Material: Unless otherwise indicated, provide the following:

a. Exterior Doors: Heavy weight, non-ferrous, ball bearing or oil impregnated bearing hinges unless Hardware Sets indicate standard weight.
b. Interior Doors: Standard weight, steel, ball bearing or oil impregnated bearing hinges unless Hardware Sets indicate heavy weight.

4. Hinge Options: Comply with the following:

a. Non-removable Pins: Provide set screw in hinge barrel that, when tightened into a groove in hinge pin, prevents removal of pin while door is closed; for the all out-swinging lockable doors.

5. Manufacturers:

a. Hager Companies (HA) - CB Series.
b. Ives (IV).
c. McKinney Products; ASSA ABLOY Architectural Door Accessories (MK) - TA Series.

B. Continuous Geared Hinges: ANSI/BHMA A156.26 Grade 1-600 certified continuous geared hinge. with minimum 0.120-inch thick extruded 6060 T6 aluminum alloy hinge leaves and a minimum overall width of 4 inches. Hinges are non-handed, reversible and fabricated to template screw locations. Factory trim hinges to suit door height and prepare for electrical cut-outs.

1. Manufacturers:

a. Hager Companies (HA).
b. Ives (IV).
c. Pemko Products; ASSA ABLOY Architectural Door Accessories (PE).

C. Sliding and Folding Door Hardware: Hardware is to be of type and design as specified and should comply with ANSI/BHMA A156.14.

1. Sliding Bi-Passing Pocket Door Hardware: Provide complete sets consisting of track, hangers, stops, bumpers, floor channel, guides, and accessories indicated.

2. Cascading: Provide a bi-parting or single direction telescoping system as required with a minimum 200 lb. per door capacity.

3. Bi-folding Door Hardware: Rated for door panels weighing up to 125 lb.

4. Pocket Sliding Door Hardware: Rated for doors weighing up to 200 lb.

5. Manufacturers:

a. Hager Companies (HA).
b. Johnson Hardware (JO).
c. Pemko Products; ASSA ABLOY Architectural Door Accessories (PE).

2.3 DOOR OPERATING TRIM

A. Flush Bolts and Surface Bolts: ANSI/BHMA A156.3 and A156.16, Grade 1, certified.

1. Flush bolts to be furnished with top rod of sufficient length to allow bolt retraction device location approximately six feet from the floor.
2. Furnish dust proof strikes for bottom bolts.
3. Surface bolts to be minimum 8” in length and U.L. listed for labeled fire doors and U.L. listed for windstorm components where applicable.
4. Provide related accessories (mounting brackets, strikes, coordinators, etc.) as required for appropriate installation and operation.

5. Manufacturers:

a. Ives (IV).
b. Rockwood Products; ASSA ABLOY Architectural Door Accessories (RO).
c. Trimco (TC).

B. Coordinators: ANSI/BHMA A156.3 certified door coordinators consisting of active-leaf, hold-open lever and inactive-leaf release trigger. Model as indicated in hardware sets.

1. Manufacturers:

a. Ives (IV).
b. Rockwood Products; ASSA ABLOY Architectural Door Accessories (RO).
c. Trimco (TC).

C. Door Push Plates and Pulls: ANSI/BHMA A156.6 certified door pushes and pulls of type and design specified in the Hardware Sets. Coordinate and provide proper width and height as required where conflicting hardware dictates.

1. Push/Pull Plates: Minimum .050 inch thick, size as indicated in hardware sets, with beveled edges, secured with exposed screws unless otherwise indicated.
2. Door Pull and Push Bar Design: Size, shape, and material as indicated in the hardware sets. Minimum clearance of 2 1/2-inches from face of door unless otherwise indicated.
3. Offset Pull Design: Size, shape, and material as indicated in the hardware sets. Minimum clearance of 2 1/2-inches from face of door and offset of 90 degrees unless otherwise indicated.
4. Fasteners: Provide manufacturer's designated fastener type as indicated in Hardware Sets.
5. Manufacturers:
    a. Ives (IV).
    b. Rockwood Products; ASSA ABLOY Architectural Door Accessories (RO).
    c. Trimco (TC).

2.4 CYLINDERS AND KEYING

A. General: Cylinder manufacturer to have minimum (10) years experience designing secured master key systems and have on record a published security keying system policy.

B. Source Limitations: Obtain each type of keyed cylinder and keys from the same source manufacturer as locksets and exit devices, unless otherwise indicated.

C. Cylinders: Original manufacturer cylinders complying with the following:

1. Mortise Type: Threaded cylinders with rings and cams to suit hardware application.
2. Rim Type: Cylinders with back plate, flat-type vertical or horizontal tailpiece, and raised trim ring.
3. Bored-Lock Type: Cylinders with tailpieces to suit locks.
4. Mortise and rim cylinder collars to be solid and recessed to allow the cylinder face to be flush and be free spinning with matching finishes.
5. Keyway: Manufacturer’s Standard.

D. Keying System: Each type of lock and cylinders to be factory keyed.

1. Conduct specified "Keying Conference" to define and document keying system instructions and requirements.
2. Furnish factory cut, nickel-silver large bow permanently inscribed with a visual key control number as directed by Owner.
3. New System: Key locks to a new key system as directed by the Owner.

E. Key Quantity: Provide the following minimum number of keys:

1. Change Keys per Cylinder: Two (2)
2. Master Keys (per Master Key Level/Group): Five (5).
3. Construction Keys (where required): Ten (10).

F. Construction Keying: Provide construction master keyed cylinders.

G. Key Registration List (Bitting List):

1. Provide keying transcript list to Owner's representative in the proper format for importing into key control software.
2. Provide transcript list in writing or electronic file as directed by the Owner.

H. Key Control Software: Provide one network version of "Key Wizard" branded key management software package that includes one year of technical support and upgrades to software at no charge. Provide factory key system formatted for importing into “Key Wizard” software.

2.5 MECHANICAL LOCKS AND LATCHING DEVICES

A. Mortise Locksets, Grade 1 (Heavy Duty): ANSI/BHMA A156.13, Series 1000, Operational Grade 1 certified. Locksets are to be manufactured with a corrosion resistant steel case and be field-reversible for handing without disassembly of the lock body.

1. Manufacturers:

a. Schlage (SC) – L9000 Series.
b. Yale Locks and Hardware (YA) – 8800FL Series.

B. Cylindrical Locksets, Grade 1 (Heavy Duty): ANSI/BHMA A156.2, Series 4000, Grade 1 certified.

1. Furnish with solid cast levers, standard 2 3/4” backset, and 1/2" (3/4" at rated paired openings) throw brass or stainless steel latchbolt.

2. Locks are to be non-handed and fully field reversible.

3. Extended cycle test: Locks to have been cycle tested in ordinance with ANSI/BHMA 156.2 requirements to 2 million cycles.

4. Manufacturers:

a. Yale Locks and Hardware (YA) 5400LN Series.
b. Dorma Products (DO) - CL800 Series.
c. Falcon Lock (FA) - T Series.

2.6 AUXILIARY LOCKS

A. Mortise Deadlocks, Small Case: ANSI/BHMA A156.36, Grade 1, small case mortise type deadlocks constructed of heavy gauge wrought corrosion resistant steel. Steel or stainless steel bolts with a 1" throw and hardened steel roller pins. Deadlocks to be products of the same source manufacturer and keyway as other specified locksets.

1. Manufacturers:

a. Schlage (SC) - L460 Series.

b. Yale Locks and Hardware (YA) - 350 Series.

B. Narrow Case Deadlocks and Deadlatches: ANSI/BHMA 156.13 Series 1000 Grade 1 certified narrow case deadlocks and deadlatches for swinging or sliding door applications. All functions shall be manufactured in a single sized case formed from 12 gauge minimum, corrosion resistant steel (option for fully stainless steel case and components). Provide minimum 2 7/8" throw laminated stainless steel bolt. Bottom rail deadlocks to have 3/8” diameter bolts.

1. Manufacturers:

a. Adams Rite Manufacturing (AD) - MS1850S / MS1950 Series.

2.7 LOCK AND LATCH STRIKES

A. Strikes: Provide manufacturer's standard strike with strike box for each latch or lock bolt, with curved lip extended to protect frame, finished to match door hardware set, unless otherwise indicated, and as follows:

1. Flat-Lip Strikes: For locks with three-piece antifriction latchbolts, as recommended by manufacturer.
2. Extra-Long-Lip Strikes: For locks used on frames with applied wood casing trim.
3. Aluminum-Frame Strike Box: Provide manufacturer's special strike box fabricated for aluminum framing.
4. Double-lipped strikes: For locks at double acting doors. Furnish with retractable stop for rescue hardware applications.

B. Standards: Comply with the following:

1. Strikes for Mortise Locks and Latches: BHMA A156.13.
2. Strikes for Bored Locks and Latches: BHMA A156.2.
3. Strikes for Auxiliary Deadlocks: BHMA A156.36.
4. Dustproof Strikes: BHMA A156.16.

2.8 CONVENTIONAL EXIT DEVICES

A. General Requirements: All exit devices specified herein shall meet or exceed the following criteria:

1. At doors not requiring a fire rating, provide devices complying with NFPA 101 and listed and labeled for "Panic Hardware" according to UL305. Provide proper fasteners as required by manufacturer including sex nuts and bolts at openings specified in the Hardware Sets.

2. Where exit devices are required on fire rated doors, provide devices complying with NFPA 80 and with UL labeling indicating "Fire Exit Hardware". Provide devices with the proper fasteners for installation as tested and listed by UL. Consult manufacturer’s catalog and template book for specific requirements.

3. Except on fire rated doors, provide exit devices with hex key dogging device to hold the pushbar and latch in a retracted position. Provide optional keyed cylinder dogging on devices where specified in Hardware Sets.

4. Devices must fit flat against the door face with no gap that permits unauthorized dogging of the push bar. The addition of filler strips is required in any case where the door light extends behind the device as in a full glass configuration.

5. Energy Efficient Design: Provide lock bodies which have a holding current draw of 15mA maximum, and can operate on either 12 or 24 volts. Locks are to be field configurable for fail safe or fail secure operation.

6. Lever Operating Trim: Where exit devices require lever trim, furnish manufacturer's heavy duty escutcheon trim with threaded studs for thru-bolts.

    a. Lock Trim Design: As indicated in Hardware Sets, provide finishes and designs to match that of the specified locksets.
    b. Where function of exit device requires a cylinder, provide a cylinder (Rim or Mortise) as specified in Hardware Sets.

7. Vertical Rod Exit Devices: Where surface or concealed vertical rod exit devices are used at interior openings, provide as less bottom rod (LBR) unless otherwise indicated. Provide dust proof strikes where thermal pins are required to project into the floor.

8. Narrow Stile Applications: At doors constructed with narrow stiles, or as specified in Hardware Sets, provide devices designed for maximum 2” wide stiles.

9. Dummy Push Bar: Nonfunctioning push bar matching functional push bar.

10. Rail Sizing: Provide exit device rails factory sized for proper door width application.

11. Through Bolt Installation: For exit devices and trim as indicated in Door Hardware Sets.

12. Hurricane and Tornado Resistance Compliance: Conventional exit devices are to be U.L. listed for windstorm assemblies where applicable. Provide the appropriate hurricane or tornado resistant products that have been independent third party tested, certified, and labeled to meet state and local windstorm building codes applicable to project.

B. Conventional Push Rail Exit Devices (Commercial Duty): ANSI/BHMA A156.3, Grade 1 certified panic and fire exit hardware devices furnished in the functions specified in the Hardware Sets. Fabricate latchbolts from cast stainless steel, Pullman type, incorporating a deadlocking feature.

1. Manufacturers:

    a. Dorma Products (DO) - 9000 Series.
    b. Falcon Hardware (FA) - 24/25 Series.
    c. Yale Locks and Hardware (YA) - 6000 Series.

2.9 DOOR CLOSERS

A. All door closers specified herein shall meet or exceed the following criteria:

1. General: Door closers to be from one manufacturer, matching in design and style, with the same type door preparations and templates regardless of application or spring size. Closers to be non-handed with full sized covers including installation and adjusting information on inside of cover.

2. Standards: Closers to comply with UL-10C for Positive Pressure Fire Test and be U.L. listed for use of fire rated doors.

3. Cycle Testing: Provide closers which have surpassed 15 million cycles in a test witnessed and verified by UL.

4. Size of Units: Comply with manufacturer's written recommendations for sizing of door closers depending on size of door, exposure to weather, and anticipated frequency of use. Where closers are indicated for doors required to be accessible to the physically handicapped, provide units complying with ANSI ICC/A117.1.

5. Closer Arms: Provide heavy duty, forged steel closer arms unless otherwise indicated in Hardware Sets.

6. Closers shall not be installed on exterior or corridor side of doors; where possible install closers on door for optimum aesthetics.

7. Closer Accessories: Provide door closer accessories including custom templates, special mounting brackets, spacers and drop plates as required for proper installation. Provide through-bolt and security type fasteners as specified in the hardware sets.

B. Door Closers, Surface Mounted (Heavy Duty): ANSI/BHMA A156.4, Grade 1 surface mounted, heavy duty door closers with complete spring power adjustment, sizes 1 thru 6; and fully operational adjustable according to door size, frequency of use, and opening force. Closers to be rack and pinion type, one piece cast iron or aluminum alloy body construction, with adjustable backcheck and separate non-critical valves for closing sweep and latch speed control. Provide non-handed units standard.

1. Manufacturers:

a. Yale Locks and Hardware (YA) - 4400 Series.
b. Dorma Products (DO) - 8900 Series.
c. Falcon Hardware (FA) - SC70 Series.

C. Door Closers, Surface Mounted (Unitrol): Unitrol arms to have door stop mechanism to absorb dead stop shock on arm and top hinge. Hold-open arms to have a spring loaded mechanism in addition to shock absorber assembly. Arms to be provided with rigid steel main arm and secondary arm lengths proportional to the door width.

1. Manufacturers:

a. Yale Locks and Hardware (YA) - Unitrol Series.

2.10 SURFACE MOUNTED CLOSER HOLDERS

A. Electromagnetic Door Holders: Certified ANSI A156.15 electromagnetic door holder/releases with a minimum 20 to 40 pounds holding power and single coil construction able to accommodate.12VDC, 24VAC, 24VDC and 120VAC. Coils to be independently wound, employing an integral fuse and armatures to include a positive release button.

1. Manufacturers:

a. LCN Door Closers (LC) - SEM7800 Series.
b. Rixson (RF) - 980/990 Series.
c. Sargent Manufacturing (SA) - 1560 Series.

2.11 ARCHITECTURAL TRIM

A. Door Protective Trim

1. General: Door protective trim units to be of type and design as specified below or in the Hardware Sets.

2. Size: Fabricate protection plates (kick, armor, or mop) not more than 2" less than door width (LDW) on stop side of single doors and 1” LDW on stop side of pairs of doors, and not more than 1" less than door width on pull side. Coordinate and provide proper width and height as required where conflicting hardware dictates. Height to be as specified in the Hardware Sets.

3. Where plates are applied to fire rated doors with the top of the plate more than 16” above the bottom of the door, provide plates complying with NFPA 80. Consult manufacturer’s catalog and template book for specific requirements for size and applications.

4. Protection Plates: ANSI/BHMA A156.6 certified protection plates (kick, armor, or mop), fabricated from the following:

a. Stainless Steel: 300 grade, 050-inch thick.

5. Options and fasteners: Provide manufacturer's designated fastener type as specified in the Hardware Sets. Provide countersunk screw holes.

6. Manufacturers:

a. Ives (IV).
b. Rockwood Products; ASSA ABLOY Architectural Door Accessories (RO).
c. Trimco (TC).

2.12 DOOR STOPS AND HOLDERS

A. General: Door stops and holders to be of type and design as specified below or in the Hardware Sets.

B. Door Stops and Bumpers: ANSI/BHMA A156.16, Grade 1 certified door stops and wall bumpers. Provide wall bumpers, either convex or concave types with anchorage as indicated, unless floor or other types of door stops are specified in Hardware Sets. Do not mount floor stops where they will impede traffic. Where floor or wall bumpers are not appropriate, provide overhead type stops and holders.

1. Manufacturers:

a. Ives (IV).
b. Rockwood Products; ASSA ABLOY Architectural Door Accessories (RO).
c. Trimco (TC).

C. Overhead Door Stops and Holders: ANSI/BHMA A156.6, Grade 1 certified overhead stops and holders to be surface or concealed types as indicated in Hardware Sets. Track, slide, arm and jamb bracket to be constructed of extruded bronze and shock absorber spring of heavy tempered steel. Provide non-handed design with mounting brackets as required for proper operation and function.

1. Manufacturers:

a. Dorma (DO).
b. Rixson Door Controls (RF).
c. Rockwood Products; ASSA ABLOY Architectural Door Accessories (RO).
d. Sargent Manufacturing (SA).

2.13 ARCHITECTURAL SEALS

A. General: Thresholds, weatherstripping, and gasket seals to be of type and design as specified below or in the Hardware Sets. Provide continuous weatherstrip gasketing on exterior doors and provide smoke, light, or sound gasketing on interior doors where indicated. At exterior applications provide non-corrosive fasteners and elsewhere where indicated.

B. Smoke Labeled Gasketing: Assemblies complying with NFPA 105 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for smoke control ratings indicated, based on testing according to UL 1784.

1. Provide smoke labeled perimeter gasketing at all smoke labeled openings.

C. Fire Labeled Gasketing: Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to UL-10C.

1. Provide intumescent seals as indicated to meet UL10C Standard for Positive Pressure Fire Tests of Door Assemblies, and NPFA 252, Standard Methods of Fire Tests of Door Assemblies.

D. Sound-Rated Gasketing: Assemblies that are listed and labeled by a testing and inspecting agency, for sound ratings indicated.

E. Replaceable Seal Strips: Provide only those units where resilient or flexible seal strips are easily replaceable and readily available from stocks maintained by manufacturer.

F. Manufacturers:

1. National Guard Products (NG).
2. Pemko Products; ASSA ABLOY Architectural Door Accessories (PE).
3. Zero (ZE).

2.14 FABRICATION

A. Fasteners: Provide door hardware manufactured to comply with published templates generally prepared for machine, wood, and sheet metal screws. Provide screws according to manufacturers recognized installation standards for application intended.

2.15 FINISHES

A. Standard: Designations used in the Hardware Sets and elsewhere indicate hardware finishes complying with ANSI/BHMA A156.18, including coordination with traditional U.S. finishes indicated by certain manufacturers for their products.

B. Provide quality of finish, including thickness of plating or coating (if any), composition, hardness, and other qualities complying with manufacturer's standards, but in no case less than specified by referenced standards for the applicable units of hardware

C. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine scheduled openings, with Installer present, for compliance with requirements for installation tolerances, labeled fire door assembly construction, wall and floor construction, and other conditions affecting performance.

B. Notify architect of any discrepancies or conflicts between the door schedule, door types, drawings and scheduled hardware. Proceed only after such discrepancies or conflicts have been resolved in writing.

3.2 PREPARATION

A. Hollow Metal Doors and Frames: Comply with ANSI/DHI A115 series.

B. Wood Doors: Comply with ANSI/DHI A115-W series.

3.3 INSTALLATION

A. Install each item of mechanical and electromechanical hardware and access control equipment to comply with manufacturer's written instructions and according to specifications.

1. Installers are to be trained and certified by the manufacturer on the proper installation and adjustment of fire, life safety, and security products including: hanging devices; locking devices; closing devices; and seals.

B. Mounting Heights: Mount door hardware units at heights indicated in following applicable publications, unless specifically indicated or required to comply with governing regulations:

1. Standard Steel Doors and Frames: DHI's "Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames."
2. Wood Doors: DHI WDHS.3, "Recommended Locations for Architectural Hardware for Wood Flush Doors."
3. Where indicated to comply with accessibility requirements, comply with ANSI A117.1 "Accessibility Guidelines for Buildings and Facilities."
4. Provide blocking in drywall partitions where wall stops or other wall mounted hardware is located.

C. Retrofitting: Install door hardware to comply with manufacturer's published templates and written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing work specified in Division 9 Sections. Do not install surface-mounted items until finishes have been completed on substrates involved.

D. Thresholds: Set thresholds for exterior and acoustical doors in full bed of sealant complying with requirements specified in Division 7 Section "Joint Sealants."

E. Storage: Provide a secure lock up for hardware delivered to the project but not yet installed. Control the handling and installation of hardware items so that the completion of the work will not be delayed by hardware losses before and after installation.

3.4 FIELD QUALITY CONTROL

A. Field Inspection: Supplier will perform a final inspection of installed door hardware and state in report whether work complies with or deviates from requirements, including whether door hardware is properly installed, operating and adjusted.

3.5 ADJUSTING

A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.

3.6 CLEANING AND PROTECTION

A. Protect all hardware stored on construction site in a covered and dry place. Protect exposed hardware installed on doors during the construction phase. Install any and all hardware at the latest possible time frame.

B. Clean adjacent surfaces soiled by door hardware installation.

C. Clean operating items as necessary to restore proper finish. Provide final protection and maintain conditions that ensure door hardware is without damage or deterioration at time of owner occupancy.

3.7 DEMONSTRATION

A. Instruct Owner's maintenance personnel to adjust, operate, and maintain mechanical and electromechanical door hardware.

3.8 DOOR HARDWARE SETS

A. The hardware sets represent the design intent and direction of the owner and architect. They are a guideline only and should not be considered a detailed hardware schedule. Discrepancies, conflicting hardware and missing items should be brought to the attention of the architect with corrections made prior to the bidding process. Omitted items not included in a hardware set should be scheduled with the appropriate additional hardware required for proper application and functionality.

B. The supplier is responsible for handing and sizing all products and providing the correct option for the appropriate door type and material where more than one is presented in the hardware sets. Quantities listed are for each pair of doors, or for each single door.

C. Manufacturer’s Abbreviations:

1. MK - McKinney
2. PE - Pemko
3. RO - Rockwood
4. SA - SARGENT
5. YA - Yale
6. AD - Adams Rite
7. RF - Rixson

8. OT - OTHER

Hardware Sets

Set: 1.0
Doors: 112.B
Description: Ext Pr HM Storage

2	Continuous Hinge	CFM__HD1		PE
2	Surface Bolt	988	Bright Zinc	SA
1	Storeroom Lock	PBR 8840FL	630	YA
1	Coordinator	2672	US28	RO
2	Mounting Bracket	2601AB or 2601C as required	Black	RO
2	Surface Closer	UNI4400 brk / spacer as required	689	YA
2	Kick Plate	K1050 8" x 2" LDW BEV CSK	US32D	RO
1	Threshold	2005AT		PE
1	Rain Guard	346C width plus 4"		PE
1	Gasketing	2891APK		PE
2	Sweep	315CN x Width		PE
1	Astragal	By Door Supplier		OT

Notes: The specified hardware is for design intent only for hurricane/windstorm. Verify and supply all products in compliance with the door manufacturers assembly rating for hurricane/windstorm and impact rating required.

Set: 2.0
Doors: 113, 114.B, 144, 206, 234
Description: Ext Sgl HM Storage

1	Continuous Hinge	CFM__HD1		PE
1	Storeroom Lock	PBR 8840FL	630	YA
1	Surface Closer	UNI4400 brk / spacer as required	689	YA
1	Kick Plate	K1050 8" x 2" LDW BEV CSK	US32D	RO
1	Threshold	2005AT		PE
1	Rain Guard	346C width plus 4"		PE
1	Gasketing	2891APK		PE
1	Sweep	315CN x Width		PE

Notes: The specified hardware is for design intent only for hurricane/windstorm. Verify and supply all products in compliance with the door manufacturers assembly rating for hurricane/windstorm and impact rating required.

Set: 3.0
Doors: 140.B,126.B,135.B, 136.B
Description: Ext Sgl HM NL Exit

1	Continuous Hinge	CFM__HD1		PE
1	Exit Device (rim, nightlatch)	7150 WS 632F	630	YA

1	Surface Closer	UNI4400 brk / spacer as required	689	YA
1	Kick Plate	K1050 8" x 2" LDW BEV CSK	US32D	RO
1	Threshold	2005AT		PE
1	Rain Guard	346C width plus 4"		PE
1	Gasketing	2891APK		PE
1	Sweep	315CN x Width		PE

Notes: The specified hardware is for design intent only for hurricane/windstorm. Verify and supply all products in compliance with the door manufacturers assembly rating for hurricane/windstorm and impact rating required.

Set: 4.0
Doors: 220, 221, 225
Description: Int Pr Storeroom - OH Stop - Tall

8	Hinge	TA2714	US26D	MK
2	Flush Bolt	555 12" / 72" AFF	US26D	RO
1	Dust Proof Strike	570	US26D	RO
1	Storeroom Lock	PB 5405LN	626	YA
2	Surf Overhead Stop	10-X36	630	RF
2	Silencer	608		RO

Notes:

Set: 5.0
Doors: 115, 116, 216
Description: Int Pr Storeroom - OH Stop

6	Hinge	TA2714	US26D	MK
2	Flush Bolt	555 12" / 72" AFF	US26D	RO
1	Dust Proof Strike	570	US26D	RO
1	Storeroom Lock	PB 5405LN	626	YA
2	Surf Overhead Stop	10-X36	630	RF
2	Silencer	608		RO

Notes:

Set: 6.0
Doors: 202.A, 205.A
Description: Int Pr Classroom DB - Closer

8	Hinge	TA2714	US26D	MK
2	Flush Bolt	555 12" / 72" AFF	US26D	RO
1	Dust Proof Strike	570	US26D	RO
1	Mortise Deadlock	MS1850SN Schoolhouse Function	628	AD
1	Strike	4000	628	AD
1	Cylinder	4066-01	130	AD
1	Mortise Cylinder	2153	626	YA
4	Pull	RM201 BTB Mtd	US32D	RO

2	Surface Closer	3501	689	YA
2	Door Stop	409 / 441CU as required	US26D	RO
2	Silencer	608		RO

Notes:

Set: 7.0
Doors: 123, 208.A, 226
Description: Int Sgl Office - Door Bottom / Closer

4	Hinge	TA2714	US26D	MK
1	Entry/Office Lock	PB 5407LN	626	YA
1	Surface Closer	3501	689	YA
1	Kick Plate	K1050 8" x 2" LDW BEV CSK	US32D	RO
1	Door Stop	409 / 441CU as required	US26D	RO
1	Gasketing	S88BL LAR		PE
1	Door Bottom	217APK		PE

Set: 8.0
Doors: 224
Description: Int Pr Storeroom - Rated - Closer / stop

8	Hinge	TA2714	US26D	MK
1	Flush Bolt Set	2845/2945 to suite dr mtl	US26D	RO
1	Dust Proof Strike	570	US26D	RO
1	Storeroom Lock	PB 5405LN	626	YA
1	Coordinator	2672	US28	RO
1	Mounting Bracket	2601AB or 2601C as required	Black	RO
1	Conc Overhead Stop	1-X36	630	RF
1	Closer with stop arm	3531	689	YA
2	Kick Plate	K1050 8" x 2" LDW BEV CSK	US32D	RO
1	Gasketing	S88BL LAR		PE
2	Astragal	303AS		PE

Notes: Closer on active leaf.

Set: 9.0
Doors: 120
Description: Int Sgl Storeroom - Rated/Smoke - Tall

4	Hinge	TA2714	US26D	MK
1	Storeroom Lock	PB 5405LN	626	YA
1	Surface Closer	3501	689	YA
1	Kick Plate	K1050 8" x 2" LDW BEV CSK	US32D	RO
1	Door Stop	409 / 441CU as required	US26D	RO
1	Gasketing	S88BL LAR		PE

Notes: At stairwell, mount closer on stair side.

Set: 10.0
Doors: 143
Description: Int Sgl Storeroom - Rated - Wide

3	Hinge (heavy weight)	T4A3786	US26D	MK
1	Storeroom Lock	PB 5405LN	626	YA
1	Surface Closer	3501	689	YA
1	Kick Plate	K1050 8" x 2" LDW BEV CSK	US32D	RO
1	Door Stop	409 / 441CU as required	US26D	RO
1	Gasketing	S88BL LAR		PE

Notes: At stairwell, mount closer on stair side.

Set: 11.0
Doors: 117
Description: Int Sgl Storeroom - Rated/Smoke

3	Hinge	TA2714	US26D	MK
1	Storeroom Lock	PB 5405LN	626	YA
1	Surface Closer	3501	689	YA
1	Kick Plate	K1050 8" x 2" LDW BEV CSK	US32D	RO
1	Door Stop	409 / 441CU as required	US26D	RO
1	Gasketing	S88BL LAR		PE

Notes: At stairwell, mount closer on stair side.

Set: 12.0
Doors: 132, 222
Description: Int Sgl Storeroom - Rated / Smoke- Closer / stop

4	Hinge	TA2714	US26D	MK
1	Storeroom Lock	PB 5405LN	626	YA
1	Closer with stop arm	3531	689	YA
1	Kick Plate	K1050 8" x 2" LDW BEV CSK	US32D	RO
1	Gasketing	S88BL LAR		PE

Set: 13.0
Doors: 201
Description: Int Sgl Storeroom - Closer

4	Hinge	TA2714	US26D	MK
1	Storeroom Lock	PB 5405LN	626	YA
1	Surface Closer	3501	689	YA
1	Kick Plate	K1050 8" x 2" LDW BEV CSK	US32D	RO
1	Door Stop	409 / 441CU as required	US26D	RO
3	Silencer	608		RO

Set: 14.0
Doors: 109

Description: Int Sgl Storeroom - Wide - Closer

4	Hinge (heavy weight)	T4A3786	US26D	MK
1	Storeroom Lock	PB 5405LN	626	YA
1	Surface Closer	3501	689	YA
1	Kick Plate	K1050 8" x 2" LDW BEV CSK	US32D	RO
1	Door Stop	409 / 441CU as required	US26D	RO
3	Silencer	608		RO

Set: 15.0
Doors: 118, 119, 217
Description: Int Sgl Storeroom - Closer/stop

3	Hinge	TA2714	US26D	MK
1	Storeroom Lock	PB 5405LN	626	YA
1	Closer with stop arm	3531	689	YA
1	Kick Plate	K1050 8" x 2" LDW BEV CSK	US32D	RO
3	Silencer	608		RO

Set: 16.0
Doors: 214, 233
Description: Int Sgl Storeroom - Tall

4	Hinge	TA2714	US26D	MK
1	Storeroom Lock	PB 5405LN	626	YA
1	Door Stop	409 / 441CU as required	US26D	RO
3	Silencer	608		RO

Set: 17.0
Doors: 134.A, 134.B, 232
Description: Int Sgl Storeroom

3	Hinge	TA2714	US26D	MK
1	Storeroom Lock	PB 5405LN	626	YA
1	Door Stop	409 / 441CU as required	US26D	RO
3	Silencer	608		RO

Set: 18.0
Doors: 228, 229, 230, 231
Description: Int Sgl Office - Acoustic - Single Lock

1	Entry/Office Lock	PB 5407LN	626	YA
1	Surface Closer	3501	689	YA
1	Door Stop	409 / 441CU as required	US26D	RO
1	Balance of Hardware	By Door Manufacturer		OT

Notes: Hinges, gasketing, astragal, threshold, door bottom and any additionally required hardware is by door manufacturer.

The specified hardware is for design intent only for STC rated doors. Verify and supply all products in compliance with the door manufacturers assembly rating for STC rating required.

Set: 19.0
Doors: 124
Description: Int Sgl Office -Closer/Stop - Smoke

4	Hinge	TA2714	US26D	MK
1	Entry/Office Lock	PB 5407LN	626	YA
1	Closer with stop arm	3531	689	YA
1	Kick Plate	K1050 8" x 2" LDW BEV CSK	US32D	RO
1	Gasketing	S88BL LAR		PE

Notes: Hinges, gasketing, astragal, threshold, door bottom and any additionally required hardware is by door manufacturer.
The specified hardware is for design intent only for STC rated doors. Verify and supply all products in compliance with the door manufacturers assembly rating for STC rating required.

Set: 20.0
Doors: 208.B, 209, 210, 211, 212
Description: Int Sgl Office

4	Hinge	TA2714	US26D	MK
1	Entry/Office Lock	PB 5407LN	626	YA
1	Door Stop	409 / 441CU as required	US26D	RO
3	Silencer	608		RO

Notes: Hinges, gasketing, astragal, threshold, door bottom and any additionally required hardware is by door manufacturer.
The specified hardware is for design intent only for STC rated doors. Verify and supply all products in compliance with the door manufacturers assembly rating for STC rating required.

Set: 21.0
Doors: 107.B, 108.A, 108.B
Description: Int Pr Classroom - Acoustic - Exit Device

2	SVR Exit (classroom)	6170 LBR PB426F	630	YA
2	Surface Closer	3501	689	YA
2	Door Stop	409 / 441CU as required	US26D	RO
1	Balance of Hardware	By Door Manufacturer		OT

Notes: Hinges, gasketing, astragal, threshold, door bottom and any additionally required hardware is by door manufacturer.
The specified hardware is for design intent only for STC rated doors. Verify and supply all products in compliance with the door manufacturers assembly rating for STC rating required.

Set: 22.0
Doors: 126.A, 127
Description: Int Pr Classroom - Rated SVR - MHO

8	Hinge	TA2714	US26D	MK
2	Fire Rated SVR Exit (classroom)	6170F LBR PB426F	630	YA
2	Surface Closer	3501	689	YA
2	Kick Plate	K1050 8" x 2" LDW BEV CSK	US32D	RO
2	Electromagnetic Holder	998M	689	RF
1	Gasketing	S88BL LAR		PE
2	Astragal	303AS		PE

Notes: Doors are magnetically held open. Upon loss of power or signal from fire controls, doors will close and latch.

Set: 23.0
Doors: 108.C, 114.A, 125
Description: Int Sgl Classroom - Rated / Smoke - Tall

4	Hinge	TA2714	US26D	MK
1	Classroom Lock	PB 5408LN	626	YA
1	Surface Closer	3501	689	YA
1	Kick Plate	K1050 8" x 2" LDW BEV CSK	US32D	RO
1	Door Stop	409 / 441CU as required	US26D	RO
1	Gasketing	S88BL LAR		PE

Set: 24.0
Doors: 107.A, 128.A, 128.B, 130.A, 130.B, 135.A, 136.A, 140.A, 223.A, 223.B
Description: Int Sgl Classroom - Acoustic - Single Lock

1	Classroom Lock	PB 5408LN	626	YA
1	Surface Closer	3501	689	YA
1	Door Stop	409 / 441CU as required	US26D	RO
1	Balance of Hardware	By Door Manufacturer		OT

Notes: Hinges, gasketing, astragal, threshold, door bottom and any additionally required hardware is by door manufacturer.
The specified hardware is for design intent only for STC rated doors. Verify and supply all products in compliance with the door manufacturers assembly rating for STC rating required.

Set: 25.0
Doors: 110.A, 110.B
Description: Int Sgl Classroom - Rated

3	Hinge	TA2714	US26D	MK
1	Classroom Lock	PB 5408LN	626	YA
1	Surface Closer	3501	689	YA
1	Kick Plate	K1050 8" x 2" LDW BEV CSK	US32D	RO
1	Door Stop	409 / 441CU as required	US26D	RO
1	Gasketing	S88BL LAR		PE

Set: 26.0

Doors: 202.B, 205.B
Description: Int Sgl Classroom

4	Hinge	TA2714	US26D	MK
1	Classroom Lock	PB 5408LN	626	YA
1	Door Stop	409 / 441CU as required	US26D	RO
3	Silencer	608		RO

Set: 27.0
Doors: 104, 204, 213
Description: Int Sgl Passage - Rated

4	Hinge	TA2714	US26D	MK
1	Passage Set	PB 5401LN	626	YA
1	Surface Closer	3501	689	YA
1	Kick Plate	K1050 8" x 2" LDW BEV CSK	US32D	RO
1	Door Stop	409 / 441CU as required	US26D	RO
1	Gasketing	S88BL LAR		PE

Notes: At stairwell, mount closer on stair side.

Set: 28.0
Doors: 133.A, 133.B, 139.A, 139.B
Description: Int Sgl Shared restroom - Acoustic - Single Lock

1	Passage Set	PB 5401LN	626	YA
1	Surface Closer	3501	689	YA
1	Door Stop	409 / 441CU as required	US26D	RO
1	Balance of Hardware	By Door Manufacturer		OT

Notes: Hinges, gasketing, astragal, threshold, door bottom and any additionally required hardware is by door manufacturer.
The specified hardware is for design intent only for STC rated doors. Verify and supply all products in compliance with the door manufacturers assembly rating for STC rating required.

Set: 29.0
Doors: 121, 122, 218, 219
Description: Int Sgl Push/Pull - Closer

4	Hinge	TA2714	US26D	MK
1	Pull Plate	111x70C	US32D	RO
1	Push Plate	70C-RKW	US32D	RO
1	Surface Closer	3501	689	YA
1	Kick Plate	K1050 8" x 2" LDW BEV CSK	US32D	RO
1	Door Stop	409 / 441CU as required	US26D	RO
3	Silencer	608		RO

Set: 30.0
Doors: 227

Description: Int Pr Biparting Doors - Counsel

1	Side Wall Track Kit	SF280C-SWTK		PE
4	Door Pull	RM3300-24 Mtg-Type 5HD	US32D	RO

Set: 31.0
Doors: 101
Description: Ext AL Exit

2	Continuous Hinge	CFM__HD1		PE
2	Exit Device (rim, nightlatch)	7150 WS 632F	630	YA
2	Surface Closer	UNI4400 brk / spacer as required	689	YA
2	Kick Plate	K1050 8" x 2" LDW BEV CSK	US32D	RO
2	Threshold	2005AT		PE
2	Rain Guard	346C width plus 4"		PE
2	Gasketing	2891APK		PE
2	Sweep	315CN x Width		PE

Notes: The specified hardware is for design intent only for hurricane/windstorm. Verify and supply all products in compliance with the door manufacturers assembly rating for hurricane/windstorm and impact rating required.

Set: 32.0
Doors: 150
Description: Hardware by door manufacturer

1	All hardware by door manufactuer	By Manufacturer		OT

END OF SECTION 087100

SECTION 08800 - GLAZING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes glazing for the following products and applications, including those specified in other Sections where glazing requirements are specified by reference to this Section:

1. Windows.
2. Doors.
3. Glazed curtain walls.
4. Storefront framing.
5. Glazed entrances.
6. Interior borrowed lites.

B. Related Sections:
1. Section 08830 "Mirrors."
2. Section 08211 “Flush Wood Doors” for interior doors to receive glazing.
3. Section 08411 “Aluminum Framed Entrances and Storefronts” for exterior storefront openings to receive glazing.
4. Section 08911 “Glazed Aluminum Curtain Walls” for exterior curtainwall openings to receive glazing.

1.3 DEFINITIONS

A. Glass Manufacturers: Firms that produce primary glass, fabricated glass, or both, as defined in referenced glazing publications.

B. Glass Thicknesses: Indicated by thickness designations in millimeters according to ASTM C 1036.

C. Interspace: Space between lites of an insulating-glass unit.

1.4 PERFORMANCE REQUIREMENTS

A. General: Installed glazing systems shall withstand normal thermal movement and wind and impact loads (where applicable) without failure, including loss or glass breakage

attributable to the following: defective manufacture, fabrication, or installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing materials; or other defects in construction.

B. Delegated Design: Design glass, including comprehensive engineering analysis according to ASTM E 1300 and ICC's 2003 International Building Code by a qualified professional engineer, using the following design criteria:
   a. Basic Wind Speed: 130 mph.
   b. Importance Factor: 1.0.
   c. Exposure Category: B .
   2. Vertical Glazing: For glass surfaces sloped 15 degrees or less from vertical, design glass to resist design wind pressure based on glass type factors for short-duration load.
   3. Maximum Lateral Deflection: For glass supported on all four edges, limit center-of-glass deflection at design wind pressure to not more than 1/50 times the short-side length or 1 inch (25 mm), whichever is less.
   4. Differential Shading: Design glass to resist thermal stresses induced by differential shading within individual glass lites.

C. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes acting on glass framing members and glazing components.

   1. Temperature Change: 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

1.5 ACTION SUBMITTALS

A. Product Data: For each glass product and glazing material indicated.

B. Glass Samples: For each type of [**glass product other than clear monolithic vision glass**] [**the following products**]; 12 inches (300 mm) square.
   1. Coated glass.
   2. Insulating glass.

C. Glazing Accessory Samples: For gaskets sealants and colored spacers, in 12-inch (300-mm) lengths.

D. Glazing Schedule: List glass types and thicknesses for each size opening and location. Use same designations indicated on Drawings.

E. Delegated-Design Submittal: For glass indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For installersand manufacturers of insulating-glass units with sputter-coated, low-e coatings .

B. Product Certificates: For glass and glazing products, from manufacturer.

C. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for coated glass insulating glass glazing sealants and glazing gaskets.

1. For glazing sealants, provide test reports based on testing current sealant formulations within previous 36-month period.

D. Preconstruction adhesion and compatibility test report.

E. Warranties: Sample of special warranties.

1.7 QUALITY ASSURANCE

A. Manufacturer Qualifications for Insulating-Glass Units with Sputter-Coated, Low-E Coatings: A qualified insulating-glass manufacturer who is approved and certified by coated-glass manufacturer.

B. Installer Qualifications: A qualified installer who employs glass installers for this Project who are certified under the National Glass Association's Certified Glass Installer Program.

C. Glass Testing Agency Qualifications: A qualified independent testing agency accredited according to the NFRC CAP 1 Certification Agency Program.

D. Sealant Testing Agency Qualifications: An independent testing agency qualified according to ASTM C 1021 to conduct the testing indicated.

E. Source Limitations for Glass: Obtain coated float glass and insulating glass from single source from single manufacturer for each glass type.

F. Source Limitations for Glazing Accessories: Obtain from single source from single manufacturer for each product and installation method.

G. Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations below, unless more stringent requirements are indicated. Refer to these publications for glazing terms not otherwise defined in this Section or in referenced standards.

1. GANA Publications: GANA's "Laminated Glazing Reference Manual" and GANA's "Glazing Manual."
2. AAMA Publications: AAMA GDSG-1, "Glass Design for Sloped Glazing," and AAMA TIR-A7, "Sloped Glazing Guidelines."
3. IGMA Publication for Sloped Glazing: IGMA TB-3001, "Guidelines for Sloped Glazing."
4. IGMA Publication for Insulating Glass: SIGMA TM-3000, "North American Glazing Guidelines for Sealed Insulating Glass Units for Commercial and Residential Use."

H. Safety Glazing Labeling: Where safety glazing labeling is indicated, permanently mark glazing with certification label of the SGCC or another certification agency acceptable to authorities having jurisdiction . Label shall indicate manufacturer's name, type of glass, thickness, and safety glazing standard with which glass complies.

I. Fire-Protection-Rated Glazing Labeling: Permanently mark fire-protection-rated glazing with certification label of a testing agency acceptable to authorities having jurisdiction. Label shall indicate manufacturer's name, test standard, whether glazing is for use in fire doors or other openings, whether or not glazing passes hose-stream test, whether or not glazing has a temperature rise rating of 450 deg F (250 deg C), and the fire-resistance rating in minutes.

J. Insulating-Glass Certification Program: Permanently marked either on spacers or on at least one component lite of units with appropriate certification label of IGCC.
1.

K. Preinstallation Conference: Conduct conference at Project site.

1. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
2. Review temporary protection requirements for glazing during and after installation.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Protect glazing materials according to manufacturer's written instructions. Prevent damage to glass and glazing materials from condensation, temperature changes, direct exposure to sun, or other causes.

B. Comply with insulating-glass manufacturer's written recommendations for venting and sealing units to avoid hermetic seal ruptures due to altitude change.

1.9 PROJECT CONDITIONS

A. Environmental Limitations: Do not proceed with glazing when ambient and substrate temperature conditions are outside limits permitted by glazing material manufacturers and when glazing channel substrates are wet from rain, frost, condensation, or other causes.

1. Do not install glazing sealants when ambient and substrate temperature conditions are outside limits permitted by sealant manufacturer or below 40 deg F (4.4 deg C).

1.10 WARRANTY

A. Manufacturer's Special Warranty for Coated-Glass Products: Manufacturer's standard form in which coated-glass manufacturer agrees to replace coated-glass units that deteriorate within specified warranty period. Deterioration of coated glass is defined as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning coated glass contrary to manufacturer's written instructions. Defects include peeling, cracking, and other indications of deterioration in coating.

1. Warranty Period: 10 years from date of Substantial Completion.

B. Manufacturer's Special Warranty on Laminated Glass: Manufacturer's standard form in which laminated-glass manufacturer agrees to replace laminated-glass units that deteriorate within specified warranty period. Deterioration of laminated glass is defined as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning laminated glass contrary to manufacturer's written instructions. Defects include edge separation, delamination materially obstructing vision through glass, and blemishes exceeding those allowed by referenced laminated-glass standard.

1. Warranty Period: Five years from date of Substantial Completion.

C. Manufacturer's Special Warranty on Insulating Glass: Manufacturer's standard form in which insulating-glass manufacturer agrees to replace insulating-glass units that deteriorate within specified warranty period. Deterioration of insulating glass is defined as failure of hermetic seal under normal use that is not attributed to glass breakage or to maintaining and cleaning insulating glass contrary to manufacturer's written instructions. Evidence of failure is the obstruction of vision by dust, moisture, or film on interior surfaces of glass.

1. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 GLASS PRODUCTS, GENERAL

A. Thickness: Where glass thickness is indicated, it is a minimum. Provide glass lites in thicknesses as needed to comply with requirements indicated.

1. Minimum Glass Thickness for Exterior Lites: Not less than 1 5-16/ inchor needed to meet the requirements set by the large missile impact test of the unit schedule to receive the glazing.

B. Strength: Where float glass is indicated, provide annealed float glass, Kind HS heat-treated float glass, or Kind FT heat-treated float glass as needed to comply with "Performance Requirements" Article. Where heat-strengthened glass is indicated, provide Kind HS heat-treated float glass or Kind FT heat-treated float glass as needed

to comply with "Performance Requirements" Article. Where fully tempered glass is indicated, provide Kind FT heat-treated float glass.

C. Windborne-Debris-Impact Resistance: Provide exterior glazing that passes enhanced-protection testing requirements in ASTM E 1996 for Wind Zone 3 when tested according to ASTM E 1886. Test specimens shall be no smaller in width and length than glazing indicated for use on the Project and shall be installed in same manner as glazing indicated for use on the Project.

1. Large-Missile Test: For glazing located within 30 feet (9.1 m) of grade.
2. Small-Missile Test: For glazing located more than 30 feet (9.1 m) above grade.

D. Thermal and Optical Performance Properties: Provide glass with performance properties specified, as indicated in manufacturer's published test data, based on procedures indicated below:

1. For monolithic-glass lites, properties are based on units with lites 1-5/16 inch or required to meet the large missile impact test for interior lights, properties are based on units with lites 6.0 mm thick.
2. For laminated-glass lites, properties are based on products of construction indicated.
3. For insulating-glass units, properties are based on units of thickness indicated for overall unit and for each lite.
4. U-Factors: Center-of-glazing values, according to NFRC 100 and based on LBL's WINDOW 5.2 computer program, expressed as Btu/sq. ft. x h x deg F (W/sq. m x K).
5. Solar Heat-Gain Coefficient and Visible Transmittance: Center-of-glazing values, according to NFRC 200 and based on LBL's WINDOW 5.2 computer program.
6. Visible Reflectance: Center-of-glazing values, according to NFRC 300.

2.2 GLASS PRODUCTS

A. Float Glass: ASTM C 1036, Type I, Quality-Q3, Class I (clear) unless otherwise indicated.

B. Heat-Treated Float Glass: ASTM C 1048; Type I; Quality-Q3; Class I (clear) unless otherwise indicated; of kind and condition indicated.

1. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed unless otherwise indicated.
2. For uncoated glass, comply with requirements for Condition A.
3. For coated vision glass, comply with requirements for Condition C (other coated glass).

2.3 LAMINATED GLASS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Viracon.

B. Windborne-Debris-Impact-Resistant Laminated Glass: ASTM C 1172, and complying with testing requirements in 16 CFR 1201 for Category II materials, with "Windborne-Debris-Impact Resistance" Paragraph in "Glass Products, General" Article, and with other requirements specified. Use materials that have a proven record of no tendency to bubble, discolor, or lose physical and mechanical properties after fabrication and installation.

1. Construction: Laminate glass with one of the following to comply with interlayer manufacturer's written recommendations:

a. Polyvinyl butyral interlayer.
b. Polyvinyl butyral interlayers reinforced with polyethylene terephthalate film.
c. Ionoplast interlayer.
d. Cast-in-place and cured-transparent-resin interlayer.
e. Cast-in-place and cured-transparent-resin interlayer reinforced with polyethylene terephthalate film.

2. Interlayer Thickness: Provide thickness not less than that indicated and as needed to comply with requirements.
3. Interlayer Color: Clear unless otherwise indicated.

C. Glass: Comply with applicable requirements in "Glass Products" Article as indicated by designations in "Laminated-Glass Types" Article.

2.4 INSULATING GLASS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Viracon.

B. Insulating-Glass Units: Factory-assembled units consisting of sealed lites of glass separated by a dehydrated interspace, qualified according to ASTM E 2190, and complying with other requirements specified.

1. Sealing System: Dual seal, with manufacturer's standard primary and secondary.
2. Spacer: Aluminum with mill or clear anodic finish .
3. Desiccant: Molecular sieve or silica gel, or blend of both.

C. Glass: Comply with applicable requirements in "Glass Products" Article and in "Laminated Glass" Article as indicated by designations in "Insulating-Glass Types" Article and in "Insulating-Laminated-Glass Types" Article.

2.5 FIRE-PROTECTION-RATED GLAZING

A. Fire-Protection-Rated Glazing, General: Listed and labeled by a testing agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated, based on testing according to NFPA 252 for door assemblies .

B. Laminated Ceramic Glazing: Laminated glass made from 2 plies of clear, ceramic flat glass; 5/16-inch (8-mm) total nominal thickness; complying with testing requirements in 16 CFR 1201 for Category II materials.

1. Products: Subject to compliance with requirements, provide one of the following:

   a. Nippon Electric Glass Co., Ltd. (distributed by Technical Glass Products); FireLite Plus.
   b. Schott North America, Inc.; Laminated Pyran Crystal.
   c. Vetrotech Saint-Gobain; SGG Keralite FR-L.

C. Fire-Protection-Rated Tempered Glass: 1/4-inch- (6.4-mm-) thick, fire-protection-rated tempered glass, complying with testing requirements in 16 CFR 1201 for Category II materials.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

   a. InterEdge, Inc., a subsidiary of AFG Industries, Inc.; PyroEdge-20.
   b. Safti First; SuperLite20.
   c. Vetrotech Saint-Gobain; SSG Pyroswiss.

2.6 GLAZING GASKETS

A. Dense Compression Gaskets: Molded or extruded gaskets of profile and hardness required to maintain watertight seal, made from one of the following:

1. Neoprene complying with ASTM C 864.
2. EPDM complying with ASTM C 864.
3. Silicone complying with ASTM C 1115.
4. Thermoplastic polyolefin rubber complying with ASTM C 1115.

B. Soft Compression Gaskets: Extruded or molded, closed-cell, integral-skinned neoprene EPDM silicone or thermoplastic polyolefin rubber gaskets complying with ASTM C 509, Type II, black; of profile and hardness required to maintain watertight seal.

1. Application: Use where soft compression gaskets will be compressed by inserting dense compression gaskets on opposite side of glazing or pressure applied by means of pressure-glazing stops on opposite side of glazing.

C. Lock-Strip Gaskets: Neoprene extrusions in size and shape indicated, fabricated into frames with molded corner units and zipper lock-strips, complying with ASTM C 542, black.

2.7 GLAZING SEALANTS

A. General:

1. Compatibility: Provide glazing sealants that are compatible with one another and with other materials they will contact, including glass products, seals of insulating-glass units, and glazing channel substrates, under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.
2. Suitability: Comply with sealant and glass manufacturers' written instructions for selecting glazing sealants suitable for applications indicated and for conditions existing at time of installation.
3. Sealants used inside the weatherproofing system shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
4. Colors of Exposed Glazing Sealants: As selected by Architect from manufacturer's full range.

B. Glazing Sealant: Neutral-curing silicone glazing sealant complying with ASTM C 920, Type S, Grade NS, Class 100/50, Use NT.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

   a. Dow Corning Corporation; 790.
   b. GE Advanced Materials - Silicones; SilPruf LM SCS2700.
   c. May National Associates, Inc.; Bondaflex Sil 290.
   d. Pecora Corporation; 890.
   e. Sika Corporation, Construction Products Division; SikaSil-C990.
   f. Tremco Incorporated; Spectrem 1.

2. Applications: Manufacturers recommended sealant or required to meet the requirements for large missile impact testing.

C. Glazing Sealant: Neutral-curing silicone glazing sealant complying with ASTM C 920, Type S, Grade NS, Class 50, Use NT.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. BASF Building Systems; Omniseal 50.
b. Dow Corning Corporation; 756 SMS .
c. GE Advanced Materials - Silicones; SilGlaze II SCS2800 .
d. May National Associates, Inc.; Bondaflex Sil 295.
e. Pecora Corporation; 864 .
f. Polymeric Systems, Inc.; PSI-641.
g. Sika Corporation, Construction Products Division; SikaSil-C995.
h. Tremco Incorporated; Spectrem 2.

2. Applications: Manufacturers recommended sealant or required to meet the requirements for large missile impact testing.

2.8 GLAZING TAPES

A. Back-Bedding Mastic Glazing Tapes: Preformed, butyl-based, 100 percent solids elastomeric tape; nonstaining and nonmigrating in contact with nonporous surfaces; with or without spacer rod as recommended in writing by tape and glass manufacturers for application indicated; and complying with ASTM C 1281 and AAMA 800 for products indicated below:

1. AAMA 804.3 tape, where indicated.
2. AAMA 806.3 tape, for glazing applications in which tape is subject to continuous pressure.
3. AAMA 807.3 tape, for glazing applications in which tape is not subject to continuous pressure.

B. Expanded Cellular Glazing Tapes: Closed-cell, PVC foam tapes; factory coated with adhesive on both surfaces; and complying with AAMA 800 for the following types:

1. AAMA 810.1, Type 1, for glazing applications in which tape acts as the primary sealant.
2. AAMA 810.1, Type 2, for glazing applications in which tape is used in combination with a full bead of liquid sealant.

2.9 MISCELLANEOUS GLAZING MATERIALS

A. General: Provide products of material, size, and shape complying with referenced glazing standard, requirements of manufacturers of glass and other glazing materials for application indicated, and with a proven record of compatibility with surfaces contacted in installation.

B. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.

C. Setting Blocks: Elastomeric material with a Shore, Type A durometer hardness of 85, plus or minus 5.

D. Spacers: Elastomeric blocks or continuous extrusions of hardness required by glass manufacturer to maintain glass lites in place for installation indicated.

E. Edge Blocks: Elastomeric material of hardness needed to limit glass lateral movement (side walking).

F. Cylindrical Glazing Sealant Backing: ASTM C 1330, Type O (open-cell material), of size and density to control glazing sealant depth and otherwise produce optimum glazing sealant performance.

G. Perimeter Insulation for Fire-Resistive Glazing: Product that is approved by testing agency that listed and labeled fire-resistant glazing product with which it is used for application and fire-protection rating indicated.

H. Laminated Panels: Large Missile Impact Resistant Panels with manufacturer's standard smooth exterior skin that is compatible with opening to receive panel. Provide manufacturer's standard waterproof/impact resistant substrate/core in thickness required to replace glass panel at storefront or curtainwall glass at locations indicated on drawings.

2.10 FABRICATION OF GLAZING UNITS

A. Fabricate glazing units in sizes required to fit openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written instructions of product manufacturer and referenced glazing publications, to comply with system performance requirements.

B. Clean-cut or flat-grind vertical edges of butt-glazed monolithic lites to produce square edges with slight chamfers at junctions of edges and faces.

C. Grind smooth and polish exposed glass edges and corners.

2.11 MONOLITHIC-GLASS TYPES

A. Glass Type [**GL-**]: Clear float glassorfully tempered float glass.

1. Thickness: 6.0 mm

2. Location:
   a. For all interior areas where the bottom of glass is 2'-0" above the finish floor provide float glass unless otherwise indicated.
   b. For all interior areas where the bottom of the glass is less than 2'-0" from the bottom of the floor provide tempered glass..
3. Provide safety glazing labeling.

2.12 LAMINATED-GLASS TYPES

A. Glass Type [**GL-**]: Clear laminated glass with two plies of fully tempered float glass .

1. Thickness of Each Glass Ply: as required by manufacturer to meet the requirements for large missile impact testing..
2. Interlayer Thickness: .as required by manufacturer to meet the requirements for large missile impact testing.
3. Provide safety glazing labeling.

B. Glass Type [**GL-**<#>]: Low-e-coated, laminated vision glass with two plies of clear fully tempered float glass.

1. Thickness of Each Glass Ply: as required by manufacturer to meet the requirements for large missile impact testing..
2. Interlayer Thickness: [as required by manufacturer to meet the requirements for large missile impact testing
3. Provide safety glazing labeling.

2.13 INSULATING-GLASS TYPES

A. Glass Type : Clear insulating glass.

1. Overall Unit Thickness: as required by manufacturer to meet the requirements for large missile impact testing..
2. Thickness of Each Glass Lite: as required by manufacturer to meet the requirements of large missile impact testing.
3. Provide safety glazing labeling.

B. Glass Type [**GL-**<#>]: Low-e-coated, clear insulating glass.

1. Overall Unit Thickness: as required by manufacturer to meet the requirements of large missile impact testing
2. Thickness of Each Glass Lite: as requirement by manufacturer to meet the requirements of large missile impact testing.
3. Provide safety glazing labeling.
4. Opaque Coating Location: Fourth surface.

2.14 INSULATING-LAMINATED-GLASS TYPES

A. Glass Type : Low-e-coated, clear insulating laminated glass.

1. Overall Unit Thickness: as required by manufacturer to meet the requirements of large missile impact testing.
2. Thickness of Outdoor Lite: as required by manufacturer to meet the requirements of large missile impact testing.
3. Provide safety glazing labeling.

2.15 FIRE-PROTECTION-RATED GLAZING TYPES

A. Glass Type : 20-minute fire-rated glazing without hose-stream test; fire-protection-rated tempered glass .

1. Provide safety glazing labeling.

2. Location: Manufacturer’s tested standard for 20 minute interior fire rated doors.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine framing, glazing channels, and stops, with Installer present, for compliance with the following:

1. Manufacturing and installation tolerances, including those for size, squareness, and offsets at corners.
2. Presence and functioning of weep systems.
3. Minimum required face and edge clearances.
4. Effective sealing between joints of glass-framing members.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Clean glazing channels and other framing members receiving glass immediately before glazing. Remove coatings not firmly bonded to substrates.

B. Examine glazing units to locate exterior and interior surfaces. Label or mark units as needed so that exterior and interior surfaces are readily identifiable. Do not use materials that will leave visible marks in the completed work.

3.3 GLAZING, GENERAL

A. Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials, unless more stringent requirements are indicated, including those in referenced glazing publications.

B. Adjust glazing channel dimensions as required by Project conditions during installation to provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances.

C. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass is glass with edge damage or other imperfections that, when installed, could weaken glass and impair performance and appearance.

D. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction testing.

E. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.

F. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.

G. Provide spacers for glass lites where length plus width is larger than 50 inches (1270 mm).

1. Locate spacers directly opposite each other on both inside and outside faces of glass. Install correct size and spacing to preserve required face clearances, unless gaskets and glazing tapes are used that have demonstrated ability to maintain required face clearances and to comply with system performance requirements.
2. Provide 1/8-inch (3-mm) minimum bite of spacers on glass and use thickness equal to sealant width. With glazing tape, use thickness slightly less than final compressed thickness of tape.

H. Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel, as recommended in writing by glass manufacturer and according to requirements in referenced glazing publications.

I. Set glass lites in each series with uniform pattern, draw, bow, and similar characteristics.

J. Set glass lites with proper orientation so that coatings face exterior or interior as specified.

K. Square cut wedge-shaped gaskets at corners and install gaskets in a manner recommended by gasket manufacturer to prevent corners from pulling away; seal corner joints and butt joints with sealant recommended by gasket manufacturer.

3.4 TAPE GLAZING

A. Position tapes on fixed stops so that, when compressed by glass, their exposed edges are flush with or protrude slightly above sightline of stops.

B. Install tapes continuously, but not necessarily in one continuous length. Do not stretch tapes to make them fit opening.

C. Cover vertical framing joints by applying tapes to heads and sills first and then to jambs. Cover horizontal framing joints by applying tapes to jambs and then to heads and sills.

D. Place joints in tapes at corners of opening with adjoining lengths butted together, not lapped. Seal joints in tapes with compatible sealant approved by tape manufacturer.

E. Do not remove release paper from tape until right before each glazing unit is installed.

F. Apply heel bead of elastomeric sealant.

G. Center glass lites in openings on setting blocks and press firmly against tape by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings.

H. Apply cap bead of elastomeric sealant over exposed edge of tape.

3.5 GASKET GLAZING (DRY)

A. Cut compression gaskets to lengths recommended by gasket manufacturer to fit openings exactly, with allowance for stretch during installation.

B. Insert soft compression gasket between glass and frame or fixed stop so it is securely in place with joints miter cut and bonded together at corners.

C. Installation with Drive-in Wedge Gaskets: Center glass lites in openings on setting blocks and press firmly against soft compression gasket by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.

D. Installation with Pressure-Glazing Stops: Center glass lites in openings on setting blocks and press firmly against soft compression gasket. Install dense compression gaskets and pressure-glazing stops, applying pressure uniformly to compression gaskets. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.

E. Install gaskets so they protrude past face of glazing stops.

3.6 SEALANT GLAZING (WET)

A. Install continuous spacers, or spacers combined with cylindrical sealant backing, between glass lites and glazing stops to maintain glass face clearances and to prevent sealant from extruding into glass channel and blocking weep systems until sealants cure. Secure spacers or spacers and backings in place and in position to control depth of installed sealant relative to edge clearance for optimum sealant performance.

B. Force sealants into glazing channels to eliminate voids and to ensure complete wetting or bond of sealant to glass and channel surfaces.

C. Tool exposed surfaces of sealants to provide a substantial wash away from glass.

3.7 LOCK-STRIP GASKET GLAZING

A. Comply with ASTM C 716 and gasket manufacturer's written instructions. Provide supplementary wet seal and weep system unless otherwise indicated.

3.8 CLEANING AND PROTECTION

A. Protect exterior glass from damage immediately after installation by attaching crossed streamers to framing held away from glass. Do not apply markers to glass surface. Remove nonpermanent labels and clean surfaces.

B. Protect glass from contact with contaminating substances resulting from construction operations. If, despite such protection, contaminating substances do come into contact with glass, remove substances immediately as recommended in writing by glass manufacturer.

C. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for buildup of dirt, scum, alkaline deposits, or stains; remove as recommended in writing by glass manufacturer.

D. Remove and replace glass that is broken, chipped, cracked, or abraded or that is damaged from natural causes, accidents, and vandalism, during construction period.

E. Wash glass on both exposed surfaces in each area of Project not more than four days before date scheduled for inspections that establish date of Substantial Completion. Wash glass as recommended in writing by glass manufacturer.

END OF SECTION 08800

SECTION 08830 - MIRRORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes the following types of silvered flat glass mirrors:
   1. Tempered glass mirrors qualifying as safety glazing.

B. Related Sections:

   1. Section 08800 "Glazing" for glass with reflective coatings used for vision and spandrel lites.

1.3 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified Installer.

B. Product Certificates: For each type of mirror and mirror mastic, from manufacturer.

C. Warranty: Sample of special warranty.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: A qualified installer who employs glass installers for this Project who are certified under the National Glass Association's Certified Glass Installer Program.

B. Source Limitations for Mirrors: Obtain mirrors from single source from single manufacturer.

C. Source Limitations for Mirror Accessories: Obtain mirror glazing accessories from single source.

D. Glazing Publications: Comply with the following published recommendations:

   1. GANA's "Glazing Manual" unless more stringent requirements are indicated. Refer to this publication for definitions of glass and glazing terms not otherwise defined in this Section or in referenced standards.

2. GANA Mirror Division's "Mirrors, Handle with Extreme Care: Tips for the Professional on the Care and Handling of Mirrors."

E. Safety Glazing Products: For tempered mirrors, provide products complying with testing requirements in 16 CFR 1201 for Category II materials.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Protect mirrors according to mirror manufacturer's written instructions and as needed to prevent damage to mirrors from moisture, condensation, temperature changes, direct exposure to sun, or other causes.

B. Comply with mirror manufacturer's written instructions for shipping, storing, and handling mirrors as needed to prevent deterioration of silvering, damage to edges, and abrasion of glass surfaces and applied coatings. Store indoors.

1.6 PROJECT CONDITIONS

A. Environmental Limitations: Do not install mirrors until ambient temperature and humidity conditions are maintained at levels indicated for final occupancy.

1.7 WARRANTY

A. Special Warranty: Manufacturer's standard form in which mirror manufacturer agrees to replace mirrors that deteriorate within specified warranty period. Deterioration of mirrors is defined as defects developed from normal use that are not attributed to mirror breakage or to maintaining and cleaning mirrors contrary to manufacturer's written instructions. Defects include discoloration, black spots, and clouding of the silver film.

1. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 SILVERED FLAT GLASS MIRRORS

A. Glass Mirrors, General: ASTM C 1503; manufactured using copper-free, low-lead mirror coating process.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   a. Binswanger Mirror; a division of Vitro America, Inc.
   b. Gardner Glass, Inc.
   c. Independent Mirror Industries, Inc.
   d. Lenoir Mirror Company.

e. National Glass Industries.
f. Virginia Mirror Company, Inc.

B. Annealed Monolithic Glass mirrors & mirrors select quality, clear
1. Nominal Thickness: 6.0 mm

C. Tempered Clear Glass: Mirror Glazing Quality, for blemish requirements; and comply with ASTM C 1048 for Kind FT, Condition A, tempered float glass before silver coating is applied.

1. Nominal Thickness: 1/4 inch.

2.2 MISCELLANEOUS MATERIALS

A. Setting Blocks: Elastomeric material with a Shore, Type A durometer hardness of 85, plus or minus 5.

B. Edge Sealer: Coating compatible with glass coating and approved by mirror manufacturer for use in protecting against silver deterioration at mirrored glass edges.

C. Mirror Mastic: An adhesive setting compound, asbestos-free, produced specifically for setting mirrors and certified by both mirror manufacturer and mastic manufacturer as compatible with glass coating and substrates on which mirrors will be installed.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
a. C.R. Laurence Co., Inc.
b. Liquid Nail Adhesive
c. Macco Adhesives; Liquid Nails Division.
d. Pecora Corporation.
e. Sommer & Maca Industries, Inc.

2.3 MIRROR HARDWARE

A. Top Channel/Cleat and Bottom Aluminum J-Channels: Aluminum extrusions with a return deep enough to produce a glazing channel to accommodate mirrors of thickness indicated and in lengths required to cover bottom and top edges of each mirror in a single piece.
1. Manufacturers: Subject to compliance with requirements, available Manufacturers offering products that may be incorporated into the project include, but are not limited to, the following:
a. C.R. Laurence
b. Andscot Company, Inc.
c. Stylmark, Inc.

2. Bottom Trim: J-channels formed with front leg and back leg not less than 3/8 and 7/8 inch in height, respectively and a thickness not less than 0.04 inch.

3. Top Trim: J-Channels formed with front leg and back leg not less than 5/8 and 1 inch in height, respectively, and a thickness of not less than 0.04 inch.

   a.

4. Finish: Clear bright anodized.

B. Fasteners: Fabricated of same basic metal and alloy as fastened metal and matching it in finished color and texture where fasteners are exposed.

C. Anchors and Inserts: Provide devices as required for mirror hardware installation. Provide toothed or lead-shield expansion-bolt devices for drilled-in-place anchors. Provide galvanized anchors and inserts for applications on inside face of exterior walls and where indicated.

2.4 FABRICATION

A. Mirror Sizes: To suit Project conditions, and before tempering, cut mirrors to final sizes and shapes. (Full width of wall unless otherwise indicated.)

B. Cutouts: Fabricate cutouts before tempering for notches and holes in mirrors without marring visible surfaces. Locate and size cutouts so they fit closely around penetrations in mirrors.

C. Mirror Edge Treatment: Flat polished.

1. Seal edges of mirrors with edge sealer after edge treatment to prevent chemical or atmospheric penetration of glass coating.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, over which mirrors are to be mounted, with Installer present, for compliance with installation tolerances, substrate preparation, and other conditions affecting performance of the Work.

B. Verify compatibility with and suitability of substrates, including compatibility of mirror mastic with existing finishes or primers.

C. Proceed with installation only after unsatisfactory conditions have been corrected and surfaces are dry.

3.2 PREPARATION

A. Comply with mastic manufacturer's written installation instructions for preparation of substrates, including coating substrates with mastic manufacturer's special bond coating where applicable.

3.3 INSTALLATION

A. General: Install mirrors to comply with mirror manufacturer's written instructions and with referenced GANA publications. Mount mirrors accurately in place in a manner that avoids distorting reflected images.

B. Provide a minimum air space of 1/8 inch (3 mm) between back of mirrors and mounting surface for air circulation between back of mirrors and face of mounting surface.

C. Wall-Mounted Mirrors: Install mirrors with mastic and mirror hardware. Attach mirror hardware securely to mounting surfaces with mechanical fasteners installed with anchors or inserts as applicable. Install fasteners so heads do not impose point loads on backs of mirrors.
   1. Top Channel/Cleat and Bottom Aluminum J-Channels: Fasten J-channel directly to wall and attach top trim to continuous cleat fastened directly to wall.
   2. Mirror Clips: Place a felt or plastic pad between mirror and each clip to prevent spalling of mirror edges. Locate clips so they are symmetrically placed and evenly spaced.
   3. Install mastic as follows:
      a. Apply barrier coat to mirror backing where approved in writing by manufacturers of mirrors and backing material.
      b. Apply mastic to comply with mastic manufacturer's written instructions for coverage and to allow air circulation between back of mirrors and face of mounting surface.
      c. After mastic is applied, align mirrors and press into place while maintaining a minimum air space of 1/8 inch (3 mm) between back of mirrors and mounting surface.

3.4 CLEANING AND PROTECTION

A. Protect mirrors from breakage and contaminating substances resulting from construction operations.

B. Do not permit edges of mirrors to be exposed to standing water.

C. Maintain environmental conditions that will prevent mirrors from being exposed to moisture from condensation or other sources for continuous periods of time.

D. Wash exposed surface of mirrors not more than four days before date scheduled for inspections that establish date of Substantial Completion. Wash mirrors as recommended in writing by mirror manufacturer.

END OF SECTION 08830

DIVISION 09

SECTION 09111 - NON-LOAD BEARING STEEL FRAMING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Non-structural metal framing systems for interior gypsum board assemblies.
2. Resilient channels for stud walls and fur
3. Suspension systems for interior gypsum ceilings, soffits, and grid systems.
4. Sound isolation clips

B. Related Requirements:

1. Section 05400 "Cold-Formed Metal Framing" for exterior and interior load-bearing wall studs; floor joists; roof rafters and ceiling joists; and roof trusses.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.4 INFORMATION SUBMITTALS

A. Evaluation Reports: Submit evaluation reports certified under an independent third-party inspection program administered by an agency accredited by IAS to ICC-ES AC98 accreditation criteria for inspection agencies.

1.5 QUALITY ASSURANCE

A. Code-Compliance Certification of Studs and Tracks: Provide documentation that framing members are certified in accordance with the product-certification program of the Steel Framing Industry Association (SFIA) or similar organization providing a verifiable code-compliance program.

PART 2 - PRODUCTS

2.1 DESCRIPTION

A. Fire-Test-Response Characteristics: For fire-resistance-rated assemblies that incorporate non-load-bearing steel framing, provide materials and construction identical to those tested in assembly indicated according to ASTM E 119 by an independent testing agency.

B. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 90 and classified according to ASTM E 413 by an independent testing agency.

C. Design framing systems in accordance with AISI S220 and ASTM C645, Section 10, unless otherwise indicated

2.2 FRAMING SYSTEMS

A. Framing Members, General: Comply with ASTM C 754 for conditions indicated.

1. Steel Sheet Components: Comply with AISI S220 and ASTM C 645, Section 10 requirements for metal unless otherwise indicated.
2. Protective Coating: Comply with AISI S220; ASTM A 653/A 653M, G40 (Z120); or coating with equivalent corrosion resistance for interior stud walls, ASTM A 653/A 653M, G60 (Z180) for exterior stud walls, hot-dip galvanized, unless otherwise indicated. Galvannealed products are unacceptable.

    a. Coating to demonstrate equivalent corrosion resistance with an evaluation report acceptable to authorities having jurisdiction.

B. Studs and Runners: AISI S220 and ASTM C 645, Section 10. Use either steel studs and runners or steel studs and runners of equivalent minimum base-steel thickness.

1. Steel Studs and Runners:

    a. Product: ClarkDietrich; ProSTUD Drywall Framing System with Smart Edge technology [and with DiamondPlus® Coating] or comparable product.
    b. Minimum Base-Steel Thickness: [**0.0181 inch (0.46 mm)**] [**0.0296 inch (0.75 mm)**] [**0.0329 inch (0.8382 mm)**] unless otherwise indicated on the drawings or required for walls over 12'-0" in height.
    c. Depth: As indicated on Drawings.

C. Slip-Type Head Joints: Where indicated, provide one of the following:

1. Single Long-Leg Runner System: AISI S220 top runner with 2-inch- (51-mm-) deep flanges in thickness not less than indicated for studs, installed with studs friction fit into top runner and with continuous bridging located within 12 inches (305 mm) of the top of studs to provide lateral bracing.
2. Deflection Track: Steel sheet top runner manufactured to prevent cracking of

finishes applied to interior partition framing resulting from deflection of structure above; in thickness not less than indicated for studs and in width to accommodate depth of studs.

a. Products: Subject to compliance with requirements, provide one of the following] [available products that may be incorporated into the Work include, but are not limited to, the following:

1) ClarkDietrich; MaxTrak Slotted Deflection Track.
2) MBA Building Supplies; FlatSteel Deflection Track or Slotted Deflecto Track.
3) Steel Network Inc. (The); VertiClip SLD or VertiTrack VTD Series.

D. Firestop Tracks: Top runner manufactured to allow partition heads to expand and contract with movement of the structure while maintaining continuity of fire-resistance- rated assembly indicated; in thickness not less than indicated for studs and in width to accommodate depth of studs.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. ClarkDietrich; BlazeFrame [**UltraBEAD with UltraTRAK Slotted System**] [**UltraBEAD with Deep Leg Deflection Track**] [**DL**] [**DSL**] [**RipTRAK**].
b. Fire Trak Corp.; Fire Trak System attached to studs with Fire Trak Posi Klip.
c. Metal-Lite, Inc.; The System.

E. Flat Strap and Backing Plate: Steel sheet for blocking and bracing in length and widthindicated.

1. Minimum Base-Steel Thickness: 0.018 inch (0.45 mm), 0.0296 inch (0.75 mm) unless otherwise indicated on the drawings.

F. Cold-Rolled Channel Bridging: Steel, 0.053-inch (1.34-mm) minimum base-steel thickness, with minimum 1/2-inch- (13-mm-) wide flanges.

1. Depth: 1-1/2 inches (38 mm).
2. Clip Angle: Not less than 1-1/2 by 1-1/2 inches (38 by 38 mm), 0.068-inch- (1.72-mm-) thick, galvanized steel.

G. Hat-Shaped, Rigid Furring Channels: AISI S220.

1. Product: ClarkDietrich; Furring Channel or comparable product.
2. Minimum Base-Steel Thickness: 0.0296 inch (0.75 mm) unless otherwise indicated on the drawings.
3. Depth: 7/8 inch (22.2 mm).

H. Cold-Rolled Furring Channels: 0.053-inch (1.34-mm) base-steel thickness, with

minimum 1/2-inch- (13-mm-) wide flanges.

1. Depth: As indicated on Drawings.
2. Furring Brackets: Adjustable, corrugated-edge type of steel sheet with minimum base-steel thickness of 0.0296 inch (0.75 mm).
3. Tie Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.062-inch- (1.59-mm-) diameter wire, or double strand of 0.048-inch- (1.21-mm-) diameter wire.

I. Resilient Furring Channels: 1/2 -inch deep, steel sheet members designed to reducesound transmission

1. Configuration: Asymmetrical
2. Products: Subject to compliance with requirements, available products that maybe incorporated into the Work include, but are not limited to, the following:

    a. ClarkDietrich RC Deluxe (Basis of Design)
    b. Marino Ware
    c. MBA Building Supplies
    d. MRI Steel Framing, LLC
    e. SCAFCO Steel Stud Company
    f. Steel Construction Systems

2.3 SUSPENSION SYSTEMS

A. Tie Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.062-inch- (1.59-mm-) diameter wire, or double strand of 0.048-inch- (1.21-mm-) diameter wire.

B. Wire Hangers: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.16 inch (4.12mm) in diameter.

C. Flat Hangers: Steel sheet, 1 by 3/16 inch (25 by 5 mm.

D. Carrying Channels: Cold-rolled, commercial-steel sheet with a base-steel thickness of 0.053 inch (1.34 mm) and minimum 1/2-inch- (13-mm-) wide flanges.

1. Depth: As indicated on Drawings otherwise 2 inches (51 mm).

E. Furring Channels (Furring Members):

1. Cold-Rolled Channels: 0.053-inch (1.34-mm) base-steel thickness, with minimum 1/2-inch- (13-mm-) wide flanges, 3/4 inch (19 mm) deep.
2. Steel Studs and Runners: AISI S220 and ASTM C 645, Section 10.

    a. Product: ClarkDietrich; ProSTUD Drywall Framing System with Smart Edge technology [and with DiamondPlus® Coating] or comparable product.
    b. Minimum Base-Steel Thickness: As indicated on Drawings otherwise

[**0.0181 inch (0.46 mm)**] [**0.0296 inch (0.75 mm)**] [**0.0329 inch (0.8382 mm)**].

c. Depth: As indicated on Drawings.

3. Hat-Shaped, Rigid Furring Channels: AISI S220, 7/8 inch (22 mm) deep.

a. Product: ClarkDietrich; Hat-Shaped, Rigid Furring Channels, or comparable product.
b. Minimum Base-Steel Thickness: As indicated on Drawings otherwise 0.0296 inch (0.75 mm).

F. Resilient Furring Channels: ½-inch deep members designed to reduce sound transmission

1. Configuration: Asymmetrical
2. Products: Subject to compliance with requirements, available products that maybe incorporated into the Work include, but are not limited to, the following:

a. ClarkDietrich RC Deluxe (Basis of Design)
b. Marino Ware
c. MBA Building Supplies
d. MRI Steel Framing, LLC
e. SCAFCO Steel Stud Company
f. Steel Construction Systems

G. Grid Suspension System for Gypsum Board Ceilings: ASTM C 645, direct-hung system composed of main beams and cross-furring members that interlock.

1. Products: Subject to compliance with requirements, available products that maybe incorporated into the Work include, but are not limited to, the following:

a. Armstrong World Industries, Inc.; Drywall Grid Systems.
b. USG Corporation; Drywall Suspension System.

H. Sound Isolation Clips: Resilient sound isolation clip installed for support of gypsum board for noise control in walls and ceilings

1. Products: Subject to compliance with requirements, available products that maybe incorporated into the Work include, but are not limited to, the following:

a. Pliteq GenieClip
b. PAC International

2.4 AUXILIARY MATERIALS

A. General: Provide auxiliary materials that comply with referenced installation standards.

1. Fasteners for Metal Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel members to substrates.

B. Isolation Strip at Exterior Walls: Provide the following:

1. Foam Gasket: Adhesive-backed, closed-cell vinyl foam strips that allow fastener penetration without foam displacement, 1/8 inch (3.2 mm) thick, in width to suit steel stud size.
2. Self-adhering membrane: as recommended by membrane manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and substrates, with Installer present, and including welded hollow-metal frames, cast-in anchors, and structural framing, for compliance with requirementsand other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Suspended Assemblies: Coordinate installation of suspension systems with installation of overhead structure to ensure that inserts and other provisions for anchorages to building structure have been installed to receive hangers at spacing required to support the Work and that hangers will develop their full strength.

1. Furnish concrete inserts and other devices indicated to other trades for installation in advance of time needed for coordination and construction.

B. Coordination with Sprayed Fire-Resistive Materials:

1. Before sprayed fire-resistive materials are applied, attach offset anchor plates or ceiling runners (tracks) to surfaces indicated to receive sprayed fire-resistive materials. Where offset anchor plates are required, provide continuous plates fastened to building structure not more than 24 inches (610 mm) o.c.
2. After sprayed fire-resistive materials are applied, remove them only to extent necessary for installation of non-load-bearing steel framing. Do not reduce thickness of fire-resistive materials below that required for fire-resistance ratings indicated. Protect adjacent fire-resistive materials from damage.

3.3 INSTALLATION, GENERAL

A. Installation Standard: ASTM C 754, except comply with framing sizes and spacing

indicated.

1. Portland Cement Plaster Assemblies: Also comply with requirements in ASTM C 1063 that apply to framing installation.
2. Gypsum Veneer Plaster Assemblies: Also comply with requirements inASTM C 844 that apply to framing installation.
3. Gypsum Board Assemblies: Also comply with requirements in ASTM C 840 thatapply to framing installation.

B. Install supplementary framing, and blocking to support fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, or similar construction.

C. Install bracing at terminations in assemblies.

D. Do not bridge building control and expansion joints with non-load-bearing steel framingmembers. Frame both sides of joints independently.

3.4 INSTALLING FRAMED ASSEMBLIES

A. Where studs are installed directly against exterior masonry walls or dissimilar metals atexterior walls, install isolation strip between studs and exterior wall.

B. Install studs so flanges within framing system point in same direction.

1. Space studs as follows:

   a. Single-Layer Application: 16 inches (406 mm) o.c. unless otherwise indicated.
   b. Multilayer Application: 16 inches (406 mm o.c. unless otherwise indicated.
   c. Tile Backing Panels: 16 inches (406 mm) o.c. unless otherwise indicated.

C. Install tracks (runners) at floors and overhead supports. Extend framing full height to structural supports or substrates above suspended ceilings, except where partitions are indicated to terminate at suspended ceilings. Continue framing around ducts penetrating partitions above ceiling.

1. Slip-Type Head Joints: Where framing extends to overhead structural supports, install to produce joints at tops of framing systems that prevent axial loading of finished assemblies.
2. Door Openings: Screw vertical studs at jambs to jamb anchor clips on door frames; install runner track section (for cripple studs) at head and secure to jamb studs.

   a. Install two studs at each jamb unless otherwise indicated.
   b. Install cripple studs at head adjacent to each jamb stud, with a minimum 1/2-inch (13-mm) clearance from jamb stud to allow for installation of control joint in finished assembly.

c. Extend jamb studs through suspended ceilings and attach to underside of overhead structure.

3. Other Framed Openings: Frame openings other than door openings the same as required for door openings unless otherwise indicated. Install framing below sills of openings to match framing required above door heads.
4. Fire-Resistance-Rated Partitions: Install framing to comply with fire-resistance-rated assembly indicated and support closures and to make partitions continuousfrom floor to underside of solid structure.

   a. Firestop Track: Where indicated, install to maintain continuity of fire-resistance-rated assembly indicated.

5. Sound-Rated Partitions: Install framing to comply with sound-rated assembly indicated.
6. Curved Partitions:

   a. Bend track to uniform curve and locate straight lengths so they are tangent to arcs.
   b. Begin and end each arch with a stud, and space intermediate studs quality along arcs. On straight lengths of no fewer than two studs at ends of arcs, place studs 6 inches o.c.

D. Installation Tolerance: Install each framing member so fastening surfaces vary notmore than 1/8 inch (3 mm) from the plane formed by faces of adjacent framing.

E. Direct furring: Attach to concrete or masonry with stud nails, screws designed formasonry attachment, or powder-driven fasteners spaced 24 inches o.c.

F. Z-Shaped Furring Members:

1. Erect insulation, specified under Section 07210 "Building Insulation" vertically and hold in pace with Z-shaped furring members spaced 24 inches o.c.
2. Except at exterior corners, securely attach narrow flanges of furring members to wall with concrete stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced 24 inches o.c.
3. At exterior corners, attach wide flanges of furring members to wall with short flange extending beyond corner; on adjacent wall surface, screw-attach short flange of furring channel to web of attached channel. At interior corners, space second member no more than 12 inches from corner and cut insulation to fit.
4. Installation tolerance: Install each framing member so fastening surfaces vary not more than 1/8 inch from the place formed by faces of adjacent framing.

3.5 INSTALLING SUSPENSION SYSTEMS

A. Install suspension system components in sizes and spacings indicated on Drawings, but not less than those required by referenced installation standards for assembly

types and other assembly components indicated.

B. Isolate suspension systems from building structure where they abut or are penetrated by building structure to prevent transfer of loading imposed by structural movement.

C. Suspend hangers from building structure as follows:

1. Install hangers plumb and free from contact with insulation or other objects withinceiling plenum that are not part of supporting structural or suspension system.

    a. Splay hangers only where required to miss obstructions and offset resultinghorizontal forces by bracing, countersplaying, or other equally effective means.

2. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with locations of hangers required to support standard suspension system members, install supplemental suspension members and hangers in the form of trapezes or equivalent devices.

    a. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced installation standards.

3. Wire Hangers: Secure by looping and wire tying, either directly to structures or toinserts, eye screws, or other devices and fasteners that are secure and appropriate for substrate, and in a manner that will not cause hangers to deteriorate or otherwise fail.
4. Flat Hangers: Secure to structure, including intermediate framing members, by attaching to inserts, eye screws, or other devices and fasteners that are secure and appropriate for structure and hanger, and in a manner that will not cause hangers to deteriorate or otherwise fail.
5. Do not attach hangers to steel roof deck.
6. Do not attach hangers to permanent metal forms. Furnish cast-in-place hanger inserts that extend through forms.
7. Do not attach hangers to rolled-in hanger tabs of composite steel floor deck.
8. Do not connect or suspend steel framing from ducts, pipes, or conduit.

D. Fire-Resistance-Rated Assemblies: Wire tie furring channels to supports.

E. Grid Suspension Systems: Attach perimeter wall track or angle where grid suspensionsystems meet vertical surfaces. Mechanically join main beam and cross-furring members to each other and butt-cut to fit into wall track.

F. Installation Tolerances: Install suspension systems that are level to within 1/8 inch in 12 feet (3 mm in 3.6 m) measured lengthwise on each member that will receive finishes and transversely between parallel members that will receive finishes.

END OF SECTION 09111

SECTION 09220 - PORTLAND CEMENT PLASTER

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:
1. Exterior portland cement plasterwork (stucco) on metal lath .

B. Related Sections:
1. Section 04813 “Brick Masonry Assemblies” for mock ups and installation of adjacent brick assemblies

2. Section 05400 "Cold-Formed Metal Framing" for structural, load-bearing (transverse and axial) steel studs and joists that support lath and portland cement plaster.
3. Section 06160 "Sheathing" for sheathing and water-resistant barriers included in portland cement plaster assemblies.
4. Section 07210 "Building Insulation" for thermal insulations and vapor retarders included in portland cement plaster assemblies.
5. Sections 07710 “Manufactured Roof Specialities” and 07620 “Sheet Metal Flashing and Trim” for manufactured stucco reglet and counterflashing included in protland cement plaster assemblies.
6. Section 09111 "Non-Load-Bearing Steel Framing" for non-structural framing and suspension systems that support lath and portland cement plaster.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

1.4 QUALITY ASSURANCE

A. Mockups: Before plastering, install mockups of at least 100 sq. ft. (9.3 sq. m) in surface area to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Install mockups for each type of finish indicated.

2. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

B. Preinstallation Conference: Conduct conference at Project site.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Store materials inside under cover and keep them dry and protected against damage from weather, direct sunlight, surface contamination, corrosion, construction traffic, and other causes.

1.6 PROJECT CONDITIONS

A. Comply with ASTM C 926 requirements.

B. Exterior Plasterwork:

1. Apply and cure plaster to prevent plaster drying out during curing period. Use procedures required by climatic conditions, including moist curing, providing coverings, and providing barriers to deflect sunlight and wind.
2. Apply plaster when ambient temperature is greater than 40 deg F (4.4 deg C).
3. Protect plaster coats from freezing for not less than 48 hours after set of plaster coat has occurred.

PART 2 - PRODUCTS

2.1 METAL LATH

A. Expanded-Metal Lath: ASTM C 847 with ASTM A 653/A 653M, G60 (Z180), hot-dip galvanized zinc coating.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

   a. Alabama Metal Industries Corporation; a Gibraltar Industries company.
   b. CEMCO.
   c. Clark Western Building Systems.
   d. Dietrich Metal Framing; a Worthington Industries company.
   e. MarinoWARE.
   f. Phillips Manufacturing Co.

2. Diamond-Mesh Lath: Self-furring, 2.5 lb/sq. yd. (1.4 kg/sq. m) for vertical surfaces and 3.4 lb/sq. yd. (1.8 kg/sq. m) for horizontal surfaces.

2.2 ACCESSORIES

A. General: Comply with ASTM C 1063 and coordinate depth of trim and accessories with thicknesses and number of plaster coats required.

B. Metal Accessories:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

    a. Alabama Metal Industries Corporation; a Gibraltar Industries company.
    b. CEMCO.
    c. Clark Western Building Systems.
    d. Dietrich Metal Framing; a Worthington Industries company.
    e. Fry Reglet Col
    f. MarinoWARE.
    g. Phillips Manufacturing Co.

2. Foundation Weep Screed: Fabricated from hot-dip galvanized-steel sheet, ASTM A 653/A 653M, G60 (Z180) zinc coating.
3. Cornerite: Fabricated from metal lath with ASTM A 653/A 653M, G60 (Z180), hot-dip galvanized zinc coating.
4. External-Corner Reinforcement: Fabricated from metal lath with ASTM A 653/A 653M, G60 (Z180), hot-dip galvanized zinc coating.
5. Cornerbeads: Fabricated from zinc or zinc-coated (galvanized) steel with a plastic nose.

    a. Small nose cornerbead with expanded flanges; use unless otherwise indicated.
    b. Small nose cornerbead with expanded flanges reinforced by perforated stiffening rib; use on columns and for finishing masonry corners.

6. Casing Beads: Fabricated from zinc or zinc-coated (galvanized) steel; square-edged style; with expanded flanges.
7. Control Joints: Fabricated from clear anodized aluminum finish; one-piece-type, folded pair of unperforated screeds in M-shaped configuration; with perforated flanges and removable protective tape on plaster face of control joint.
8. Drip Screed: Fabricated from clear anodized Aluminum finish

2.3 MISCELLANEOUS MATERIALS

A. Water for Mixing: Potable and free of substances capable of affecting plaster set or of damaging plaster, lath, or accessories.

B. Fiber for Base Coat: Alkaline-resistant glass or polypropylene fibers, 1/2 inch (13 mm) long, free of contaminants, manufactured for use in portland cement plaster.

C. Steel Drill Screws: For metal-to-metal fastening, ASTM C 1002 or ASTM C 954, as required by thickness of metal being fastened; with pan head that is suitable for application; in lengths required to achieve penetration through joined materials of no fewer than three exposed threads.

D. Fasteners for Attaching Metal Lath to Substrates: Complying with ASTM C 1063.

E. Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, not less than 0.0475-inch (1.21-mm) diameter, unless otherwise indicated.

2.4 PLASTER MATERIALS

A. Portland Cement: ASTM C 150, Type I or Type II.

1. Color for Finish Coats: White.

B. Lime: ASTM C 206, Type S; or ASTM C 207, Type S.

C. Sand Aggregate: ASTM C 897.

1. Color for Job-Mixed Finish Coats: White.

D. Ready-Mixed Finish-Coat Plaster: Mill-mixed portland cement, aggregates, coloring agents, and proprietary ingredients.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. Bonsal American, an Oldcastle Company; Marblesil Stucco Mix.
b. California Stucco Products Corp.; Conventional Portland Cement Stucco.
c. El Rey Stucco Company, Inc., a brand of ParexLaHabra, Inc.; Premium Stucco Finish.
d. Omega Products International, Inc.; ColorTek Exterior Stucco.
e. QUIKCRETE; QUIKCRETE Finish Coat Stucco, No. 1201.
f. Shamrock Stucco LLC; Exterior Stucco.
g. SonoWall, BASF Wall Systems, Inc.; Thoro Stucco.
h. USG Corporation; Oriental Exterior Finish Stucco.

2. Color: As selected by Architect from manufacturer's full range.

2.5 PLASTER MIXES

A. General: Comply with ASTM C 926 for applications indicated.

1. Fiber Content: Add fiber to base-coat mixes after ingredients have mixed at least two minutes. Comply with fiber manufacturer's written instructions for fiber quantities in mixes, but do not exceed 1 lb of fiber/cu. yd. (0.6 kg of fiber/cu. m) of cementitious materials.

B. Base-Coat Mixes for Use over Metal Lath: Scratch and brown coats for three-coat plasterwork as follows:

1. Portland Cement Mixes:

a. Scratch Coat: For cementitious material, mix 1 part portland cement and 3/4 to 1-1/2 parts lime. Use 2-1/2 to 4 parts aggregate per part of cementitious material.
b. Brown Coat: For cementitious material, mix 1 part portland cement and 3/4 to 1-1/2 parts lime. Use 3 to 5 parts aggregate per part of cementitious material, but not less than volume of aggregate used in scratch coat.

C. Base-Coat Mixes: Single base coats for two-coat plasterwork as follows:

1. Portland Cement Mix: For cementitious material, mix 1 part portland cement and 0 to 3/4 part lime. Use 2-1/2 to 4 parts aggregate per part of cementitious material.

D. Job-Mixed Finish-Coat Mixes:

1. Portland Cement Mix: For cementitious materials, mix 1 part portland cement and 3/4 to 1-1/2 parts lime. Use 1-1/2 to 3 parts aggregate per part of cementitious material.

E. Factory-Prepared Finish-Coat Mixes: For ready-mixed finish-coat plasters, comply with manufacturer's written instructions.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and substrates, with Installer present, and including welded hollow-metal frames, cast-in anchors, and structural framing, for compliance with requirements and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Protect adjacent work from soiling, spattering, moisture deterioration, and other harmful effects caused by plastering.

B. Prepare solid substrates for plaster that are smooth or that do not have the suction capability required to bond with plaster according to ASTM C 926.

3.3 INSTALLING METAL LATH

A. Expanded-Metal Lath: Install according to ASTM C 1063.

1. Partition Framing and Vertical Furring: Install 2.5 lb/sq yd self-furring diamond-mesh lath.
2. Flat-Ceiling and Horizontal Framing: Install 3.4 lb/sq yd self furring diamond-mesh lath.

3.4 INSTALLING ACCESSORIES

A. Install according to ASTM C 1063 and at locations indicated on Drawings.

B. Reinforcement for External Corners:

1. Install lath-type, external-corner reinforcement at exterior locations.

C. Control Joints: Install control joints at locations indicated on Drawings.

1. At distances between control joints of not greater than 18 feet (5.5 m) o.c.
2. As required to delineate plasterwork into areas (panels) with length-to-width ratios of not greater than 2-1/2:1.
3. Where control joints occur in surface of construction directly behind plaster.
4. Where plasterwork areas change dimensions, to delineate rectangular-shaped areas (panels) and to relieve the stress that occurs at the corner formed by the dimension change.

3.5 PLASTER APPLICATION

A. General: Comply with ASTM C 926.

1. Do not deviate more than plus or minus 1/4 inch in 10 feet (6.4 mm in 3 m) from a true plane in finished plaster surfaces, as measured by a 10-foot (3-m) straightedge placed on surface.
2. Finish plaster flush with metal frames and other built-in metal items or accessories that act as a plaster ground unless otherwise indicated. Where casing bead does not terminate plaster at metal frame, cut base coat free from metal frame before plaster sets and groove finish coat at junctures with metal.
3. Provide plaster surfaces that are ready to receive field-applied finishes indicated.

B. Bonding Compound: Apply on unit masonry and concrete plaster bases.

C. Walls; Base-Coat Mixes for Use over Metal Lath: Scratch and brown coats for three-coat plasterwork, on concrete; 3/4-inch (19-mm) thickness.

1. Portland cement mixes.

D. Ceilings; Base-Coat Mixes for Use over Metal Lath: Scratch and brown coats for three-coat plasterwork; 1/2 inch (13 mm) thick.

1. Portland cement mixes.

E. Plaster Finish Coats: Apply to provide smooth finish to match Architect's sample to receive elastomeric coating specified.

3.6 PLASTER REPAIRS

A. Repair or replace work to eliminate cracks, dents, blisters, buckles, crazing and check cracking, dry outs, efflorescence, sweat outs, and similar defects and where bond to substrate has failed.

3.7 PROTECTION

A. Remove temporary protection and enclosure of other work. Promptly remove plaster from door frames, windows, and other surfaces not indicated to be plastered. Repair floors, walls, and other surfaces stained, marred, or otherwise damaged during plastering.

END OF SECTION 09220

SECTION 09250 - GYPSUM BOARD

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Interior gypsum board.
2. Tile backing panels.
3. Texture finishes.

B. Related Requirements:
1. Section 09111 "Non-Load-Bearing Steel Framing" for non-structural framing and suspension systems that support gypsum board panels.
2. Section 09310 "Ceramic Tile" for cementitious backer units installed as substrates for ceramic tile.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.4 QUALITY ASSURANCE

A. Mockups: Before beginning gypsum board installation, install mockups of at least 100 sq. ft. (9 sq. m) in surface area to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Install mockups for the following:
   a. Each texture finish indicated.

2. Apply or install final decoration indicated, including painting and wallcoverings, on exposed surfaces for review of mockups.
3. Simulate finished lighting conditions for review of mockups.
4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.5 DELIVERY, STORAGE AND HANDLING

A. Store materials inside under cover and keep them dry and protected against weather, condensation, direct sunlight, construction traffic, and other potential causes of damage. Stack panels flat and supported on risers on a flat platform to prevent sagging.

1.6 FIELD CONDITIONS

A. Environmental Limitations: Comply with ASTM C 840 requirements or gypsum board manufacturer's written recommendations, whichever are more stringent.

B. Do not install paper-faced gypsum panels until installation areas are enclosed and conditioned.

C. Do not install panels that are wet, those that are moisture damaged, and those that are mold damaged.

1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Resistance-Rated Assemblies: For fire-resistance-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 119 by an independent testing agency.

B. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 90 and classified according to ASTM E 413 by an independent testing agency.

2.2 GYPSUM BOARD, GENERAL

A. Size: Provide maximum lengths and widths available that will minimize joints in each area and that correspond with support system indicated.

2.3 INTERIOR GYPSUM BOARD

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. American Gypsum.
2. CertainTeed Corp.
3. Georgia-Pacific Gypsum LLC.
4. Lafarge North America Inc.
5. National Gypsum Company.
6. USG Corporation.

B. Gypsum Wallboard: ASTM C 1396/C 1396M.

C. Gypsum Board, Type X: ASTM C 1396/C 1396M.

1. Thickness: 5/8 inch (15.9 mm).
2. Long Edges: Tapered and featured (rounded or beveled) for prefilling.

D. Moisture- and Mold-Resistant Gypsum Board: ASTM C 1396/C 1396M. With moisture- and mold-resistant core and paper surfaces.

1. Core: 5/8 inch (15.9 mm), Type X.
2. Long Edges: Tapered.
3. Mold Resistance: ASTM D 3273, score of 10 as rated according to ASTM D 3274.

2.4 TILE BACKING PANELS

A. Cementitious Backer Units: ANSI A118.9 and ASTM C 1288 or 1325, with manufacturer's standard edges.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

   a. C-Cure; C-Cure Board 990.
   b. CertainTeed Corp.; FiberCement BackerBoard.
   c. Custom Building Products; Wonderboard.
   d. James Hardie Building Products, Inc.; Hardiebacker.
   e. National Gypsum Company, Permabase Cement Board.
   f. USG Corporation; DUROCK Cement Board.

2. Thickness: 5/8 inch (15.9 mm).
3. Mold Resistance: ASTM D 3273, score of 10 as rated according to ASTM D 3274.

2.5 TRIM ACCESSORIES

A. Interior Trim: ASTM C 1047.

1. Material: Paper-faced galvanized steel sheet.
2. Shapes:

a. Cornerbead.
b. LC-Bead: J-shaped; exposed long flange receives joint compound.
c. L-Bead: L-shaped; exposed long flange receives joint compound.

B. Aluminum Trim: Extruded accessories of profiles and dimensions indicated.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. Fry Reglet Corp.
b. Gordon, Inc.
c. Pittcon Industries.

2. Aluminum: Alloy and temper with not less than the strength and durability properties of ASTM B 221 (ASTM B 221M), Alloy 6063-T5.
3. Finish: Clear Anodized Aluminum

2.6 JOINT TREATMENT MATERIALS

A. General: Comply with ASTM C 475/C 475M.

B. Joint Tape:

1. Interior Gypsum Board: Paper.
2. Tile Backing Panels: As recommended by panel manufacturer.

C. Joint Compound for Interior Gypsum Board: For each coat use formulation that is compatible with other compounds applied on previous or for successive coats.

1. Prefilling: At open joints, rounded or beveled panel edges, and damaged surface areas, use setting-type taping compound.
2. Embedding and First Coat: For embedding tape and first coat on joints, fasteners, and trim flanges, use setting-type taping compound.

a. Use setting-type compound for installing paper-faced metal trim accessories.

3. Fill Coat: For second coat, use setting-type, sandable topping compound.
4. Finish Coat: For third coat, use drying-type, all-purpose compound.

2.7 AUXILIARY MATERIALS

A. General: Provide auxiliary materials that comply with referenced installation standards and manufacturer's written recommendations.

B. Steel Drill Screws: ASTM C 1002, unless otherwise indicated.

1. Use screws complying with ASTM C 954 for fastening panels to steel members from 0.033 to 0.112 inch (0.84 to 2.84 mm) thick.
2. For fastening cementitious backer units, use screws of type and size recommended by panel manufacturer.

C. Sound Attenuation Blankets: ASTM C 665, Type I (blankets without membrane facing) produced by combining thermosetting resins with mineral fibers manufactured from glass, slag wool, or rock wool.

1. Fire-Resistance-Rated Assemblies: Comply with mineral-fiber requirements of assembly.

D. Acoustical Joint Sealant: Manufacturer's standard nonsag, paintable, nonstaining latex sealant complying with ASTM C 834. Product effectively reduces airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

   a. Accumetric LLC; BOSS 824 Acoustical Sound Sealant.
   b. Grabber Construction Products; Acoustical Sealant GSC.
   c. Pecora Corporation; AIS-919.
   d. Specified Technologies, Inc.; Smoke N Sound Acoustical Sealant.
   e. USG Corporation; SHEETROCK Acoustical Sealant.

2. Acoustical joint sealant shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

E. Thermal Insulation: As specified in Section 07210 "Building Insulation."

F. Vapor Retarder: As specified in Section 07210 "Building Insulation."

2.8 TEXTURE FINISHES

A. Primer: As recommended by textured finish manufacturer.

B. Non-Aggregate Finish: Pre-mixed, vinyl texture finish for spray application.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

   a. CertainTeed Corp.; ProRoc Easi-Tex Spray Texture.
   b. National Gypsum Company; Perfect Spray EM Texture.
   c. USG Corporation; BEADEX FasTex Wall and Ceiling Spray Texture.

2. Texture: Fine Orange Peel .

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and substrates including welded hollow-metal frames and framing, with Installer present, for compliance with requirements and other conditions affecting performance.

B. Examine panels before installation. Reject panels that are wet, moisture damaged, and mold damaged.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 APPLYING AND FINISHING PANELS, GENERAL

A. Comply with ASTM C 840.

B. Install ceiling panels across framing to minimize the number of abutting end joints and to avoid abutting end joints in central area of each ceiling. Stagger abutting end joints of adjacent panels not less than one framing member.

C. Install panels with face side out. Butt panels together for a light contact at edges and ends with not more than 1/16 inch (1.5 mm) of open space between panels. Do not force into place.

D. Locate edge and end joints over supports, except in ceiling applications where intermediate supports or gypsum board back-blocking is provided behind end joints. Do not place tapered edges against cut edges or ends. Stagger vertical joints on opposite sides of partitions. Do not make joints other than control joints at corners of framed openings.

E. Form control and expansion joints with space between edges of adjoining gypsum panels.

F. Cover both faces of support framing with gypsum panels in concealed spaces (above ceilings, etc.), except in chases braced internally.

1. Unless concealed application is indicated or required for sound, fire, air, or smoke ratings, coverage may be accomplished with scraps of not less than 8 sq. ft. (0.7 sq. m) in area.
2. Fit gypsum panels around ducts, pipes, and conduits.
3. Where partitions intersect structural members projecting below underside of floor/roof slabs and decks, cut gypsum panels to fit profile formed by structural members; allow 1/4- to 3/8-inch- (6.4- to 9.5-mm-) wide joints to install sealant.

G. Isolate perimeter of gypsum board applied to non-load-bearing partitions at structural abutments, except floors. Provide 1/4- to 1/2-inch- (6.4- to 12.7-mm-) wide spaces at

these locations and trim edges with edge trim where edges of panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.

H. Attachment to Steel Framing: Attach panels so leading edge or end of each panel is attached to open (unsupported) edges of stud flanges first.

I. STC-Rated Assemblies: Seal construction at perimeters, behind control joints, and at openings and penetrations with a continuous bead of acoustical sealant. Install acoustical sealant at both faces of partitions at perimeters and through penetrations. Comply with ASTM C 919 and with manufacturer's written recommendations for locating edge trim and closing off sound-flanking paths around or through assemblies, including sealing partitions above acoustical ceilings.

J. Install sound attenuation blankets before installing gypsum panels unless blankets are readily installed after panels have been installed on one side.

3.3 APPLYING INTERIOR GYPSUM BOARD

A. Install interior gypsum board in the following locations:
   1. Type X: Vertical and horizontal surfaces unless otherwise indicated.
   2. Moisture- and Mold-Resistant Type: In all wet areas on surface not scheduled to receive tile. Includes but not limited to Restrooms, Kitchen, Mop Closets, and Janitor’s Closet.

B. Single-Layer Application:

   1. On ceilings, apply gypsum panels before wall/partition board application to greatest extent possible and at right angles to framing unless otherwise indicated.
   2. On partitions/walls, apply gypsum panels vertically (parallel to framing) unless otherwise indicated or required by fire-resistance-rated assembly, and minimize end joints.

      a. Stagger abutting end joints not less than one framing member in alternate courses of panels.
      b. At stairwells and other high walls, install panels horizontally unless otherwise indicated or required by fire-resistance-rated assembly.

   3. On Z-furring members, apply gypsum panels vertically (parallel to framing) with no end joints. Locate edge joints over furring members.
   4. Fastening Methods: Apply gypsum panels to supports with steel drill screws.

3.4 APPLYING TILE BACKING PANELS

A. Cementitious Backer Units: ANSI A108.11, at locations indicated to receive tile.

B. Where tile backing panels abut other types of panels in same plane, shim surfaces to produce a uniform plane across panel surfaces.

3.5 INSTALLING TRIM ACCESSORIES

A. General: For trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels. Otherwise, attach trim according to manufacturer's written instructions.

B. Interior Trim: Install in the following locations:

1. Cornerbead: Use at outside corners unless otherwise indicated.
2. Bullnose Bead: Use at outside corners where indicated.
3. LC-Bead: Use at exposed panel edges.
4. L-Bead: Use where indicated.

C. Aluminum Trim: Install in locations indicated on Drawings.

3.6 FINISHING GYPSUM BOARD

A. General: Treat gypsum board joints, interior angles, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration. Promptly remove residual joint compound from adjacent surfaces.

B. Prefill open joints, rounded or beveled edges, and damaged surface areas.

C. Apply joint tape over gypsum board joints, except for trim products specifically indicated as not intended to receive tape.

D. Gypsum Board Finish Levels: Finish panels to levels indicated below and according to ASTM C 840:

1. Level 1: Ceiling plenum areas, concealed areas, and where indicated.
2. Level 2: Panels that are substrate for tile and Panels that are substrate for acoustical tile Where indicated on Drawings.
3. Level 4: At panel surfaces that will be exposed to view unless otherwise indicated.

E. Cementitious Backer Units: Finish according to manufacturer's written instructions.

3.7 APPLYING TEXTURE FINISHES

A. Surface Preparation and Primer: Prepare and apply primer to gypsum panels and other surfaces receiving texture finishes. Apply primer to surfaces that are clean, dry, and smooth.

B. Texture Finish Application: Mix and apply finish using powered spray equipment, to produce a uniform texture matching approved mockup and free of starved spots or other evidence of thin application or of application patterns.

C. Prevent texture finishes from coming into contact with surfaces not indicated to receive texture finish by covering them with masking agents, polyethylene film, or other means. If, despite these precautions, texture finishes contact these surfaces, immediately remove droppings and overspray to prevent damage according to texture-finish manufacturer's written recommendations.

3.8 PROTECTION

A. Protect adjacent surfaces from drywall compound and promptly remove from floors and other non-drywall surfaces. Repair surfaces stained, marred, or otherwise damaged during drywall application.

B. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.

C. Remove and replace panels that are wet, moisture damaged, and mold damaged.

1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION 09250

SECTION 09310 - CERAMIC TILE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Ceramic tile.
2. Tile backing panels.

B. Related Sections:

1. Section 07131 "Self-Adhering Sheet Waterproofing" for waterproofing under thickset mortar beds.
2. Section 07920 "Joint Sealants" for sealing of expansion, contraction, control, and isolation joints in tile surfaces.
3. Section 09250 "Gypsum Board" for cementitious backer units .
4. Section 09638 "Stone Flooring" for stone thresholds.

1.3 DEFINITIONS

A. General: Definitions in the ANSI A108 series of tile installation standards and in ANSI A137.1 apply to Work of this Section unless otherwise specified.

B. ANSI A108 Series: ANSI A108.01, ANSI A108.02, ANSI A108.1A, ANSI A108.1B, ANSI A108.1C, ANSI A108.4, ANSI A108.5, ANSI A108.6, ANSI A108.8, ANSI A108.9, ANSI A108.10, ANSI A108.11, ANSI A108.12, ANSI A108.13, ANSI A108.14, ANSI A108.15, ANSI A108.16, and ANSI A108.17, which are contained in "American National Standard Specifications for Installation of Ceramic Tile."

C. Module Size: Actual tile size plus joint width indicated.

D. Face Size: Actual tile size, excluding spacer lugs.

1.4 PERFORMANCE REQUIREMENTS

A. Static Coefficient of Friction: For tile installed on walkway surfaces, provide products with the following values as determined by testing identical products per ASTM C 1028:

1. Level Surfaces: Minimum 0.51.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Samples for Initial Selection: For each type of tile and grout indicated. Include Samples of accessories involving color selection.

C. Samples for Verification:

1. Full-size units of each type and composition of tile and for each color and finish required.
2. Full-size units of each type of trim and accessory for each color and finish required.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified Installer.

B. Master Grade Certificates: For each shipment, type, and composition of tile, signed by tile manufacturer and Installer.

C. Product Certificates: For each type of product, signed by product manufacturer.

D. Material Test Reports: For each tile-setting and -grouting product and special purpose tile.

1.7 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match and are from same production runs as products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Tile and Trim Units: Furnish quantity of full-size units equal to 3 percent of amount installed for each type, composition, color, pattern, and size indicated.

1.8 QUALITY ASSURANCE

A. Source Limitations for Tile: Obtain tile of each type from one source or producer.

1. Obtain tile of each type and color or finish from same production run and of consistent quality in appearance and physical properties for each contiguous area.

B. Source Limitations for Setting and Grouting Materials: Obtain ingredients of a uniform quality for each mortar, adhesive, and grout component from one manufacturer and each aggregate from one source or producer.

C. Source Limitations for Other Products: Obtain each of the following products specified in this Section from a single manufacturer for each product:
1. Joint sealants.
2. Cementitious backer units.

D. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
1. Build mockup of each type of floor tile installationBuild mockup of each type of wall tile installation.

2. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

E. Preinstallation Conference: Conduct conference at Project site.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Deliver and store packaged materials in original containers with seals unbroken and labels intact until time of use. Comply with requirements in ANSI A137.1 for labeling tile packages.

B. Store tile and cementitious materials on elevated platforms, under cover, and in a dry location.

C. Store aggregates where grading and other required characteristics can be maintained and contamination can be avoided.

D. Store liquid materials in unopened containers and protected from freezing.

E. Handle tile that has temporary protective coating on exposed surfaces to prevent coated surfaces from contacting backs or edges of other units. If coating does contact bonding surfaces of tile, remove coating from bonding surfaces before setting tile.

1.10 PROJECT CONDITIONS

A. Environmental Limitations: Do not install tile until construction in spaces is complete and ambient temperature and humidity conditions are maintained at the levels indicated in referenced standards and manufacturer's written instructions.

PART 2 - PRODUCTS

2.1 PRODUCTS, GENERAL

A. ANSI Ceramic Tile Standard: Provide tile that complies with ANSI A137.1 for types, compositions, and other characteristics indicated.

1. Provide tile complying with Standard grade requirements unless otherwise indicated.

B. ANSI Standards for Tile Installation Materials: Provide materials complying with ANSI A108.02, ANSI standards referenced in other Part 2 articles, ANSI standards referenced by TCA installation methods specified in tile installation schedules, and other requirements specified.

C. Factory Blending: For tile exhibiting color variations within ranges, blend tile in factory and package so tile units taken from one package show same range in colors as those taken from other packages and match approved Samples.

D. Mounting: For factory-mounted tile, provide back- or edge-mounted tile assemblies as standard with manufacturer unless otherwise indicated.

2.2 TILE PRODUCTS

A. Tile Type CT1-]: Factory-mounted glazed ceramic mosaic

a.

b. 1. Basis of Design Product: Subject to compliance with requirements, provided for:American Olean; Division of Dal-Tile International Inc.
c. Crossville, Inc.
d. Daltile; Division of Dal-Tile International Inc.; Keystone Series
e. Deutsche Steinzeug America, Inc.
f. Interceramic.
g. Lone Star Ceramics Company.
h. Grupo Porcelanite.
i. Portobello America, Inc.
j. Seneca Tiles, Inc.

2. Composition: .Vitreous or impervious natural clay or porcelain.
3. Module Size: .2 by 2 inches.
4. Thickness: 1/4 inch (6.35 mm).
5. Face: Pattern of design indicated,
6. SurfaceSlip resistant, with abrasive admixture.
7. Tile Color and Pattern: As selected by Architect from manufacturer's full range .
8. Grout Color: As selected by Architect from manufacturer's full range .

B. Tile Type QT1: Unglazed square-edged quarry tile.
1. Basis of Design Product: Subject to compliance with requirements, provide:

a. American Olean; Division of Dal-Tile International Inc.
b. Atlas Minerals & Chemicals, Inc.
c. Daltile; Division of Dal-Tile International Inc.
d. Deutsche Steinzeug America, Inc.
e. Endicott Tile Ltd.; Endicott Clay Products Co.
f. Florida Brick & Clay Company Inc.
g. Florida Tile Industries, Inc.
h. Interceramic.
i. Metropolitan Ceramics.
j. Portobello America, Inc.
k. Quarry Tile Co.
l. Seneca Tiles, Inc.
m. Summitville Tiles, Inc.
n. United States Ceramic Tile Company.

2. Face Size: 6 by 6 inches (152 by 152 mm) .
3. Thickness: .3/8 inch (9.5 mm)
4. Wearing Surface: Nonabrasive, smooth .
5. Tile Color and Pattern: As selected by Architect from manufacturer's full range.
6. Grout Color: As selected by Architect from manufacturer's full range .
7.
8. Trim Units: Coordinated with sizes and coursing of adjoining flat tile where applicable and matching characteristics of adjoining flat tile. Provide shapes as follows, selected from manufacturer's standard shapes:

a. Base: Coved, face size 6 by 6 inches (152 by 152 mm) .

C. Tile Type [**CT-**2-9]: Glazed wall tile .

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

    a. American Marazzi Tile, Inc.
    b. American Olean; Division of Dal-Tile International Inc.
    c. Daltile; Division of Dal-Tile International Inc.
    d. Deutsche Steinzeug America, Inc.
    e. Florida Tile Industries, Inc.
    f. Florim USA.
    g. Laufen.
    h. Grupo Porcelanite.
    i. Portobello America, Inc.
    j. Seneca Tiles, Inc.
    k. United States Ceramic Tile Company.

2. Module Size: varies
3. Thickness: 5/16 inch (8 mm).
4. Face: Plain with modified square edges or cushion edges .
5. Tile Color and Pattern: As selected by Architect from manufacturer's full range.
6. Grout Color: As selected by Architect from manufacturer's full range .
7. Mounting: Factory, back mounted.
8. Mounting: Pregrouted sheets of tiles factory assembled and grouted with manufacturer's standard white silicone rubber.
9. Trim Units: Coordinated with sizes and coursing of adjoining flat tile where applicable and matching characteristics of adjoining flat tile. Provide shapes as follows, selected from manufacturer's standard shapes:
    a. Internal Corners: Field-butted square corners. For coved base and cap use angle pieces designed to fit with stretcher shapes.

2.3 TILE BACKING PANELS

A. Cementitious Backer Units: ANSI A118.9 or ASTM C 1325, in maximum lengths available to minimize end-to-end butt joints.

1. Products: Subject to compliance with requirements, provide one of the following :
    a. Custom Building Products; Wonderboard.
    b. FinPan, Inc.; Util-A-Crete Concrete Backer Board.
    c. USG Corporation; DUROCK Cement Board.

2. Thickness: 5/8 inch (15.9 mm) .

2.4 SETTING MATERIALS

A. Dry-Set Portland Cement Mortar (Thin Set): ANSI A118.1.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
    a. C-Cure.
    b. Laticrete International, Inc.
    c. MAPEI Corporation.
    d. Southern Grouts & Mortars, Inc.

2. For wall applications, provide mortar that complies with requirements for nonsagging mortar in addition to the other requirements in ANSI A118.1.

2.5 GROUT MATERIALS

A. Sand-Portland Cement Grout: ANSI A108.10, composed of white or gray cement and white or colored aggregate as required to produce color indicated.

B. Standard Cement Grout: ANSI A118.6.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   a. C-Cure.
   b. Laticrete International, Inc.
   c. MAPEI Corporation.

2.6 ELASTOMERIC SEALANTS

A. General: Provide sealants, primers, backer rods, and other sealant accessories that comply with the following requirements and with the applicable requirements in Section 07920 "Joint Sealants."

B. Colors: Provide colors of exposed sealants to match colors of grout in tile adjoining sealed joints unless otherwise indicated.

C. One-Part, Mildew-Resistant Silicone Sealant: ASTM C 920; Type S; Grade NS; Class 25; Uses NT, G, A, and, as applicable to nonporous joint substrates indicated, O; formulated with fungicide, intended for sealing interior ceramic tile joints and other nonporous substrates that are subject to in-service exposures of high humidity and extreme temperatures.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

   a. DAP Inc.; Titanium Enriched Kitchen and Bath Sealant .
   b. Dow Corning Corporation; Dow Corning 786.
   c. GE Silicones; a division of GE Specialty Materials; Sanitary 1700.
   d. Laticrete International, Inc.; Latasil Tile & Stone Sealant.
   e. Pecora Corporation; Pecora 898 Sanitary Silicone Sealant.
   f. Tremco Incorporated; Tremsil 600 White.
   g. <

2.7 MISCELLANEOUS MATERIALS

A. Grout Sealer: Manufacturer's standardor the tile product for sealing grout joints and that does not change color or appearance of grout.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

   a. Bonsal American; an Oldcastle company; Grout Sealer.
   b. Custom Building Products; Grout Sealer.

c. Southern Grouts & Mortars, Inc.; Silicone Grout Sealer.
d. TEC; a subsidiary of H. B. Fuller Company; TA-256 Penetrating Silicone Grout Sealer.

2.8 MIXING MORTARS AND GROUT

A. Mix mortars and grouts to comply with referenced standards and mortar and grout manufacturers' written instructions.

B. Add materials, water, and additives in accurate proportions.

C. Obtain and use type of mixing equipment, mixer speeds, mixing containers, mixing time, and other procedures to produce mortars and grouts of uniform quality with optimum performance characteristics for installations indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions where tile will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of installed tile.

1. Verify that substrates for setting tile are firm, dry, clean, free of coatings that are incompatible with tile-setting materials including curing compounds and other substances that contain soap, wax, oil, or silicone; and comply with flatness tolerances required by ANSI A108.01 for installations indicated.

2. Verify that installation of grounds, anchors, recessed frames, electrical and mechanical units of work, and similar items located in or behind tile has been completed.
3. Verify that joints and cracks in tile substrates are coordinated with tile joint locations; if not coordinated, adjust joint locations in consultation with Architect.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Fill cracks, holes, and depressions in concrete substrates for tile floors installed with thin-set mortar with trowelable leveling and patching compound specifically recommended by tile-setting material manufacturer.

B. Where indicated, prepare substrates to receive waterproofing by applying a reinforced mortar bed that complies with ANSI A108.1A and is sloped 1/4 inch per foot (1:50) toward drains.

C. Blending: For tile exhibiting color variations, verify that tile has been factory blended and packaged so tile units taken from one package show same range of colors as those taken from other packages and match approved Samples. If not factory blended, either return to manufacturer or blend tiles at Project site before installing.

D. Field-Applied Temporary Protective Coating: If indicated under tile type or needed to prevent grout from staining or adhering to exposed tile surfaces, precoat them with continuous film of temporary protective coating, taking care not to coat unexposed tile surfaces.

3.3 TILE INSTALLATION

A. Comply with TCA's "Handbook for Ceramic Tile Installation" for TCA installation methods specified in tile installation schedules. Comply with parts of the ANSI A108 Series "Specifications for Installation of Ceramic Tile" that are referenced in TCA installation methods, specified in tile installation schedules, and apply to types of setting and grouting materials used.

1. For the following installations, follow procedures in the ANSI A108 Series of tile installation standards for providing 95 percent mortar coverage:
   a. Tile floors in wet areas.
   b. Tile floors in laundries.

B. Extend tile work into recesses and under or behind equipment and fixtures to form complete covering without interruptions unless otherwise indicated. Terminate work neatly at obstructions, edges, and corners without disrupting pattern or joint alignments.

C. Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Carefully grind cut edges of tile abutting trim, finish, or built-in items for straight aligned joints. Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so plates, collars, or covers overlap tile.

D. Provide manufacturer's standard trim shapes where necessary to eliminate exposed tile edges.

E. Jointing Pattern: Lay tile in grid pattern unless otherwise indicated. Lay out tile work and center tile fields in both directions in each space or on each wall area. Lay out tile work to minimize the use of pieces that are less than half of a tile. Provide uniform joint widths unless otherwise indicated.

1. For tile mounted in sheets, make joints between tile sheets same width as joints within tile sheets so joints between sheets are not apparent in finished work.
2. Where adjoining tiles on floor, base, walls, or trim are specified or indicated to be same size, align joints.
3. Where tiles are specified or indicated to be whole integer multiples of adjoining tiles on floor, base, walls, or trim, align joints unless otherwise indicated.

F. Joint Widths: Unless otherwise indicated, install tile with the following joint widths:
1. Quarry Tile: 3/8 inch (9.5 mm).
2. Glazed Wall Tile: 1/16 inch (1.6 mm).

G. Lay out tile wainscots to dimensions indicated or to next full tile beyond dimensions indicated.

H. Expansion Joints: Provide expansion joints and other sealant-filled joints, including control, contraction, and isolation joints, where indicated. Form joints during installation of setting materials, mortar beds, and tile. Do not saw-cut joints after installing tiles.

1. Where joints occur in concrete substrates, locate joints in tile surfaces directly above them.

I. Grout Sealer: Apply grout sealer to cementitious grout joints in tile floors according to grout-sealer manufacturer's written instructions. As soon as grout sealer has penetrated grout joints, remove excess sealer and sealer from tile faces by wiping with soft cloth.

3.4 TILE BACKING PANEL INSTALLATION

A. Install cementitious backer units and treat joints according to ANSI A108.11 and manufacturer's written instructions for type of application indicated. Use latex-portland cement mortar for bonding material unless otherwise directed in manufacturer's written instructions.

3.5 CLEANING AND PROTECTING

A. Cleaning: On completion of placement and grouting, clean all ceramic tile surfaces so they are free of foreign matter.

1. Remove latex-portland cement grout residue from tile as soon as possible.
2. Clean grout smears and haze from tile according to tile and grout manufacturer's written instructions but no sooner than 10 days after installation. Use only cleaners recommended by tile and grout manufacturers and only after determining that cleaners are safe to use by testing on samples of tile and other surfaces to be cleaned. Protect metal surfaces and plumbing fixtures from effects of cleaning. Flush surfaces with clean water before and after cleaning.
3. Remove temporary protective coating by method recommended by coating manufacturer and that is acceptable to tile and grout manufacturer. Trap and remove coating to prevent drain clogging.

B. Protect installed tile work with kraft paper or other heavy covering during construction period to prevent staining, damage, and wear. If recommended by tile manufacturer, apply coat of neutral protective cleaner to completed tile walls and floors.

C. Prohibit foot and wheel traffic from tiled floors for at least seven days after grouting is completed.

D. Before final inspection, remove protective coverings and rinse neutral protective cleaner from tile surfaces.

1. Tile Installation F113: Thin-set mortar; TCA F113.

    a. Tile Type: quarry tile and glazed ceramic mosaics
    b. Thin-Set Mortar: Dry-set portland cement mortar.
    c. Grout: Sand-portland cement grout.

2. Tile Installation W244: Thin-set mortar on cementitious backer units or fiber cement underlayment; TCA W244.

    a. Tile Type: Semi Gloss Porcelain tile
    b. Thin-Set Mortar: Dry-set portland cement mortar.
    c. Grout: Sand-portland cement grout.

END OF SECTION 09310

SECTION 09512 - ACOUSTICAL TILE CEILINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes acoustical tiles for ceilings and the following:

1. Concealed suspension systems.

1.3 DEFINITIONS

A. AC: Articulation Class.

B. CAC: Ceiling Attenuation Class.

C. LR: Light-Reflectance coefficient.

D. NRC: Noise Reduction Coefficient.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Samples for Verification: For each component indicated and for each exposed finish required, prepared on Samples of size indicated below.

1. Acoustical Tile: Set of full-size Samples of each type, color, pattern, and texture.
2. Concealed Suspension System Members: 12-inch- long Sample of each type.
3. Exposed Moldings and Trim: Set of 12-inch- long Samples of each type and color.

C. Qualification Data: For testing agency.

D. Maintenance Data: For finishes to include in maintenance manuals.

1.5 QUALITY ASSURANCE

A. Acoustical Testing Agency Qualifications: An independent testing laboratory, or an NVLAP-accredited laboratory, with the experience and capability to conduct the testing indicated. NVLAP-accredited laboratories must document accreditation, based on a "Certificate of Accreditation" and a "Scope of Accreditation" listing the test methods specified.

B. Source Limitations: Obtain each type of acoustical ceiling tile and supporting suspension system through one source from a single manufacturer.

C. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver acoustical tiles, suspension system components, and accessories to Project site in original, unopened packages and store them in a fully enclosed, conditioned space where they will be protected against damage from moisture, humidity, temperature extremes, direct sunlight, surface contamination, and other causes.

B. Before installing acoustical tiles, permit them to reach room temperature and a stabilized moisture content.

C. Handle acoustical tiles carefully to avoid chipping edges or damaging units in any way.

1.7 PROJECT CONDITIONS

A. Environmental Limitations: Do not install acoustical tile ceilings until spaces are enclosed and weatherproof, wet work in spaces is complete and dry, work above ceilings is complete, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

1. Pressurized Plenums: Operate ventilation system for not less than 48 hours before beginning acoustical tile ceiling installation.

1.8 COORDINATION

A. Coordinate layout and installation of acoustical tiles and suspension system with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, fire-suppression system, and partition assemblies.

1.9 EXTRA MATERIALS

A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Acoustical Ceiling Units: Full-size tiles equal to 2.0 percent of quantity installed.
2. Suspension System Components: Quantity of each concealed grid and exposed component equal to 2.0 percent of quantity installed.

PART 2 - PRODUCTS

2.1 ACOUSTICAL TILES, GENERAL

A. Acoustical Tile Standard: Provide manufacturer's standard tiles of configuration indicated that comply with ASTM E 1264 classifications as designated by types, patterns, acoustical ratings, and light reflectances, unless otherwise indicated.

1. Mounting Method for Measuring NRC: Type E-400; plenum mounting in which face of test specimen is 15-3/4 inches away from test surface per ASTM E 795.

B. Acoustical Tile Colors and Patterns: Match appearance characteristics indicated for each product type.

C. Antimicrobial Fungicide Treatment: Provide acoustical tiles with face and back surfaces coated with antimicrobial treatment consisting of manufacturer's standard formulation with fungicide added to inhibit growth of mold and mildew and showing no mold or mildew growth when tested according to ASTM D 3273 and evaluated according to ASTM D 3274 or ASTM G 21.

2.2 ACOUSTICAL TILES FOR ACOUSTICAL TILE CEILING IN ALL AREAS UNLESS OTHERWISE NOTED

Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:

A. Basis-of-Design Product: Subject to compliance with requirements, provide Armstrong World Industries, Cirrus Beveled Tegular 9/16”, 589 or Architect approved equal non-fissured, fine textured tile:

B. Classification: Provide tiles complying with ASTM E 1264 for type, form, and pattern as follows:
1. Type and Form: Wet-formed mineral board
2. Pattern: As indicated by manufacturer's designation

C. Color: White.

D. LR: Not less than 0.80

E. NRC: Not less than 0.60.

F. CAC: Not less than 35 .

G. Edge/Joint Detail: Beaded Tegular for interface with Superfine 9/16” Exposed Tee.

H. Thickness: 9/16”.

I. Modular Size: 24”x24” (610 x 610mm).

2.3 METAL SUSPENSION SYSTEMS, GENERAL

A. Metal Suspension System Standard: Provide manufacturer's standard metal suspension systems of types, structural classifications, and finishes indicated that comply with applicable requirements in ASTM C 635.

B. Finishes and Colors, General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes. Provide manufacturer's standard factory-applied finish for type of system indicated.

C. Attachment Devices: Size for five times the design load indicated in ASTM C 635, Table 1, "Direct Hung," unless otherwise indicated. Comply with seismic design requirements.

1. Anchors in Concrete: Anchors of type and material indicated below, with holes or loops for attaching hangers of type indicated and with capability to sustain, without failure, a load equal to five times that imposed by ceiling construction, as determined by testing per ASTM E 488 or ASTM E 1512 as applicable, conducted by a qualified testing and inspecting agency. *Select type from three options in subparagraph below. Verify with Project's structural engineer.

a. Type: Postinstalled expansion or Postinstalled bonded anchors.
b. Corrosion Protection: Carbon-steel components zinc plated to comply with ASTM B 633, Class Fe/Zn 5 (0.005 mm) for Class SC 1 service condition.

2. Power-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hangers of type indicated, and with capability to sustain, without failure, a load equal to 10 times that imposed by ceiling construction, as determined by testing per ASTM E 1190, conducted by a qualified testing and inspecting agency. * Note: fasteners allowed at existing concrete joists or beams only. Acceptable for only distributed ceiling systems only and not for point loaded suspension.

D. Wire Hangers, Braces, and Ties: Provide wires complying with the following requirements:

1. Zinc-Coated, Carbon-Steel Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper.

E. Hanger Rods or Flat Hangers: Mild steel, zinc coated or protected with rust-inhibitive paint.

F. Angle Hangers: Angles with legs not less than 7/8 inch wide; formed with 0.04-inch- thick, galvanized steel sheet complying with ASTM A 653/A 653M, G90 coating designation; with bolted connections and 5/16-inch- diameter bolts.

2.4 METAL SUSPENSION SYSTEM FOR ACOUSTICAL TILE CEILING IN ALL AREAS UNLESS OTHERWISE NOTED

A. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:

B. Basis-of-Design Product: Subject to compliance with requirements, provide Armstrong World Industries, Superfine 9/16” Exposed Tee

2.5 METAL SUSPENSION SYSTEM FOR ACOUSTICAL TILE CEILING IN KITCHEN AND ALL KITCHEN SUPPORT AREAS

A. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:

B. Basis-of-Design Product: Subject to compliance with requirements, provide Armstrong World Industries,15/16" Exposed Tee Lay-In Grid

C. Direct-Hung, Double-Web**,** Suspension System: Main and cross runners roll formed from and capped with cold-rolled steel sheet, prepainted, electrolytically zinc coated, or hot-dip galvanized according to ASTM A 653/A 653M, G30 coating designation.

1. Structural Classification: Intermediate.

a. Initial Access Opening: In each module, .

D. Indirect-HungSuspension System: Main and cross runners roll formed from cold-rolled steel sheet, prepainted, electrolytically zinc coated, or hot-dip galvanized according to ASTM A 653/A 653M, G30 coating designation.

1. Structural Classification: Intermediate-duty system.
2. Carrying Channels: Cold-rolled steel, 0.059850-inch- minimum base (uncoated) metal thickness, not less than 3/16-inch- wide flanges by 1-1/2-inch- deep steel channels, 475 lb/1000 feet, with rust-inhibitive paint finish .

2.6 METAL EDGE MOLDINGS AND TRIM

A. Basis-of-Design Product: Subject to compliance with requirements, provide Armstrong World Industries

B. Roll-Formed, Sheet-Metal Edge Moldings and Trim: Type and profile indicated or, if not indicated, manufacturer's standard moldings for edges and penetrations that comply with seismic design requirements; formed from sheet metal of same material, finish, and color as that used for exposed flanges of suspension system runners.

1. Provide manufacturer's standard edge moldings that fit acoustical tile edge details and suspension systems indicated and that match width and configuration of exposed runners, unless otherwise indicated.
2. Conversion-Coated Finish: AA-M12C42 (Chemical Finish: cleaned with inhibited chemicals; acid-chromate-fluoride-phosphate conversion coating).
3. Baked-Enamel Finish: AA-C12C42R1x (Chemical Finish: cleaned with inhibited chemicals; Chemical Finish: acid-chromate-fluoride-phosphate conversion coating; organic coating: as specified below). Apply baked enamel complying with paint manufacturer's written instructions for cleaning, conversion coating, and painting.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, including structural framing and substrates to which acoustical tile ceilings attach or abut, with Installer present, for compliance with requirements specified in this and other Sections that affect ceiling installation and anchorage and with requirements for installation tolerances and other conditions affecting performance of acoustical tile ceilings.

1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Measure each ceiling area and establish layout of acoustical tiles to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width tiles at borders, and comply with layout shown on reflected ceiling plans.

3.3 INSTALLATION, SUSPENDED ACOUSTICAL TILE CEILINGS

A. General: Install acoustical tile ceilings to comply with ASTM C 636 and seismic design requirements indicated, per manufacturer's written instructions and CISCA's "Ceiling Systems Handbook."

B. Suspend ceiling hangers from building's structural members and as follows:

1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structure or of ceiling suspension system.
2. Splay hangers only where required to miss obstructions; offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
3. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with location of hangers at spacings required to support standard suspension system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices.
4. Secure wire hangers to ceiling suspension members and to supports above with a minimum of three tight turns. Connect hangers directly either to structures or to inserts, eye screws, or other devices that are secure and appropriate for substrate and that will not deteriorate or otherwise fail due to age, corrosion, or elevated temperatures.
5. When steel framing does not permit installation of hanger wires at spacing required, install carrying channels or other supplemental support for attachment of hanger wires.
6. Do not attach hangers to steel roof deck. Attach hangers to structural members.
7. Space hangers not more than 48 inches o.c. along each member supported directly from hangers, unless otherwise indicated; provide hangers not more than 8 inches from ends of each member.
8. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards and publications.

C. Install edge moldings and trim of type indicated at perimeter of acoustical tile ceiling area and where necessary to conceal edges of acoustical tiles.

1. Do not use exposed fasteners, including pop rivets, on moldings and trim.

D. Install suspension system runners so they are square and securely interlocked with one another. Remove and replace dented, bent, or kinked members.

E. Arrange directionally patterned acoustical tiles as follows:

1. As indicated on reflected ceiling plans.

F. Install acoustical tiles in coordination with suspension system and exposed moldings and trim. Place splines or suspension system flanges into kerfed edges so tile-to-tile joints are closed by double lap of material.

1. Fit adjoining tile to form flush, tight joints. Scribe and cut tile for accurate fit at borders and around penetrations through tile.
2. Hold tile field in compression by inserting leaf-type, spring-steel spacers between tile and moldings, spaced 12 inches o.c.

3.4 FIELD QUALITY CONTROL

3.5 CLEANING

A. Clean exposed surfaces of acoustical tile ceilings, including trim and edge moldings. Comply with manufacturer's written instructions for cleaning and touchup of minor finish damage. Remove and replace tiles and other ceiling components that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

END OF SECTION 09512

SECTION 09 60 1

ACOUSTIC UNDERLAYMENT

PART 1 - General

1.1 Summary

A. The work of this section includes:
   1. Types of re-bonded recycled rubber sound control underlayment to be placed under hard surface flooring at upper level floors
   2. Adhesives for finished floors to sound control underlayment

1.2 Related Sections
   1. Section 09 30310 –CeramicTile
   2. Section 09 651– Resilient Tile Flooring
   3. Section 09681- Tile Carpeting

1.3 References
A. Standards listed by reference, including revisions by issuing authority, form a part of this specification section to extent indicated. The standards listed are identified by an issuing authority, authority abbreviation, designation number, title, or other designation established by the issuing authority. The standards subsequently referenced herein are referred to by an issuing authority and standard designation.
B. ASTM E492 - Standard Test Method for Laboratory Measurement of Impact Sound Transmission Through Floor-Ceiling Assemblies Using the Tapping Machine
C. ASTM C627 - Standard Test Method for Evaluating Ceramic Floor Tile Installation Systems Using the Robinson-Type Floor Tester
D. ASTM E989 - Standard Classification for Determination of Impact Insulation Class (IIC)
E. ASTM E1007 - Standard Test Method for Field Measurement of Tapping Machine Impact Sound Transmission Through Floor-Ceiling Assemblies and Associated Support Structures
F. ASTM E2179 - Standard Test Method for Laboratory Measurement of the Effectiveness of Floor Coverings in Reducing Impact Sound Transmission Through Concrete Floors
G. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements
H. ASTM E336 - Standard Test Method for Measurement of Airborne Sound Insulation in Buildings
I. ASTM F2170 - Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in-situ Probes
J. ASTM D5116 CHPS/CA 01350 – Collaborative of High Performance Schools, Low-Emitting Materials Criteria
K. ASTM F1869 - Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride
L. ASTM F924 Standard Test Method for Resistance to Puncture of Cushioned Resilient Floor Coverings
M. ASTM F1265 - Standard Test Method for Resistance to Impact for Resilient Floor Tiles
N. ASTM F2753 - Standard Practice to Evaluate the Effects of Dynamic Rolling Load over Resilient Floor Covering System

O. ASTM D5215 - Standard Test Method for Instrumental Evaluation of Staining of Vinyl Flooring by Adhesives
P. ASTM D297 - Standard Test Method for Rubber Products - Chemical Analysis 1.2.2.16: ASTM C627 - Standard Test Method for Evaluating Ceramic Floor Tile Installation
Q. Systems Using the Robinson Wheel-Type Floor Tester
R. ASTM F2170 - Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs using in situ Probes

1.4 System Description
A. Performance Requirements: Provide recycled rubber resilient underlayment, which has been manufactured and installed to maintain performance criteria stated by manufacturer without defects, damage, or failure.

1.5 Submittals
A. General: Submit listed submittals in accordance with Conditions of the Contract and Division 1 Submittal Procedures Section.
B. Product Data: Submit product data, including manufacturer's guide specifications product sheet, for specified products.
C. Shop Drawings: Manufacturer's specifications, catalog cuts, and other items needed to demonstrate compliance with the specified requirements. Also the manufacturer's recommended installation procedures, which, when approved by the architect, will become the basis for accepting or rejecting actual installation procedures used on work.
D. Samples: Submit selection and verification samples for finishes, colors, and textures.
E. Quality Assurance Submittals: Submit the following:
    1. Certificates: If required, certification of performance characteristics specified in this document shall be provided by the manufacturer.
    2. Manufacturer's Instructions: Manufacturer's installation instructions.
    3. Sound Control Underlayment material manufacturer shall provide a Certificate of Compliance certifying that the material is compliant with all of the material specifications as outlined in Section 2, and the Certificate of Compliance shall be stamped by a Professional Engineer.
    4. Closeout Submittals
        a. Warranty: Warranty documents specified herein.

1.6 Quality Assurance
A. Qualifications
    1. Installer Qualifications: Installer experienced in performing work of this section who has specialized in installation of work similar to that required for this project.
        a. Certificate: When requested, submit certificate indicating qualification.
        b. Manufacturers' Qualifications: Manufacturer capable of approving application method.
    2. Regulatory Requirements: [specify applicable requirements of regulatory agencies].
B. Pre-installation Meetings: Conduct pre-installation meeting to verify project requirements, substrate conditions, manufacturer's instructions, and manufacturer's warranty requirements. Comply with Division 1 Project Management and Coordination (Project Meetings) Section.

1.7 Delivery, Storage, and Handling
A. General: Comply with Division 1 Product Requirements Sections.
B. Ordering: Comply with manufacturer's ordering instructions and lead time requirements to

avoid construction delays.

C. Delivery: Deliver materials in manufacturer's original, unopened, and undamaged containers with identification labels intact.

D. Storage and Protection: Store materials at temperature and humidity conditions recommended by manufacturer and protect from exposure to harmful weather conditions.

1.8 Project Conditions

A. Temperature Requirements: Maintain air temperature in spaces where products will be installed for time period before, during, and after installation as recommended by manufacturer.

B. Field Measurements: Verify actual measurements/openings by field measurements before fabrication; show recorded measurements on shop drawings. Coordinate field measurements and fabrication schedule with construction progress to avoid construction delays.

1.9 Warranty

A. Project Warranty: Refer to Conditions of the Contract for project warranty provisions.

1.10 Maintenance

A. Extra Materials: Deliver to Owner extra materials from the same production run as products installed. Package products with protective covering and identify with descriptive labels. Comply with Division 1 Closeout Submittals (Maintenance Materials) Section.

B. Quantity: Furnish quantity of re-bonded recycled rubber Sound Control Underlayment units as requested on purchase order.

C. Delivery, Storage and Protection: Comply with Owner's requirements for delivery, storage, and protection of extra materials.

PART 2 - Products

2.1 Manufacturers:

A. Pliteq Inc.: 131 Royal Group Crescent, Vaughan, ON L4H 1X9; Telephone: (416) 449-0049; Fax: (416) 849-0415; www.pliteq.com

B. Regupol America: 11 Ritter Way, Lebanon, PA, 17042; Telephone: (800) 537-8737; www.regupol.com

C. Substitution: See Section 01600 Product Requirements

2.2 Acoustical Underlayment

A. Underlayment, 2nd Floor VCT floors and floating wood floors:

1. Manufacturers:
   a. Proflex Products ;Proflex LV 200 (1.8 mm) (double glue down installation)
   b. Patcraft; Groundworks Noise reduction underlayment (1.4 mm)
   c. Diversified Products; Floormuffler 1mm
2. Substitution: See Section 01600 Product Requirements

B. Underlayment, 2nd Floor Ceramic tile floors:

1. Manufacturers:
   a. Regupol America; Sonos 12mm
   b. Pliteq; Genie Mat RST12
   c. Ecore International; QT 4012 Sound Isolation 12 mm

2. Substitution: See Section 01600 Product Requirements

2.3 Accessories

A. Perimeter Isolation Strips
Perimeter isolation strips: Per Manufacturers recommended product

B. Tape: Manufactures standard tape where required.

C. Adhesives: Per Manufacturers recommended product

PART 3 - Execution

3.1 General Procedures

A. Manufacturers' Instructions: Comply with manufacturer's product data, including product technical bulletins, product catalog installation instructions, and product carton instructions for installation.

B. Site Verification of Conditions: Verify substrate conditions, which have been previously installed under other sections, are acceptable for product installation in accordance with manufacturer's instructions.

C. Preparation

1. Surface Preparation: Surfaces shall be prepared in accordance with ANSI standards.
2. Erection/Installation/Application/Construction.
3. Related Products Installation: Refer to other sections listed in Related Sections paragraph herein for related products installation.
4. Installation should not begin until all other trades are finished in the area.
5. Areas to receive the re-bonded recycled rubber Sound Control Underlayment should be weather tight and maintained at a minimum uniform temperature of 65°F (18°C) for 48 hours before, during, and after the installation.

D. Field Quality Requirements: Upon Owner's request, provide manufacturer's field service consisting of product use recommendations in accordance with manufacturer's instructions.

E. Cleaning: Remove temporary coverings and protection of adjacent work areas. Repair or replace damaged installed products. Clean installed products in accordance with manufacturer's instructions prior to Owner's acceptance. Remove construction debris from project site and legally dispose of debris

F. Protection: Protect installed product and finish surfaces from damage during construction

End of Section

SECTION 09640 - WOOD FLOORING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Factory-finished engineered wood flooring.
2.
3. Sound control underlayment.

B. Related Requirements:
1. Division 06 Section “Miscellaneous Carpentry” for subfloor.
2. Division 09 “Acoustical Underlayment” for subfloor

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For each type of floor finish provide plan indicating location of installation along with threshold details and locations.

C. Samples: For each exposed product and for each color and texture specified, approximately 24 in x 36 in finish board and of same thickness and material indicated for the Work and showing the full range of normal color and texture variations expected.

D. Samples for Initial Selection: Manufacturer's color charts showing the full range of colors and finishes available for wood flooring.

1. Include Samples of accessories involving color and finish selection.

E. Samples for Verification: For each type of wood flooring and accessory, with stain color and finish required, approximately 12 inches long and of same thickness and material indicated for the Work and showing the full range of normal color and texture variations expected.

1.4 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Wood Flooring: Equal to 2 Insert number percent of amount installed for each type, color, and finish of wood flooring indicated.

1.5 QUALITY ASSURANCE

A. Provide workmanship in accordance with NWFA and the Hardwood Flooring Finishing/Refinishing Manual published by the National Oak Flooring Manufacturer's Association (NOFMA).

B. Provide a finish system as produced by a single manufacturer.

C. Refinishing: Performed by experienced millworking professionals with not less than three years of successful experience at salvage, reinstallation, reapirs, and finishing work similar to requirements for this project.

D. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.

1. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver wood flooring materials in unopened cartons or bundles.

B. Protect wood flooring from exposure to moisture. Do not deliver wood flooring until after concrete, masonry, plaster, ceramic tile, and similar wet-work is complete and dry.

C. Store wood flooring materials in a dry, warm, ventilated, weathertight location.

1.7 FIELD CONDITIONS

A. Conditioning period begins not less than seven days before wood flooring installation, is continuous through installation, and continues not less than seven days after wood flooring installation.

1. Environmental Conditioning: Maintain ambient temperature between 65 and 75 deg F and relative humidity planned for building occupants in spaces to receive wood flooring during the conditioning period.
2. Wood Flooring Conditioning: Move wood flooring into spaces where it will be installed, no later than the beginning of the conditioning period.

a. Do not install flooring until it adjusts to relative humidity of, and is at same temperature as, space where it is to be installed.
b. Open sealed packages to allow wood flooring to acclimatize immediately on moving flooring into spaces in which it will be installed.

B. After conditioning period, maintain relative humidity and ambient temperature planned for building occupants.

C. Install factory-finished wood flooring after other finishing operations, including painting, have been completed.

PART 2 - PRODUCTS

2.1 FACTORY-FINISHED ENGINEERED WOOD FLOORING

A. Solid-Wood Flooring: Kiln dried to 6 to 9 percent maximum moisture content; tongue and groove and end matched; with backs channeled.

1. Manufacturers:
   a. UA Flooring
      1) Old Charleson – True Reclaimed Heart Pine
   b. Albany millworks
      1) Custom product to match width of original flooring

2. Species: Reclaimed Heart Pine.
3. Grade: Select
4. Cut: Match Existing.
5. Thickness: 1/2 inch with 1/8” Wear layer.
6. Face Width: 3 9/16 inches.
7. Lengths: Random lengths between 36 inches and 120 inches
8. Edge Style: Square.
9. Finish: UV urethane.

   a. Color: As selected by Architect from manufacturer's full range.

2.2 SOUND CONTROL UNDERLAYMENT

A. Sound Control Underlayment: Sound reducing underlayment consisting of impact-absorbing materials. Minimum Impact Insulation Class (IIC) of 55 when tested according to ASTM E492. To be installed under engineered wood flooring.

1. Product: Genie Mat RST05

2.3 ACCESSORY MATERIALS

A. WoodSubfloor: As specified in Section 061000 "Rough Carpentry" and Section 061600 "Sheathing."

B. Wood Flooring Adhesive: Mastic recommended by flooring and adhesive manufacturers for application indicated.

C. Trowelable Leveling and Patching Compound: Latex-modified, hydraulic-cement-based formulation approved by wood flooring manufacturer.

D. Fasteners: As recommended by manufacturer, but not less than that recommended in NWFA's "Installation Guidelines."

E. Thresholds and Saddles: To match wood flooring. Milled T-shaped saddle transition strip. Tapered on each side not to exceed ½” with ¼” bevel.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for maximum moisture content, installation tolerances, and other conditions affecting performance of wood flooring.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

C. Concrete Slabs: Verify that concrete substrates are dry and moisture-vapor emissions are within acceptable levels according to manufacturer's written instructions.

3.2 PREPARATION

A. Concrete Slabs:

1. Grind high spots and fill low spots to produce a maximum 1/8-inch (3-mm) deviation in any direction when checked with a 10-foot (3-m) straight edge.
2. Use trowelable leveling and patching compounds, according to manufacturer's written instructions, to fill cracks, holes, and depressions in substrates.
3. Remove coatings, including curing compounds, and other substances on substrates that are incompatible with installation adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.

B. Broom or vacuum clean substrates to be covered immediately before product installation. After cleaning, examine substrates for moisture, alkaline salts, carbonation, or dust. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 INSTALLATION

A. Comply with flooring manufacturer's written installation instructions, but not less than applicable recommendations in NWFA's "Installation Guidelines."

B. Provide expansion space at walls and other obstructions and terminations of flooring as indicated on Drawings.

C. Sound Control Underlayment: Install over vapor retarder according to manufacturer's written instructions.

D. Solid-Wood Flooring: Blind nail or staple flooring to substrate.

1. Plank Flooring: For flooring of face width more than 3 inches (76 mm):

a. Hardwood: Install countersunk screws at each end of each piece in addition to blind nailing. Cover screw heads with wood plugs glued flush with flooring.
b. Softwood: Install no fewer than two countersunk nails at each end of each piece, spaced not more than 16 inches (406 mm) along length of each piece, in addition to blind nailing. Fill holes with matching wood filler.

E. Engineered-Wood Flooring: Install floating floor.

3.4 FIELD FINISHING

A. Machine-sand flooring to remove offsets, ridges, cups, and sanding-machine marks that are noticeable after finishing. Vacuum and tack with a clean cloth immediately before applying finish.

1. Comply with applicable recommendations in NWFA's "Installation Guidelines."

B. Fill open-grained hardwood.

C. Fill and repair wood flooring defects.

D. Apply floor-finish materials in number of coats recommended by finish manufacturer for application indicated, but not less than one coat of floor sealer and three finish coats.

1. Apply stains to achieve an even color distribution matching approved Samples.
2. For water-based finishes, use finishing methods recommended by finish manufacturer to minimize grain raise.

E. Cover wood flooring before finishing.

F. Do not cover wood flooring after finishing until finish reaches full cure, and not before seven days after applying last finish coat.

3.5 PROTECTION

A. Protect installed wood flooring during remainder of construction period with covering of heavy kraft paper or other suitable material. Do not use plastic sheet or film that might cause condensation.

1. Do not move heavy and sharp objects directly over kraft-paper-covered wood flooring. Protect flooring with plywood or hardboard panels to prevent damage from storing or moving objects over flooring.

END OF SECTION 096400

SECTION 09651 - RESILIENT FLOOR TILE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:
1. Rubber floor tile.
2. Vinyl composition floor tile.
3. Luxury vinyl tile

B. Related Sections:
1. Section 09653 "Resilient Wall Base and Accessories" for resilient base, reducer strips, and other accessories installed with resilient floor coverings.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Samples for Initial Selection: For each type of floor tile indicated.

C. Samples for Verification: Full-size units of each color and pattern of floor tile required.

1. For heat-welding bead, manufacturer's standard-size Samples, but not less than 9 inches (230 mm) long, of each color required.

D. Product Schedule: For floor tile.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified Installer.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For each type of floor tile to include in maintenance manuals.

1.6 MATERIALS MAINTENANCE SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Floor Tile: Furnish 1 box for every 50 boxes or fraction thereof, of each type, color, and pattern of floor tile installed.

1.7 QUALITY ASSURANCE

A. Installer Qualifications: A qualified installer who employs workers for this Project who are competent in techniques required by manufacturer for floor tile installation indicated.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Store floor tile and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 deg F (10 deg C) or more than 90 deg F (32 deg C). Store floor tiles on flat surfaces.

1.9 PROJECT CONDITIONS

A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 70 deg F (21 deg C) or more than 95 deg F (35 deg C) , in spaces to receive floor tile during the following time periods:

1. 48 hours before installation.
2. During installation.
3. 48 hours after installation.

B. Until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 deg F (13 deg C) or more than 95 deg F (35 deg C) .

C. Close spaces to traffic during floor tile installation.

D. Close spaces to traffic for 48 hours after floor tile installation.

E. Install floor tile after other finishing operations, including painting, have been completed.

PART 2 - PRODUCTS

2.1 SOLID VINYL FLOOR TILE (LVT)

A. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
1. Armstrong World Industries, Inc.;
2. Johnsonite;
3. Roppe Corporation, USA;
4. Tarkett, Inc.;

B. Tile Standard: ASTM F 1700.

1. Class: [**As indicated by product designations**] [**Class I, monolithic vinyl tile**] [**Class II, surface-decorated vinyl tile**] [**Class III, printed film vinyl tile**].
2. Type: [**Type A, smooth surface**] [**Type B, embossed surface**].

C. Thickness: [**0.080 inch (2.0 mm)**] [**0.100 inch (2.5 mm)**] [**0.120 inch (3.0 mm)**] [**0.125 inch (3.2 mm)**] <**Insert thickness**>.

D. Size: [**12 by 12 inches (305 by 305 mm)**] [**18 by 18 inches (457 by 457 mm)**] [**24 by 24 inches (610 by 610 mm)**] [**36 by 36 inches (914 by 914 mm)**] [**3 by 36 inches (76 by 914 mm)**] <**Insert size**>.

E. Seaming Method: [**Heat welded**] [**Chemically bonded**] [**Standard**] <**Insert requirements**>.

F. Colors and Patterns: [**As indicated by manufacturer's designations**] [**Match Architect's sample**] [**As selected by Architect from full range of industry colors**].

2.2 VINYL COMPOSITION FLOOR TILE (VCT)

A. Products: Subject to compliance with requirements, provide one of the following :
1. Armstrong World Industries, Inc.; .
2. Congoleum Corporation; <**Insert product name or designation**>.
3. Tarkett, Inc.; .

B. Tile Standard: ASTM F 1066, Class 1, solid-color tile .

C. Wearing Surface: Smooth .

D. Thickness: 0.125 inch (3.2 mm) .

E. Size: 12 by 12 inches (305 by 305 mm).

F. Colors and Patterns: As selected by Architect from full range of industry colors.

2.3 INSTALLATION MATERIALS

A. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement based or blended hydraulic-cement-based formulation provided or approved by manufacturer for applications indicated.

B. Adhesives: Water-resistant type recommended by manufacturer to suit floor tile and substrate conditions indicated.

1. Adhesives shall comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):

a. VCT and Asphalt Tile Adhesives: Not more than 50 g/L.

C. Floor Polish: Provide protective liquid floor polish products as recommended by manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

B. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of floor tile.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Prepare substrates according to manufacturer's written instructions to ensure adhesion of resilient products.

B. Concrete Substrates: Prepare according to ASTM F 710.

1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
2. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.
3. Alkalinity and Adhesion Testing: Perform tests recommended by manufacturer. Proceed with installation only after substrates pass testing.
4. Moisture Testing: Perform tests recommended by manufacturer and as follows. Proceed with installation only after substrates pass testing.

C. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound and remove bumps and ridges to produce a uniform and smooth substrate.

D. Do not install floor tiles until they are same temperature as space where they are to be installed.

1. Move resilient products and installation materials into spaces where they will be installed at least 48 hours in advance of installation.

E. Sweep and vacuum clean substrates to be covered by resilient products immediately before installation.

3.3 FLOOR TILE INSTALLATION

A. Comply with manufacturer's written instructions for installing floor tile.

B. Lay out floor tiles from center marks established with principal walls, discounting minor offsets, so tiles at opposite edges of room are of equal width. Adjust as necessary to avoid using cut widths that equal less than one-half tile at perimeter.

1. Lay tiles in pattern indicated .

C. Match floor tiles for color and pattern by selecting tiles from cartons in the same sequence as manufactured and packaged, if so numbered. Discard broken, cracked, chipped, or deformed tiles.

1. Lay tiles with grain direction alternating in adjacent tiles (basket-weave pattern) .

D. Scribe, cut, and fit floor tiles to butt neatly and tightly to vertical surfaces and permanent fixtures including built-in furniture, cabinets, pipes, outlets, and door frames.

E. Extend floor tiles into toe spaces, door reveals, closets, and similar openings. Extend floor tiles to center of door openings.

F. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on floor tiles as marked on substrates. Use chalk or other nonpermanent, nonstaining marking device.

G. Adhere floor tiles to flooring substrates using a full spread of adhesive applied to substrate to produce a completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections.

3.4 CLEANING AND PROTECTION

A. Comply with manufacturer's written instructions for cleaning and protection of floor tile.

B. Perform the following operations immediately after completing floor tile installation:

1. Remove adhesive and other blemishes from exposed surfaces.
2. Sweep and vacuum surfaces thoroughly.
3. Damp-mop surfaces to remove marks and soil.

C. Protect floor tile products from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.

D. Floor Polish: Remove soil, visible adhesive, and surface blemishes from floor tile surfaces before applying liquid floor polish.

E. Cover floor tile until Substantial Completion.

END OF SECTION 09651

SECTION 09653 - RESILIENT WALL BASE AND ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Resilient base.
2. Resilient molding accessories.

B. Related Sections:
1. Section 09651 "Resilient Floor Tile for resilient floor tile."

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Samples for Initial Selection: For each type of product indicated.

C. Product Schedule: For resilient products. Use same designations indicated on Drawings.

1.4 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Furnish not less than 10 linear feet for every 500 linear feet or fraction thereof, of each type, color, pattern, and size of resilient product installed.

1.5 QUALITY ASSURANCE

A. Fire-Test-Response Characteristics: As determined by testing identical products according to ASTM E 648 or NFPA 253 by a qualified testing agency.

1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Store resilient products and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 deg F (10 deg C) or more than 90 deg F (32 deg C).

1.7 PROJECT CONDITIONS

A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 70 deg F (21 deg C) or more than 95 deg F (35 deg C), in spaces to receive resilient products during the following time periods:

1. 48 hours before installation.
2. During installation.
3. 48 hours after installation.

B. Until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 deg F (13 deg C) or more than 95 deg F (35 deg C).

C. Install resilient products after other finishing operations, including painting, have been completed.

PART 2 - PRODUCTS

2.1 RESILIENT BASE

A. Resilient Base:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Burke Mercer Flooring Products; Division of Burke Industries, Inc.
   b. Johnsonite.
   c. Roppe Corporation, USA.

B. Resilient Base Standard: ASTM F 1861.

1. Material Requirement: Type TS (rubber, vulcanized thermoset) .
2. Manufacturing Method: Group I (solid, homogeneous).
3. Style: Cove (base with toe).

C. Minimum Thickness: 0.080 inch

D. Height: 4 inches.

E. Lengths: Coils in manufacturer's standard length.

F. Outside Corners: Preformed.

G. Inside Corners: Preformed.

H. Finish: Satin.

I. Colors and Patterns: As selected by Architect from full range of industry colors.

2.2 INSTALLATION MATERIALS

A. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement based or blended hydraulic-cement-based formulation provided or approved by manufacturer for applications indicated.

B. Adhesives: Water-resistant type recommended by manufacturer to suit resilient products and substrate conditions indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

B. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of resilient products.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Prepare substrates according to manufacturer's written instructions to ensure adhesion of resilient products.

B. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound and remove bumps and ridges to produce a uniform and smooth substrate.

C. Do not install resilient products until they are same temperature as the space where they are to be installed.

1. Move resilient products and installation materials into spaces where they will be installed at least 48 hours in advance of installation.

D. Sweep and vacuum clean substrates to be covered by resilient products immediately before installation.

3.3 RESILIENT BASE INSTALLATION

A. Comply with manufacturer's written instructions for installing resilient base.

B. Apply resilient base to walls, columns, pilasters, casework and cabinets in toe spaces, and other permanent fixtures in rooms and areas where base is required.

C. Install resilient base in lengths as long as practicable without gaps at seams and with tops of adjacent pieces aligned.

D. Tightly adhere resilient base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.

E. Do not stretch resilient base during installation.

F. On masonry surfaces or other similar irregular substrates, fill voids along top edge of resilient base with manufacturer's recommended adhesive filler material.

G. Preformed Corners: Install preformed corners before installing straight pieces.

3.4 CLEANING AND PROTECTION

A. Comply with manufacturer's written instructions for cleaning and protection of resilient products.

B. Perform the following operations immediately after completing resilient product installation:

1. Remove adhesive and other blemishes from exposed surfaces.
2. Sweep and vacuum surfaces thoroughly.
3. Damp-mop surfaces to remove marks and soil.

C. Protect resilient products from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.

D. Cover resilient products until Substantial Completion.

END OF SECTION 09653

SECTION 09681 - TILE CARPETING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes modular, tufted carpet tile.

B. Related Requirements:
   1. Section 096513 "Resilient Base and Accessories" Section 096519 "Resilient Tile Flooring" for resilient wall base and accessories installed with carpet tile.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

   1. Review methods and procedures related to carpet tile installation including, but not limited to, the following:

      a. Review delivery, storage, and handling procedures.
      b. Review ambient conditions and ventilation procedures.
      c. Review subfloor preparation procedures.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

   1. Include manufacturer's written data on physical characteristics, durability, and fade resistance.
   2. Include installation recommendations for each type of substrate.

B. Shop Drawings: Show the following:

   1. Columns, doorways, enclosing walls or partitions, built-in cabinets, and locations where cutouts are required in carpet tiles.
   2. Carpet tile type, color, and dye lot.
   3. Type of subfloor.
   4. Type of installation.
   5. Pattern of installation.
   6. Pattern type, location, and direction.
   7. Pile direction.
   8. Type, color, and location of insets and borders.
   9. Type, color, and location of edge, transition, and other accessory strips.
   10. Transition details to other flooring materials.

C. Samples: For each of the following products and for each color and texture required. Label each Sample with manufacturer's name, material description, color, pattern, and designation indicated on Drawings and in schedules.

1. Carpet Tile: Full-size Sample.
2. Exposed Edge, Transition, and Other Accessory Stripping: 12-inch- (300-mm-) long Samples.

D. Product Schedule: For carpet tile. Use same designations indicated on Drawings.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Product Test Reports: For carpet tile, for tests performed by a qualified testing agency.

C. Sample Warranty: For special warranty.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance Data: For carpet tiles to include in maintenance manuals. Include the following:

1. Methods for maintaining carpet tile, including cleaning and stain-removal products and procedures and manufacturer's recommended maintenance schedule.
2. Precautions for cleaning materials and methods that could be detrimental to carpet tile.

1.7 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Carpet Tile: Full-size units equal to 5 percent of amount installed for each type indicated, but not less than 10 sq. yd. (8.3 sq. m).

1.8 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who is certified by the International Certified Floorcovering Installers Association at the Commercial II certification level.

B. Fire-Test-Response Ratings: Where indicated, provide carpet tile identical to those of assemblies tested for fire response according to NFPA 253 by a qualified testing agency.

C. Mockups: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for fabrication and installation.

1. Build mockups at locations and in sizes shown on Drawings.
2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Comply with CRI 104.

1.10 FIELD CONDITIONS

A. Comply with CRI 104 for temperature, humidity, and ventilation limitations.

B. Environmental Limitations: Do not deliver or install carpet tiles until spaces are enclosed and weathertight, wet work in spaces is complete and dry, and ambient temperature and humidity conditions are maintained at occupancy levels during the remainder of the construction period.

C. Do not install carpet tiles over concrete slabs until slabs have cured and are sufficiently dry to bond with adhesive and concrete slabs have pH range recommended by carpet tile manufacturer.

D. Where demountable partitions or other items are indicated for installation on top of carpet tiles, install carpet tiles before installing these items.

1.11 WARRANTY

A. Special Warranty for Carpet Tiles: Manufacturer agrees to repair or replace components of carpet tile installation that fail in materials or workmanship within specified warranty period.

1. Warranty does not include deterioration or failure of carpet tile due to unusual traffic, failure of substrate, vandalism, or abuse.
2. Failures include, but are not limited to, more than 10 percent edge raveling, snags, runs, dimensional stability, excess static discharge, loss of tuft bind strength, loss of face fiber,and delamination.
3. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 CARPET TILE

A. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

1. Interface, Inc.

2. Shaw Industries Group, Inc.

3. Tandus US, Inc.

4. Mohawk Group

B. Color: As selected by Architect from manufacturer's full range.

C. Backing/Backcoating: Manufacturer's standard composite materials to Products under 2.1 (A). PVC-free

D. Size: Manufacturer's available sizes

E. Applied Soil-Resistance Treatment: Manufacturer's standard treatment meeting Performance requirements.

F. Antimicrobial Treatment: Manufacturer's standard treatment meeting Performance requirements.
   1. Antimicrobial Activity: Not less than 2-mm halo of inhibition of gram-positive bacteria, not less than 1-mm halo of inhibition for gram-negative bacteria, and no fungal growth, according to AATCC 174.

G. Performance Characteristics: Comparable to Products listed under 2.1A

2.2 INSTALLATION ACCESSORIES

A. Trowelable Leveling and Patching Compounds: Latex-modified, hydraulic-cement-based formulation provided or recommended by carpet tile manufacturer.

B. Adhesives: Water-resistant, mildew-resistant, nonstaining, pressure-sensitive type to suit products and subfloor conditions indicated, that complies with flammability requirements for installed carpet tile and is recommended by carpet tile manufacturer for releasable installation.

   1. Adhesives shall have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
   2. Adhesives shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

C. Metal Edge/Transition Strips: Extruded aluminum with mill finish of profile and width shown, of height required to protect exposed edge of carpet, and of maximum lengths to minimize running joints.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for maximum moisture content, alkalinity range, installation tolerances, and other conditions affecting carpet tile performance. Examine carpet tile for type, color, pattern, and potential defects.

B. Concrete Subfloors: Verify that concrete slabs comply with ASTM F 710 and the following:

   1. Slab substrates are dry and free of curing compounds, sealers, hardeners, and other materials that may interfere with adhesive bond. Determine adhesion and dryness characteristics by performing bond and moisture tests recommended by carpet tile manufacturer.
   2. Subfloor finishes comply with requirements specified in Section 033000 "Cast-in-Place Concrete" for slabs receiving carpet tile.
   3. Subfloors are free of cracks, ridges, depressions, scale, and foreign deposits.

C. For painted subfloors, verify the following:

1. Perform bond test recommended in writing by adhesive manufacturer.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. General: Comply with CRI 104, Section 6.2, "Site Conditions; Floor Preparation," and with carpet tile manufacturer's written installation instructions for preparing substrates indicated to receive carpet tile installation.

B. Use trowelable leveling and patching compounds, according to manufacturer's written instructions, to fill cracks, holes, depressions, and protrusions in substrates. Fill or level cracks, holes and depressions 1/8 inch (3 mm) wide or wider and protrusions more than 1/32 inch (0.8 mm) unless more stringent requirements are required by manufacturer's written instructions.

C. Remove coatings, including curing compounds, and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, without using solvents. Use mechanical methods recommended in writing by carpet tile manufacturer.

D. Clean metal substrates of grease, oil, soil and rust, and prime if directed by adhesive manufacturer. Rough sand painted metal surfaces and remove loose paint. Sand aluminum surfaces, to remove metal oxides, immediately before applying adhesive.

E. Broom and vacuum clean substrates to be covered immediately before installing carpet tile.

3.3 INSTALLATION

A. General: Comply with CRI 104, Section 14, "Carpet Modules," and with carpet tile manufacturer's written installation instructions.

B. Installation Method: As recommended in writing by carpet tile manufacturer.

C. Maintain dye lot integrity. Do not mix dye lots in same area.

D. Cut and fit carpet tile to butt tightly to vertical surfaces, permanent fixtures, and built-in furniture including cabinets, pipes, outlets, edgings, thresholds, and nosings. Bind or seal cut edges as recommended by carpet tile manufacturer.

E. Extend carpet tile into toe spaces, door reveals, closets, open-bottomed obstructions, removable flanges, alcoves, and similar openings.

F. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on finish flooring as marked on subfloor. Use nonpermanent, nonstaining marking device.

G. Install pattern parallel to walls and borders.

H. Stagger joints of carpet tiles so carpet tile grid is offset from access flooring panel grid. Do not fill seams of access flooring panels with carpet adhesive; keep seams free of adhesive.

3.4 CLEANING AND PROTECTION

A. Perform the following operations immediately after installing carpet tile:

1. Remove excess adhesive, seam sealer, and other surface blemishes using cleaner recommended by carpet tile manufacturer.
2. Remove yarns that protrude from carpet tile surface.
3. Vacuum carpet tile using commercial machine with face-beater element.

B. Protect installed carpet tile to comply with CRI 104, Section 16, "Protecting Indoor Installations."

C. Protect carpet tile against damage from construction operations and placement of equipment and fixtures during the remainder of construction period. Use protection methods indicated or recommended in writing by carpet tile manufacturer.

END OF SECTION 09681

SECTION 09911 - EXTERIOR PAINTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes surface preparation and the application of paint systems on exterior substrates. [**the following exterior substrates:**]

1. Concrete.
2. Clay masonry.
3. Concrete masonry units (CMU).
4. Steel.
5. Galvanized metal.
6. Aluminum (not anodized or otherwise coated).
7. Stainless-steel flashing.
8. Wood.
9. Plastic trim fabrications.
10. Exterior portland cement plaster (stucco).
11. Exterior gypsum board.

B. Related Requirements:

1. Section 05120 "Structural Steel" for shop priming of metal substrates with primers specified in this Section.
2. Section 09960 "High-Performance Coatings" for special-use coatings.
3. Section 09912 "Interior Painting" for surface preparation and the application of paint systems on interior substrates.
4. Section 09931 "Wood Stains and Transparent Finishes" for surface preparation and the application of wood stains and transparent finishes on exterior wood substrates.

1.3 DEFINITIONS

A. Gloss Level 1: Not more than 5 units at 60 degrees and 10 units at 85 degrees, according to ASTM D 523.

B. Gloss Level 3: 10 to 25 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.

C. Gloss Level 4: 20 to 35 units at 60 degrees and not less than 35 units at 85 degrees, according to ASTM D 523.

D. Gloss Level 5: 35 to 70 units at 60 degrees, according to ASTM D 523.

E. Gloss Level 6: 70 to 85 units at 60 degrees, according to ASTM D 523.

F. Gloss Level 7: More than 85 units at 60 degrees, according to ASTM D 523.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product. Include preparation requirements and application instructions.

B. Samples for Initial Selection: For each type of topcoat product.

C. Samples for Verification: For each type of paint system and each color and gloss of topcoat.

1. Submit Samples on rigid backing, 8 inches (200 mm) square.
2. Step coats on Samples to show each coat required for system.
3. Label each coat of each Sample.
4. Label each Sample for location and application area.

D. Product List: For each product indicated, include the following:

1. Cross-reference to paint system and locations of application areas. Use same designations indicated on Drawings and in schedules.
2. Printout of current "MPI Approved Products List" for each product category specified, with the proposed product highlighted.
3. VOC content.

1.5 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Paint: 5 percent, but not less than 1 gal. (3.8 L) of each material and color applied.

1.6 QUALITY ASSURANCE

A. Mockups: Apply mockups of each paint system indicated and each color and finish selected to verify preliminary selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Architect will select one surface to represent surfaces and conditions for application of each paint system specified in Part 3.

a. Vertical and Horizontal Surfaces: Provide samples of at least 100 sq. ft. (9 sq. m).
b. Other Items: Architect will designate items or areas required.

2. Final approval of color selections will be based on mockups.

a. If preliminary color selections are not approved, apply additional mockups of additional colors selected by Architect at no added cost to Owner.

3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F (7 deg C).

1. Maintain containers in clean condition, free of foreign materials and residue.
2. Remove rags and waste from storage areas daily.

1.8 FIELD CONDITIONS

A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F (10 and 35 deg C).

B. Do not apply paints in snow, rain, fog, or mist; when relative humidity exceeds 85 percent; at temperatures less than 5 deg F (3 deg C) above the dew point; or to damp or wet surfaces.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Benjamin Moore & Co.
2. PPG Architectural Finishes, Inc.
3. Sherwin-Williams Company (The).

2.2 PAINT, GENERAL

A. MPI Standards: Provide products that comply with MPI standards indicated and that are listed in its "MPI Approved Products List."

B. Material Compatibility:

1. Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
2. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.

C. VOC Content: Provide materials that comply with VOC limits of authorities having jurisdiction.

D. Colors: As selected by Architect from manufacturer's full range.

1. [**10**] [**20**] [**30**] <**Insert number**> percent of surface area will be painted with deep tones.

2.3 BLOCK FILLERS

A. Block Filler, Latex, Interior/Exterior:[**MPI #4.**]

1. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation**>.

2.4 PRIMERS/SEALERS

A. Primer, Alkali Resistant, Water Based:[**MPI #3.**]

1. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation**>.

B. Primer, Bonding, Water Based:[**MPI #17.**]

1. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation**>.

C. Primer, Bonding, Solvent Based:[**MPI #69.**]

1. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation**>.

D. Wood-Knot Sealer: Sealer recommended in writing by topcoat manufacturer for exterior use in paint system indicated.

1. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation**>.

2.5 METAL PRIMERS

A. Primer, Alkyd, Anti-Corrosive for Metal:[**MPI #79.**]

1. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation**>.

B. Primer, Alkyd, Quick Dry, for Metal:[**MPI #76.**]

1. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation**>.

C. Primer, Galvanized, Water Based:[**MPI #134.**]

1. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation**>.

D. Primer, Galvanized: As recommended in writing by topcoat manufacturer.

1. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation**>.

E. Primer, Quick Dry, for Aluminum:[**MPI #95.**]

1. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation**>.

2.6 WOOD PRIMERS

A. Primer, Latex for Exterior Wood:[**MPI #6.**]

1. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation**>.

B. Primer, Alkyd for Exterior Wood:[**MPI #5.**]

1. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation**>.

C. Primer, Oil for Exterior Wood:[**MPI #7.**]

1. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation**>.

2.7 WATER-BASED PAINTS

A. Latex, Exterior Flat (Gloss Level 1):[**MPI #10.**]

1. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation**>.

B. Latex, Exterior Semi-Gloss (Gloss Level 5):[**MPI #11.**]

1. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation**>.

C. Latex, Exterior, Gloss (Gloss Level 6:[**MPI #119.**]

1. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation**>.

D. Light Industrial Coating, Exterior, Water Based (Gloss Level 3):[**MPI #161.**]

1. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation**>.

E. Light Industrial Coating, Exterior, Water Based, Semi-Gloss (Gloss Level 5):[**MPI #163.**]

1. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation**>.

F. Light Industrial Coating, Exterior, Water Based, Gloss (Gloss Level 6):[**MPI #164.**]

1. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation**>.

2.8 SOLVENT-BASED PAINTS

A. Alkyd, Exterior Flat (Gloss Level 1):[**MPI #8.**]

1. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation**>.

B. Alkyd, Exterior, Semi-Gloss (Gloss Level 5):[**MPI #94.**]

1. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation**>.

C. Alkyd, Exterior Gloss (Gloss Level 6):[**MPI #9.**]

1. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation**>.

D. Alkyd, Quick Dry, Semi-Gloss (Gloss Level 5):[**MPI #81.**]

1. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation**>.

E. Alkyd, Quick Dry, Gloss (Gloss Level 7):[**MPI #96.**]

1. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation**>.

2.9 TEXTURED AND HIGH-BUILD COATINGS

A. Primer for Textured Coating, Latex, Flat: As recommended in writing by topcoat manufacturer.

1. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation**>.

B. Intermediate Coat for Textured Coating, Latex, Flat: As recommended in writing by topcoat manufacturer.

1. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation**>.

C. Textured Coating, Latex, Flat:[**MPI #42.**]

1. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation**>.

D. Primer for Latex, Exterior, High Build: As recommended in writing by topcoat manufacturer.

1. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation**>.

E. Intermediate Coat for Latex, Exterior, High Build: As recommended in writing by topcoat manufacturer.

1. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation**>.

F. Latex, Exterior, High Build:[**MPI #40.**]

1. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation**>.

2.10 ALUMINUM PAINT

A. Aluminum Paint:[**MPI #1.**]

1. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation**>.

2.11 FLOOR COATINGS

A. Sealer, Water Based, for Concrete Floors:[**MPI #99.**]

1. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation**>.

B. Sealer, Solvent Based, for Concrete Floors:[**MPI #104.**]

1. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation**>.

C. Floor Paint, Latex, Low Gloss (Maximum Gloss Level 3):[**MPI #60.**]

1. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation**>.

D. Floor Enamel, Alkyd, Gloss (Gloss Level 6):[**MPI #27.**]

1. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation**>.

2.12 SOURCE QUALITY CONTROL

A. Testing of Paint Materials: Owner reserves the right to invoke the following procedure:

1. Owner will engage the services of a qualified testing agency to sample paint materials. Contractor will be notified in advance and may be present when samples are taken. If paint materials have already been delivered to Project site, samples may be taken at Project site. Samples will be identified, sealed, and certified by testing agency.

2. Testing agency will perform tests for compliance with product requirements.
3. Owner may direct Contractor to stop applying paints if test results show materials being used do not comply with product requirements. Contractor shall remove noncomplying paint materials from Project site, pay for testing, and repaint surfaces painted with rejected materials. Contractor will be required to remove rejected materials from previously painted surfaces if, on repainting with complying materials, the two paints are incompatible.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:

1. Concrete: 12 percent.
2. Masonry (Clay and CMU): 12 percent.
3. Wood: 15 percent.
4. Portland Cement Plaster: 12 percent.
5. Gypsum Board: 12 percent.

C. Portland Cement Plaster Substrates: Verify that plaster is fully cured.

D. Exterior Gypsum Board Substrates: Verify that finishing compound is sanded smooth.

E. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.

F. Proceed with coating application only after unsatisfactory conditions have been corrected.

1. Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Comply with manufacturer's written instructions and recommendations in "MPI Manual" applicable to substrates and paint systems indicated.

B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.

1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection.

C. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.

1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce paint systems indicated.

D. Concrete Substrates: Remove release agents, curing compounds, efflorescence, and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.

E. Masonry Substrates: Remove efflorescence and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces or mortar joints exceeds that permitted in manufacturer's written instructions.

F. Steel Substrates: Remove rust, loose mill scale, and shop primer if any. Clean using methods recommended in writing by paint manufacturer[**.**] [**but not less than the following:**]

1. SSPC-SP 2, "Hand Tool Cleaning."
2. SSPC-SP 3, "Power Tool Cleaning."
3. SSPC-SP 7/NACE No. 4, "Brush-off Blast Cleaning."
4. SSPC-SP 11, "Power Tool Cleaning to Bare Metal."

G. Shop-Primed Steel Substrates: Clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material as used for shop priming to comply with SSPC-PA 1 for touching up shop-primed surfaces.

H. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.

I. Aluminum Substrates: Remove loose surface oxidation.

J. Wood Substrates:

1. Scrape and clean knots. Before applying primer, apply coat of knot sealer recommended in writing by topcoat manufacturer for exterior use in paint system indicated.
2. Sand surfaces that will be exposed to view, and dust off.
3. Prime edges, ends, faces, undersides, and backsides of wood.
4. After priming, fill holes and imperfections in the finish surfaces with putty or plastic wood filler. Sand smooth when dried.

K. Plastic Trim Fabrication Substrates: Remove dust, dirt, and other foreign material that might impair bond of paints to substrates.

3.3 APPLICATION

A. Apply paints according to manufacturer's written instructions and recommendations in "MPI Manual."

1. Use applicators and techniques suited for paint and substrate indicated.
2. Paint surfaces behind movable items same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed items with prime coat only.
3. Paint both sides and edges of exterior doors and entire exposed surface of exterior door frames.
4. Paint entire exposed surface of window frames and sashes.

5. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
6. Primers specified in painting schedules may be omitted on items that are factory primed or factory finished if acceptable to topcoat manufacturers.

B. Tint undercoats same color as topcoat, but tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Provide sufficient difference in shade of undercoats to distinguish each separate coat.

C. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.

D. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.

E. Painting Fire Suppression, Plumbing, HVAC, Electrical, Communication, and Electronic Safety and Security Work:

1. Paint the following work where exposed to view:

a. Equipment, including panelboards[**and switch gear**].
b. Uninsulated metal piping.
c. Uninsulated plastic piping.
d. Pipe hangers and supports.
e. Metal conduit.
f. Plastic conduit.
g. Tanks that do not have factory-applied final finishes.
h. <**Insert mechanical items to be painted**>.

3.4 FIELD QUALITY CONTROL

A. Dry Film Thickness Testing: Owner may engage the services of a qualified testing and inspecting agency to inspect and test paint for dry film thickness.

1. Contractor shall touch up and restore painted surfaces damaged by testing.
2. If test results show that dry film thickness of applied paint does not comply with paint manufacturer's written recommendations, Contractor shall pay for testing and apply additional coats as needed to provide dry film thickness that complies with paint manufacturer's written recommendations.

3.5 CLEANING AND PROTECTION

A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.

B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.

C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.

D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.6 EXTERIOR PAINTING SCHEDULE

A. Concrete Substrates, Nontraffic Surfaces:

1. Latex System:

a. Prime Coat: Latex, exterior, matching topcoat.
b. Prime Coat: Primer, alkali resistant, water based**[, MPI #3]**.
c. Intermediate Coat: Latex, exterior, matching topcoat.
d. Topcoat: Latex, exterior flat (Gloss Level 1)**[, MPI #10]**.
e. Topcoat: Latex, exterior, low sheen (Gloss Level 3-4)**[, MPI #15]**.
f. Topcoat: Latex, exterior semi-gloss (Gloss Level 5)**[, MPI #11]**.
g. Topcoat: Latex, exterior gloss (Gloss Level 6)**[, MPI #119]**.

2. Latex Aggregate/Latex System:

a. Prime Coat: Textured coating, latex, flat**[, MPI #42]**.
b. Intermediate Coat: Latex, exterior, matching topcoat.
c. Topcoat: Latex, exterior flat (Gloss Level 1)**[, MPI #10]**.
d. Topcoat: Latex, exterior, low sheen (Gloss Level 3-4)**[, MPI #15]**.
e. Topcoat: Latex, exterior semi-gloss (Gloss Level 5)**[, MPI #11]**.
f. Topcoat: Latex, exterior gloss (Gloss Level 6)**[, MPI #119]**.

3. High-Build Latex System: Dry film thickness not less than 10 mils (0.25 mm).

a. Prime Coat: As recommended in writing by topcoat manufacturer.
b. Intermediate Coat: As recommended in writing by topcoat manufacturer.
c. Topcoat: Latex, exterior, high build**[, MPI #40]**.

4. Latex Aggregate System:

a. Prime Coat: As recommended in writing by topcoat manufacturer.
b. Intermediate Coat: As recommended in writing by topcoat manufacturer.
c. Topcoat: Textured coating, latex, flat**[, MPI #42]**.

B. Concrete Substrates, Traffic Surfaces:

1. Latex Floor Paint System:

a. Prime Coat: Floor paint, latex, low gloss (maximum Gloss Level 3)**[, MPI #60]**.
b. Intermediate Coat: Floor paint, latex, low gloss (maximum Gloss Level 3)**[, MPI #60]**.
c. Topcoat: Floor paint, latex, low gloss (maximum Gloss Level 3)**[, MPI #60]**.

2. Alkyd Floor Enamel System:

a. Prime Coat: Floor enamel, alkyd, gloss (Gloss Level 6)**[, MPI #27]**.
b. Intermediate Coat: Floor enamel, alkyd, gloss (Gloss Level 6)**[, MPI #27]**.
c. Topcoat: Floor enamel, alkyd, gloss (Gloss Level 6)**[, MPI #27]**.

d. Additive: Manufacturer's standard additive to increase skid resistance of painted surface.

3. Water-Based Clear Sealer System:

a. Prime Coat: Sealer, water based, for concrete floors**[, MPI #99]**.
b. Intermediate Coat: Sealer, water based, for concrete floors**[, MPI #99]**.
c. Topcoat: Sealer, water based, for concrete floors**[, MPI #99]**.

4. Solvent-Based Clear Sealer System:

a. Prime Coat: Sealer, solvent based, for concrete floors**[, MPI #104]**.
b. Intermediate Coat: Sealer, solvent based, for concrete floors**[, MPI #104]**.
c. Topcoat: Sealer, solvent based, for concrete floors**[, MPI #104]**.

C. Clay-Masonry Substrates:

1. Latex System:

a. Prime Coat: Latex, exterior, matching topcoat.
b. Intermediate Coat: Latex, exterior, matching topcoat.
c. Topcoat: Latex, exterior flat (Gloss Level 1)**[, MPI #10]**.
d. Topcoat: Latex, exterior, low sheen (Gloss Level 3-4)**[, MPI #15]**.
e. Topcoat: Latex, exterior semi-gloss (Gloss Level 5)**[, MPI #11]**.
f. Topcoat: Latex, exterior gloss (Gloss Level 6)**[, MPI #119]**.

2. High-Build Latex System: Dry film thickness not less than 10 mils (0.25 mm).

a. Prime Coat: As recommended in writing by topcoat manufacturer.
b. Intermediate Coat: As recommended in writing by topcoat manufacturer.
c. Topcoat: Latex, exterior, high build**[, MPI #40]**.

3. Latex Aggregate System:

a. Prime Coat: As recommended in writing by topcoat manufacturer.
b. Intermediate Coat: As recommended in writing by topcoat manufacturer.
c. Topcoat: Textured coating, latex, flat**[, MPI #42]**.

D. CMU Substrates:

1. Latex System:

a. Prime Coat: Block filler, latex, interior/exterior**[, MPI #4]**.
b. Intermediate Coat: Latex, exterior, matching topcoat.
c. Topcoat: Latex, exterior flat (Gloss Level 1)**[, MPI #10]**.
d. Topcoat: Latex, exterior, low sheen (Gloss Level 3-4)**[, MPI #15]**.
e. Topcoat: Latex, exterior semi-gloss (Gloss Level 5)**[, MPI #11]**.
f. Topcoat: Latex, exterior gloss (Gloss Level 6)**[, MPI #119]**.

2. Latex over Alkali-Resistant Primer System:

a. Prime Coat: Primer, alkali resistant, water based**[, MPI #3]**.
b. Intermediate Coat: Latex, exterior, matching topcoat.
c. Topcoat: Latex, exterior flat (Gloss Level 1)**[, MPI #10]**.

d. Topcoat: Latex, exterior, low sheen (Gloss Level 3-4)**[, MPI #15]**.
e. Topcoat: Latex, exterior semi-gloss (Gloss Level 5)**[, MPI #11]**.
f. Topcoat: Latex, exterior gloss (Gloss Level 6)**[, MPI #119]**.

3. High-Build Latex System: Dry film thickness not less than 10 mils (0.25 mm).

a. Prime Coat: As recommended in writing by topcoat manufacturer.
b. Intermediate Coat: As recommended in writing by topcoat manufacturer.
c. Topcoat: Latex, exterior, high build**[, MPI #40]**.

4. Latex Aggregate System:

a. Prime Coat: As recommended in writing by topcoat manufacturer.
b. Intermediate Coat: As recommended in writing by topcoat manufacturer.
c. Topcoat: Textured coating, latex, flat**[, MPI #42]**.

E. Steel Substrates:

1. Water-Based Light Industrial Coating System:

a. Prime Coat: Primer, alkyd, anti-corrosive for metal**[, MPI #79]**.
b. Prime Coat: Shop primer specified in Section 05120 "Structural Steel" where substrate is specified.
c. Intermediate Coat: Light industrial coating, exterior, water based, matching topcoat.
d. Topcoat: Light industrial coating, exterior, water based (Gloss Level 3)**[, MPI #161]**.
e. Topcoat: Light industrial coating, exterior, water based, semi-gloss (Gloss Level 5)**[, MPI #163]**.
f. Topcoat: Light industrial coating, exterior, water based, gloss (Gloss Level 6)**[, MPI #164]**.

2. Alkyd System:

a. Prime Coat: Primer, alkyd, anticorrosive for metal**[, MPI #79]**.
b. Prime Coat: Shop primer specified in Section 05120 "Structural Steel" where substrate is specified.
c. Intermediate Coat: Exterior alkyd enamel matching topcoat.
d. Topcoat: Alkyd, exterior, flat (Gloss Level 1)**[, MPI #8]**.
e. Topcoat: Alkyd, exterior, semi-gloss (Gloss Level 5)**[, MPI #94]**.
f. Topcoat: Alkyd, exterior, gloss (Gloss Level 6)**[, MPI #9]**.

3. Quick-Drying Enamel System:

a. Prime Coat: Primer, alkyd, quick dry, for metal**[, MPI #76]**.
b. Intermediate Coat: Alkyd, quick dry, matching topcoat.
c. Topcoat: Alkyd, quick dry, semi-gloss (Gloss Level 5)**[, MPI #81]**.
d. Topcoat: Alkyd, quick dry, gloss (Gloss Level 7)**[, MPI #96]**.

4. Aluminum Paint System:

a. Prime Coat: Primer, alkyd, anti-corrosive for metal**[, MPI #79]**.
b. Prime Coat: Shop primer specified in Section 05120 "Structural Steel" where substrate is specified.

c. Intermediate Coat: Aluminum paint**[, MPI #1**].
d. Topcoat: Aluminum paint**[, MPI #1**].

F. Galvanized-Metal Substrates:

1. Latex System:

a. Prime Coat: Primer, galvanized, water based**[, MPI #134**].
b. Prime Coat: Primer, galvanized metal**[, as recommended in writing by topcoat manufacturer for exterior use on galvanized-metal substrates with topcoat indicated**].
c. Intermediate Coat: Latex, exterior, matching topcoat.
d. Topcoat: Latex, exterior flat (Gloss Level 1)**[, MPI #10**].
e. Topcoat: Latex, exterior, low sheen (Gloss Level 3-4)**[, MPI #15**].
f. Topcoat: Latex, exterior semi-gloss (Gloss Level 5)**[, MPI #11**].
g. Topcoat: Latex, exterior gloss (Gloss Level 6)**[, MPI #119**].

2. Water-Based Light Industrial Coating System:

a. Prime Coat: Primer, galvanized, water based**[, MPI #134**].
b. Prime Coat: Primer, galvanized metal**[, as recommended in writing by topcoat manufacturer for exterior use on galvanized-metal substrates with topcoat indicated**].
c. Intermediate Coat: Light industrial coating, exterior, water based, matching topcoat.
d. Topcoat: Light industrial coating, exterior, water based (Gloss Level 3)**[, MPI #161**].
e. Topcoat: Light industrial coating, exterior, water based, semi-gloss (Gloss Level 5)**[, MPI #163**].
f. Topcoat: Light industrial coating, exterior, water based, gloss (Gloss Level 6)**[, MPI #164**].

3. Alkyd System:

a. Prime Coat: Primer, galvanized metal**[, as recommended in writing by topcoat manufacturer for exterior use on galvanized-metal substrates with topcoat indicated**].
b. Intermediate Coat: Exterior alkyd enamel matching topcoat.
c. Topcoat: Alkyd, exterior, flat (Gloss Level 5)**[, MPI #8**].
d. Topcoat: Alkyd, exterior, semi-gloss (Gloss Level 5)**[, MPI #94**].
e. Topcoat: Alkyd, exterior, gloss (Gloss Level 5)**[, MPI #9**].

G. Aluminum Substrates:

1. Latex System:

a. Prime Coat: Primer, quick dry, for aluminum**[, MPI #95**].
b. Intermediate Coat: Latex, exterior, matching topcoat.
c. Topcoat: Latex, exterior flat (Gloss Level 1)**[, MPI #10**].
d. Topcoat: Latex, exterior, low sheen (Gloss Level 3-4)**[, MPI #15**].
e. Topcoat: Latex, exterior semi-gloss (Gloss Level 5)**[, MPI #11**].
f. Topcoat: Latex, exterior gloss (Gloss Level 6)**[, MPI #119**].

2. Water-Based Light Industrial Coating System:

a. Prime Coat: Primer, quick dry, for aluminum[**, MPI #95**].
b. Intermediate Coat: Light industrial coating, exterior, water based, matching topcoat.
c. Topcoat: Light industrial coating, exterior, water based (Gloss Level 3)[**, MPI #161**].
d. Topcoat: Light industrial coating, exterior, water based, semi-gloss (Gloss Level 5)[**, MPI #163**].
e. Topcoat: Light industrial coating, exterior, water based, gloss (Gloss Level 6)[**, MPI #164**].

3. Alkyd System:

a. Prime Coat: Primer, quick dry, for aluminum[**, MPI #95**].
b. Intermediate Coat: Exterior alkyd enamel matching topcoat.
c. Topcoat: Alkyd, exterior, flat (Gloss Level 5)[**, MPI #8**].
d. Topcoat: Alkyd, exterior, semi-gloss (Gloss Level 5)[**, MPI #94**].
e. Topcoat: Alkyd, exterior, gloss (Gloss Level 5)[**, MPI #9**].

H. Stainless-Steel Substrates:

1. Latex System:

a. Prime Coat: Primer, bonding, solvent based[**, MPI #69**].
b. Intermediate Coat: Latex, exterior, matching topcoat.
c. Topcoat: Latex, exterior flat (Gloss Level 1)[**, MPI #10**].
d. Topcoat: Latex, exterior, low sheen (Gloss Level 3-4)[**, MPI #15**].
e. Topcoat: Latex, exterior semi-gloss (Gloss Level 5)[**, MPI #11**].
f. Topcoat: Latex, exterior gloss (Gloss Level 6)[**, MPI #119**].

2. Water-Based Light Industrial Coating System:

a. Prime Coat: Primer, quick dry, for aluminum[**, MPI #95**].
b. Intermediate Coat: Light industrial coating, exterior, water based, matching topcoat.
c. Topcoat: Light industrial coating, exterior, water based (Gloss Level 3)[**, MPI #161**].
d. Topcoat: Light industrial coating, exterior, water based, semi-gloss (Gloss Level 5)[**, MPI #163**].
e. Topcoat: Light industrial coating, exterior, water based, gloss (Gloss Level 6)[**, MPI #164**].

I. Wood Substrates: Including [**wood trim**] [**architectural woodwork**] [**doors**] [**windows**] [**wood siding**] [**wood fences**] [**wood-based panel products**] [**glued-laminated construction**] [**exposed joists**] [**exposed beams**] [**wood shingles and shakes (excluding roofs)**] <**Insert description**>.

1. Latex System:

a. Prime Coat: Primer, latex for exterior wood[**, MPI #6**].
b. Intermediate Coat: Latex, exterior, matching topcoat.
c. Topcoat: Latex, exterior flat (Gloss Level 1)[**, MPI #10**].
d. Topcoat: Latex, exterior, low sheen (Gloss Level 3-4)[**, MPI #15**].
e. Topcoat: Latex, exterior semi-gloss (Gloss Level 5)[**, MPI #11**].
f. Topcoat: Latex, exterior gloss (Gloss Level 6)[**, MPI #119**].

2. Latex over Alkyd Primer System:

    a. Prime Coat: Primer, alkyd for exterior wood[**, MPI #5**].
    b. Prime Coat: Primer, oil for exterior wood[**, MPI #7**].
    c. Intermediate Coat: Latex, exterior, matching topcoat.
    d. Topcoat: Latex, exterior flat (Gloss Level 1)[**, MPI #10**].
    e. Topcoat: Latex, exterior, low sheen (Gloss Level 3-4)[**, MPI #15**].
    f. Topcoat: Latex, exterior semi-gloss (Gloss Level 5)[**, MPI #11**].
    g. Topcoat: Latex, exterior gloss (Gloss Level 6)[**, MPI #119**].

3. Alkyd System:

    a. Prime Coat: Primer, alkyd for exterior wood[**, MPI #5**].
    b. Prime Coat: Primer, oil for exterior wood[**, MPI #7**].
    c. Intermediate Coat: Exterior alkyd enamel matching topcoat.
    d. Topcoat: Alkyd, exterior, flat (Gloss Level 5)[**, MPI #8**].
    e. Topcoat: Alkyd, exterior, semi-gloss (Gloss Level 5)[**, MPI #94**].
    f. Topcoat: Alkyd, exterior, gloss (Gloss Level 5)[**, MPI #9**].

J. Wood Substrates, Traffic Surfaces: Including [**lumber decking**] [**stairs**] <**Insert description**>.

1. Latex System:

    a. Prime Coat: Primer, latex for exterior wood[**, MPI #6**].
    b. Intermediate Coat: Interior/exterior latex floor and porch (low gloss).
    c. Topcoat: Interior/exterior latex floor and porch (low gloss).

        1) With additive to increase skid resistance of painted surface.

2. Latex over Alkyd Primer System:

    a. Prime Coat: Primer, alkyd for exterior wood[**, MPI #5**].
    b. Intermediate Coat: Interior/exterior latex floor and porch (low gloss).
    c. Topcoat: Interior/exterior latex floor and porch (low gloss).

        1) With additive to increase skid resistance of painted surface.

3. Alkyd Floor Enamel System:

    a. Prime Coat: Floor enamel, alkyd, gloss (Gloss Level 6)[**, MPI #27**].
    b. Intermediate Coat: Floor enamel, alkyd, gloss (Gloss Level 6)[**, MPI #27**].
    c. Topcoat: Floor enamel, alkyd, gloss (Gloss Level 6)[**, MPI #27**].
    d. Additive: Manufacturer's standard additive to increase skid resistance of painted surface.

K. Plastic Trim Fabrication Substrates:

1. Latex System:

    a. Prime Coat: Primer, bonding, water based[**, MPI #17**].
    b. Prime Coat: Primer, bonding, solvent based[**, MPI #69**].
    c. Intermediate Coat: Latex, exterior, matching topcoat.
    d. Topcoat: Latex, exterior flat (Gloss Level 1)[**, MPI #10**].
    e. Topcoat: Latex, exterior, low sheen (Gloss Level 3-4)[**, MPI #15**].

f. Topcoat: Latex, exterior semi-gloss (Gloss Level 5)[**, MPI #11**].
g. Topcoat: Latex, exterior gloss (Gloss Level 6)[**, MPI #119**].

2. Alkyd System:

a. Prime Coat: Primer, bonding, water based[**, MPI #17**].
b. Prime Coat: Primer, bonding, solvent based[**, MPI #69**].
c. Intermediate Coat: Exterior alkyd enamel matching topcoat.
d. Topcoat: Alkyd, exterior, flat (Gloss Level 5)[**, MPI #8**].
e. Topcoat: Alkyd, exterior, semi-gloss (Gloss Level 5)[**, MPI #94**].
f. Topcoat: Alkyd, exterior, gloss (Gloss Level 5)[**, MPI #9**].

L. Portland Cement Plaster Substrates:

1. Latex System:

a. Prime Coat: Latex, exterior, matching topcoat.
b. Intermediate Coat: Latex, exterior, matching topcoat.
c. Topcoat: Latex, exterior flat (Gloss Level 1)[**, MPI #10**].
d. Topcoat: Latex, exterior, low sheen (Gloss Level 3-4)[**, MPI #15**].
e. Topcoat: Latex, exterior semi-gloss (Gloss Level 5)[**, MPI #11**].
f. Topcoat: Latex, exterior gloss (Gloss Level 6)[**, MPI #119**].

2. Latex over Alkali-Resistant Primer System:

a. Prime Coat: Primer, alkali resistant, water based[**, MPI #3**].
b. Intermediate Coat: Latex, exterior, matching topcoat.
c. Topcoat: Latex, exterior flat (Gloss Level 1)[**, MPI #10**].
d. Topcoat: Latex, exterior, low sheen (Gloss Level 3-4)[**, MPI #15**].
e. Topcoat: Latex, exterior semi-gloss (Gloss Level 5)[**, MPI #11**].
f. Topcoat: Latex, exterior gloss (Gloss Level 6)[**, MPI #119**].

3. High-Build Latex System: Dry film thickness not less than 10 mils (0.25 mm).

a. Prime Coat: As recommended in writing by topcoat manufacturer.
b. Intermediate Coat: As recommended in writing by topcoat manufacturer.
c. Topcoat: Latex, exterior, high build[**, MPI #40**].

M. Exterior Gypsum Board Substrates:

1. Latex System:

a. Prime Coat: Latex, exterior, matching topcoat.
b. Intermediate Coat: Latex, exterior, matching topcoat.
c. Topcoat: Latex, exterior flat (Gloss Level 1)[**, MPI #10**].
d. Topcoat: Latex, exterior, low sheen (Gloss Level 3-4)[**, MPI #15**].
e. Topcoat: Latex, exterior semi-gloss (Gloss Level 5)[**, MPI #11**].
f. Topcoat: Latex, exterior gloss (Gloss Level 6)[**, MPI #119**].

END OF SECTION 09911

SECTION 09912 - INTERIOR PAINTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes surface preparation and the application of paint systems on the following interior substrates:

1. Concrete.
2. Clay masonry.
3. Concrete masonry units (CMU).
4. Steel.
5. Cast iron.
6. Galvanized metal.
7. Aluminum (not anodized or otherwise coated).
8. Wood.
9. Gypsum board.
10. Plaster.
11. Spray-textured ceilings.
12. Cotton or canvas insulation covering.
13. ASJ insulation covering.

B. Related Requirements:

1. Section 05120 "Structural Steel" for shop priming of metal substrates with primers specified in this Section.
2. Section 09960 "High-Performance Coatings" for high-performance and special-use coatings. Section 09911 "Exterior Painting" for surface preparation and the application of paint systems on exterior substrates.

1.3 DEFINITIONS

A. Gloss Level 1: Not more than 5 units at 60 degrees and 10 units at 85 degrees, according to ASTM D 523.

B. Gloss Level 2: Not more than 10 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.

C. Gloss Level 3: 10 to 25 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.

D. Gloss Level 4: 20 to 35 units at 60 degrees and not less than 35 units at 85 degrees, according to ASTM D 523.

E. Gloss Level 5: 35 to 70 units at 60 degrees, according to ASTM D 523.

F. Gloss Level 6: 70 to 85 units at 60 degrees, according to ASTM D 523.

G. Gloss Level 7: More than 85 units at 60 degrees, according to ASTM D 523.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product. Include preparation requirements and application instructions.

B. LEED Submittals:

1. Product Data for Credit EQ 4.2: For paints and coatings, including printed statement of VOC content.
2. Laboratory Test Reports for Credit EQ 4: For paints and coatings, documentation indicating that they meet the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

C. Samples for Initial Selection: For each type of topcoat product.

D. Samples for Verification: For each type of paint system and in each color and gloss of topcoat.

1. Submit Samples on rigid backing, 8 inches (200 mm) square.
2. Step coats on Samples to show each coat required for system.
3. Label each coat of each Sample.
4. Label each Sample for location and application area.

E. Product List: For each product indicated, include the following:

1. Cross-reference to paint system and locations of application areas. Use same designations indicated on Drawings and in schedules.
2. Printout of current "MPI Approved Products List" for each product category specified in Part 2, with the proposed product highlighted.
3. VOC content.

1.5 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials**,** from the same product run**,** that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Paint: 5 percent, but not less than **1 gal.** of each material and color applied.

1.6 QUALITY ASSURANCE

A. Mockups: Apply mockups of each paint system indicated and each color and finish selected to verify preliminary selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Architect will select one surface to represent surfaces and conditions for application of each paint system specified in Part 3.

    a. Vertical and Horizontal Surfaces: Provide samples of at least 100 sq. ft.
    b. Other Items: Architect will designate items or areas required.

2. Final approval of color selections will be based on mockups.

    a. If preliminary color selections are not approved, apply additional mockups of additional colors selected by Architect at no added cost to Owner.

3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F (7 deg C).

1. Maintain containers in clean condition, free of foreign materials and residue.
2. Remove rags and waste from storage areas daily.

1.8 FIELD CONDITIONS

A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F (10 and 35 deg C).

B. Do not apply paints when relative humidity exceeds 85 percent; at temperatures less than 5 deg F (3 deg C) above the dew point; or to damp or wet surfaces.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Benjamin Moore & Co.
2. PPG Architectural Finishes, Inc.
3. Sherwin-Williams Company (The).

2.2 PAINT, GENERAL

A. MPI Standards: Provide products that comply with MPI standards indicated and that are listed in its "MPI Approved Products List."

B. Material Compatibility:

1. Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
2. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.

C. VOC Content: Products shall comply with VOC limits of authorities having jurisdiction[**and, for interior paints and coatings applied at Project site, the following VOC limits, exclusive of colorants added to a tint base, when calculated according to 40 CFR 59, Subpart D (EPA Method 24)**].

1. Flat Paints and Coatings: 50 g/L.
2. Nonflat Paints and Coatings: 150 g/L.
3. Dry-Fog Coatings: 400 g/L.
4. Primers, Sealers, and Undercoaters: 200 g/L.
5. Anticorrosive and Antirust Paints Applied to Ferrous Metals: 250 g/L.
6. Zinc-Rich Industrial Maintenance Primers: 340 g/L.
7. Pretreatment Wash Primers: 420 g/L.
8. Floor Coatings: 100 g/L.
9. Shellacs, Clear: 730 g/L.
10. Shellacs, Pigmented: 550 g/L.

D. Low-Emitting Materials: Interior paints and coatings shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

E. Colors: As selected by Architect from manufacturer's full range or Match Architect's samples

1. 30 percent of surface area will be painted with deep tones.

2.3 BLOCK FILLERS

A. Block Filler, Latex, Interior/Exterior:[**MPI #4.**]

1. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation**>.

2.4 PRIMERS/SEALERS

A. Primer Sealer, Latex, Interior:[**MPI #50.**]

1. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation**>.

B. Primer, Alkali Resistant, Water Based:[**MPI #3.**]

1. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation**>.

C. Primer Sealer, Interior, Institutional Low Odor/VOC:[**MPI #149.**]

1. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation**>.

D. Primer, Latex, for Interior Wood:[**MPI #39.**]

1. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation**>.

E. Primer Sealer, Alkyd, Interior:[**MPI #45.**]

1. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation**>.

F. Primer, Bonding, Water Based:[**MPI #17.**]

1. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation**>.

G. Primer, Bonding, Solvent Based:[**MPI #69.**]

1. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation**>.

H. Wood-Knot Sealer: Sealer recommended in writing by topcoat manufacturer for use in paint systems indicated.

1. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation**>.

2.5 METAL PRIMERS

A. Primer, Rust-Inhibitive, Water Based:[**MPI #107.**]

1. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation**>.

B. Primer, Alkyd, Anti-Corrosive, for Metal:[**MPI #79.**]

1. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation**>.

C. Primer, Alkyd, Quick Dry, for Metal:[**MPI #76.**]

1. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation**>.

D. Primer, Galvanized, Water Based:[**MPI #134.**]

1. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation**>.

E. Primer, Vinyl Wash:[**MPI #80.**]

1. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation**>.

F. Primer, Quick Dry, for Aluminum:[**MPI #95.**]

1. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation**>.

2.6 WATER-BASED PAINTS

A. Latex, Interior, Flat, (Gloss Level 1):[**MPI #53.**]

1. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation**>.

B. Latex, Interior, (Gloss Level 2):[**MPI #44.**]

1. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation**>.

C. Latex, Interior, (Gloss Level 3):[**MPI #52.**]

1. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation**>.

D. Latex, Interior, (Gloss Level 4):[**MPI #43.**]

1. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation**>.

E. Latex, Interior, Semi-Gloss, (Gloss Level 5):[**MPI #54.**]

1. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation**>.

F. Latex, Interior, Gloss, (Gloss Level 6, except minimum gloss of 65 units at 60 degrees):[**MPI #114.**]

1. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation**>.

G. Latex, Interior, Institutional Low Odor/VOC, Flat (Gloss Level 1):[**MPI #143.**]

1. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation**>.

H. Latex, Interior, Institutional Low Odor/VOC, (Gloss Level 2):[**MPI #144.**]

1. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation**>.

I. Latex, Interior, Institutional Low Odor/VOC, (Gloss Level 3):[**MPI #145.**]

1. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation**>.

J. Latex, Interior, Institutional Low Odor/VOC, Semi-Gloss (Gloss Level 5):[**MPI #147.**]

1. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation**>.

K. Latex, Interior, High Performance Architectural, (Gloss Level 2):[**MPI #138.**]

1. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation**>.

L. Latex, Interior, High Performance Architectural, (Gloss Level 3):[**MPI #139.**]

1. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation**>.

M. Latex, Interior, High Performance Architectural, (Gloss Level 4):[**MPI #140.**]

1. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation**>.

N. Latex, Interior, High Performance Architectural, Semi-Gloss (Gloss Level 5):[**MPI #141.**]

1. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation**>.

O. Light Industrial Coating, Interior, Water Based (Gloss Level 3):[**MPI #151.**]

1. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation**>.

P. Light Industrial Coating, Interior, Water Based, Semi-Gloss (Gloss Level 5):[**MPI #153.**]

1. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation**>.

Q. Light Industrial Coating, Interior, Water Based, Gloss (Gloss Level 6):[**MPI #154.**]

1. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation**>.

2.7 SOLVENT-BASED PAINTS

A. Alkyd, Interior, Flat (Gloss Level 1):[**MPI #49.**]

1. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation**>.

B. Alkyd, Interior, (Gloss Level 3):[**MPI #51.**]

1. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation**>.

C. Alkyd, Interior, Semi-Gloss (Gloss Level 5):[**MPI #47.**]

1. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation**>.

D. Alkyd, Interior, Gloss (Gloss Level 6):[**MPI #48.**]

1. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation**>.

E. Alkyd, Quick Dry, Semi-Gloss (Gloss Level 5):[**MPI #81.**]

1. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation**>.

F. Alkyd, Quick Dry, Gloss (Gloss Level 7):[**MPI #96.**]

1. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation**>.

2.8 TEXTURED COATING

A. Primer for Textured Coating, Latex, Flat: As recommended in writing by topcoat manufacturer.

1. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation**>.

B. Intermediate Coat for Textured Coating, Latex, Flat: As recommended in writing by topcoat manufacturer.

1. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation**>.

C. Textured Coating, Latex, Flat:[**MPI #42.**]

1. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation**>.

2.9 DRY FOG/FALL COATINGS

A. Dry Fall, Latex, Flat:[**MPI #118.**]

1. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation**>.

B. Dry Fall, Water Based, for Galvanized Steel, Flat (Gloss Level 1):[**MPI #133.**]

1. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation**>.

C. Dry Fall, Alkyd, Flat:[**MPI #55.**]

1. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation**>.

2.10 ALUMINUM PAINT

A. Aluminum Paint:[**MPI #1.**]

1. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation**>.

2.11 FLOOR COATINGS

A. Stain, Interior, for Concrete Floors:[**MPI #58.**]

1. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation**>.

B. Sealer, Water Based, for Concrete Floors:[**MPI #99.**]

1. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation**>.

C. Sealer, Solvent Based, for Concrete Floors:[**MPI #104.**]

1. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation**>.

D. Floor Paint, Latex, Low Gloss (Maximum Gloss Level 3):[**MPI #60.**]

1. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation**>.

E. Floor Enamel, Alkyd, Gloss (Gloss Level 6):[**MPI #27.**]

1. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation**>.

2.12 SOURCE QUALITY CONTROL

A. Testing of Paint Materials: Owner reserves the right to invoke the following procedure:

1. Owner will engage the services of a qualified testing agency to sample paint materials. Contractor will be notified in advance and may be present when samples are taken. If paint materials have already been delivered to Project site, samples may be taken at Project site. Samples will be identified, sealed, and certified by testing agency.
2. Testing agency will perform tests for compliance with product requirements.
3. Owner may direct Contractor to stop applying coatings if test results show materials being used do not comply with product requirements. Contractor shall remove noncomplying paint materials from Project site, pay for testing, and repaint surfaces

painted with rejected materials. Contractor will be required to remove rejected materials from previously painted surfaces if, on repainting with complying materials, the two paints are incompatible.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:

1. Concrete: 12 percent.
2. Masonry (Clay and CMU): 12 percent.
3. Wood: 15 percent.
4. Gypsum Board: 12 percent.
5. Plaster: 12 percent.

C. Gypsum Board Substrates: Verify that finishing compound is sanded smooth.

D. Plaster Substrates: Verify that plaster is fully cured.

E. Spray-Textured Ceiling Substrates: Verify that surfaces are dry.

F. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.

G. Proceed with coating application only after unsatisfactory conditions have been corrected.

1. Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Comply with manufacturer's written instructions and recommendations in "MPI Manual" applicable to substrates indicated.

B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.

1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.

C. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.

1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce paint systems indicated.

D. Concrete Substrates: Remove release agents, curing compounds, efflorescence, and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.

E. Masonry Substrates: Remove efflorescence and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces or mortar joints exceed that permitted in manufacturer's written instructions.

F. Steel Substrates: Remove rust, loose mill scale, and shop primer, if any. Clean using methods recommended in writing by paint manufacturer[**.**] [**but not less than the following:**]

1. SSPC-SP 2, "Hand Tool Cleaning."
2. SSPC-SP 3, "Power Tool Cleaning."
3. SSPC-SP 7/NACE No. 4, "Brush-off Blast Cleaning."
4. SSPC-SP 11, "Power Tool Cleaning to Bare Metal."

G. Shop-Primed Steel Substrates: Clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material as used for shop priming to comply with SSPC-PA 1 for touching up shop-primed surfaces.

H. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal fabricated from coil stock by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.

I. Aluminum Substrates: Remove loose surface oxidation.

J. Wood Substrates:

1. Scrape and clean knots, and apply coat of knot sealer before applying primer.
2. Sand surfaces that will be exposed to view, and dust off.
3. Prime edges, ends, faces, undersides, and backsides of wood.
4. After priming, fill holes and imperfections in the finish surfaces with putty or plastic wood filler. Sand smooth when dried.

K. Cotton or Canvas Insulation Covering Substrates: Remove dust, dirt, and other foreign material that might impair bond of paints to substrates.

3.3 APPLICATION

A. Apply paints according to manufacturer's written instructions and to recommendations in "MPI Manual."

1. Use applicators and techniques suited for paint and substrate indicated.
2. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
3. Paint front and backsides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.
4. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
5. Primers specified in painting schedules may be omitted on items that are factory primed or factory finished if acceptable to topcoat manufacturers.

B. Tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Tint undercoats to match color of topcoat, but provide sufficient difference in shade of undercoats to distinguish each separate coat.

C. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.

D. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.

E. Painting Fire Suppression, Plumbing, HVAC, Electrical, Communication, and Electronic Safety and Security Work:

1. Paint the following work where exposed in equipment rooms:

    a. Equipment, including panelboards and switch gear.
    b. Uninsulated metal piping.
    c. Uninsulated plastic piping.
    d. Pipe hangers and supports.
    e. Metal conduit.
    f. Plastic conduit.
    g. Tanks that do not have factory-applied final finishes.
    h. Duct, equipment, and pipe insulation having cotton or canvas insulation covering or other paintable jacket material.
    i. <**Insert mechanical items to be painted**>.

2. Paint the following work where exposed in occupied spaces:

    a. Equipment, including panelboards.
    b. Uninsulated metal piping.
    c. Uninsulated plastic piping.
    d. Pipe hangers and supports.
    e. Metal conduit.
    f. Plastic conduit.
    g. Duct, equipment, and pipe insulation having cotton or canvas insulation covering or other paintable jacket material.
    h. Other items as directed by Architect.
    i. <**Insert mechanical items to be painted**>.

3. Paint portions of internal surfaces of metal ducts, without liner, behind air inlets and outlets that are visible from occupied spaces.

3.4 FIELD QUALITY CONTROL

A. Dry Film Thickness Testing: Owner may engage the services of a qualified testing and inspecting agency to inspect and test paint for dry film thickness.

1. Contractor shall touch up and restore painted surfaces damaged by testing.
2. If test results show that dry film thickness of applied paint does not comply with paint manufacturer's written recommendations, Contractor shall pay for testing and apply additional coats as needed to provide dry film thickness that complies with paint manufacturer's written recommendations.

3.5 CLEANING AND PROTECTION

A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.

B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.

C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.

D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.6 INTERIOR PAINTING SCHEDULE

A. Concrete Substrates, Nontraffic Surfaces:

1. Latex System:

a. Prime Coat: Primer sealer, latex, interior[**, MPI #50**].
b. Prime Coat: Latex, interior, matching topcoat.
c. Intermediate Coat: Latex, interior, matching topcoat.
d. Topcoat: Latex, interior, flat, (Gloss Level 1)[**, MPI #53**].
e. Topcoat: Latex, interior, (Gloss Level 2)[**, MPI #44**].
f. Topcoat: Latex, interior, (Gloss Level 3)[**, MPI #52**].
g. Topcoat: Latex, interior, (Gloss Level 4)[**, MPI #43**].
h. Topcoat: Latex, interior, semi-gloss, (Gloss Level 5)[**, MPI #54**].
i. Topcoat: Latex, interior, gloss, (Gloss Level 6, except minimum gloss of 65 units at 60 degrees)[**, MPI #114**].

2. Latex over Latex Aggregate System:

a. Prime Coat: Textured coating, latex, flat[**, MPI #42**].
b. Intermediate Coat: Latex, interior, matching topcoat.
c. Topcoat: Latex, interior, flat, (Gloss Level 1)[**, MPI #53**].
d. Topcoat: Latex, interior, (Gloss Level 2)[**, MPI #44**].
e. Topcoat: Latex, interior, (Gloss Level 3)[**, MPI #52**].
f. Topcoat: Latex, interior, (Gloss Level 4)[**, MPI #43**].
g. Topcoat: Latex, interior, semi-gloss, (Gloss Level 5)[**, MPI #54**].
h. Topcoat: Latex, interior, gloss, (Gloss Level 6, except minimum gloss of 65 units at 60 degrees)[**, MPI #114**].

3. Institutional Low-Odor/VOC Latex System:

a. Prime Coat: Primer sealer, interior, institutional low odor/VOC[**, MPI #149**].
b. Intermediate Coat: Latex, interior, institutional low odor/VOC, matching topcoat.
c. Topcoat: Latex, interior, institutional low odor/VOC, flat (Gloss Level 1)[**, MPI #143**].
d. Topcoat: Latex, interior, institutional low odor/VOC, (Gloss Level 2)[**, MPI #144**].
e. Topcoat: Latex, interior, institutional low odor/VOC, (Gloss Level 3)[**, MPI #145**].

f. Topcoat: Latex, interior, institutional low odor/VOC, semi-gloss (Gloss Level 5)**[, MPI #147**].

4. High-Performance Architectural Latex System:

a. Prime Coat: Primer, alkali resistant, water based**[, MPI #3**].
b. Intermediate Coat: Latex, interior, high performance architectural, matching topcoat.
c. Topcoat: Latex, interior, high performance architectural, (Gloss Level 2)**[, MPI #138**].
d. Topcoat: Latex, interior, high performance architectural, (Gloss Level 3)**[, MPI #139**].
e. Topcoat: Latex, interior, high performance architectural, (Gloss Level 4)**[, MPI #140**].
f. Topcoat: Latex, interior, high performance architectural, semi-gloss (Gloss Level 5)**[, MPI #141**].

5. Water-Based Light Industrial Coating System:

a. Prime Coat: Primer, alkali resistant, water based**[, MPI #3**].
b. Intermediate Coat: Light industrial coating, interior, water based, matching topcoat.
c. Topcoat: Light industrial coating, interior, water based (Gloss Level 3)**[, MPI #151**].
d. Topcoat: Light industrial coating, interior, water based, semi-gloss (Gloss Level 5)**[, MPI #153**].
e. Topcoat: Light industrial coating, interior, water based, gloss (Gloss Level 6)**[, MPI #154**].

6. Alkyd System:

a. Prime Coat: Primer, alkali resistant, water based**[, MPI #3**].
b. Intermediate Coat: Alkyd, interior, matching topcoat.
c. Topcoat: Alkyd, interior, flat (Gloss Level 1)**[, MPI #49**].
d. Topcoat: Alkyd, interior, (Gloss Level 3)**[, MPI #51**].
e. Topcoat: Alkyd, interior, semi-gloss (Gloss Level 5)**[, MPI #47**].
f. Topcoat: Alkyd, interior, gloss (Gloss Level 6)**[, MPI #48**].

B. Concrete Substrates, Traffic Surfaces:

1. Latex Floor Enamel System:

a. Prime Coat: Floor paint, latex, low gloss (maximum Gloss Level 3)**[, MPI #60**].
b. Intermediate Coat: Floor paint, latex, low gloss (maximum Gloss Level 3)**[, MPI #60**].
c. Topcoat: Floor paint, latex, low gloss (maximum Gloss Level 3)**[, MPI #60**].

2. Alkyd Floor Enamel System:

a. Prime Coat: Floor enamel, alkyd, gloss (Gloss Level 6)**[, MPI #27**].
b. Intermediate Coat: Floor enamel, alkyd, gloss (Gloss Level 6)**[, MPI #27**].
c. Topcoat: Floor enamel, alkyd, gloss (Gloss Level 6)**[, MPI #27**].

3. Concrete Stain System:

a. First Coat: Stain, interior, for concrete floors**[, MPI #58]**.
b. Topcoat: Stain, interior, for concrete floors**[, MPI #58]**.

4. Water-Based Clear Sealer System:

a. First Coat: Sealer, water based, for concrete floors**[, MPI #99]**.
b. Topcoat: Sealer, water based, for concrete floors**[, MPI #99]**.

5. Solvent-Based Clear Sealer System:

a. First Coat: Sealer, solvent based, for concrete floors**[, MPI #104]**.
b. Topcoat: Sealer, solvent based, for concrete floors**[, MPI #104]**.

C. Clay-Masonry Substrates:

1. Latex System:

a. Prime Coat: Latex, interior, matching topcoat.
b. Intermediate Coat: Latex, interior, matching topcoat.
c. Topcoat: Latex, interior, flat, (Gloss Level 1)**[, MPI #53]**.
d. Topcoat: Latex, interior, (Gloss Level 2)**[, MPI #44]**.
e. Topcoat: Latex, interior, (Gloss Level 3)**[, MPI #52]**.
f. Topcoat: Latex, interior, (Gloss Level 4)**[, MPI #43]**.
g. Topcoat: Latex, interior, semi-gloss, (Gloss Level 5)**[, MPI #54]**.
h. Topcoat: Latex, interior, gloss, (Gloss Level 6, except minimum gloss of 65 units at 60 degrees)**[, MPI #114]**.

2. Latex Aggregate System:

a. Prime Coat: Primer for textured coating, latex, flat**[, as recommended in writing by topcoat manufacturer]**.
b. Intermediate Coat: Intermediate coat for textured coating, latex, flat**[, as recommended in writing by topcoat manufacturer]**.
c. Topcoat: Textured coating, latex, flat**[, MPI #42]**.

3. Institutional Low-Odor/VOC Latex System:

a. Prime Coat: Primer sealer, interior, institutional low odor/VOC**[, MPI #149]**.
b. Intermediate Coat: Latex, interior, institutional low odor/VOC, matching topcoat.
c. Topcoat: Latex, interior, institutional low odor/VOC, flat (Gloss Level 1)**[, MPI #143]**.
d. Topcoat: Latex, interior, institutional low odor/VOC, (Gloss Level 2)**[, MPI #144]**.
e. Topcoat: Latex, interior, institutional low odor/VOC, (Gloss Level 3)**[, MPI #145]**.
f. Topcoat: Latex, interior, institutional low odor/VOC, semi-gloss (Gloss Level 5)**[, MPI #147]**.

4. High-Performance Architectural Latex System:

a. Prime Coat: Primer, alkali resistant, water based**[, MPI #3]**.
b. Intermediate Coat: Latex, interior, high performance architectural, matching topcoat.
c. Topcoat: Latex, interior, high performance architectural, (Gloss Level 2)**[, MPI #138]**.

d. Topcoat: Latex, interior, high performance architectural, (Gloss Level 3)[**, MPI #139**].
e. Topcoat: Latex, interior, high performance architectural, (Gloss Level 4)[**, MPI #140**].
f. Topcoat: Latex, interior, high performance architectural, semi-gloss (Gloss Level 5)[**, MPI #141**].

5. Water-Based Light Industrial Coating System:

a. Prime Coat: Primer, alkali resistant, water based[**, MPI #3**].
b. Intermediate Coat: Light industrial coating, interior, water based, matching topcoat.
c. Topcoat: Light industrial coating, interior, water based (Gloss Level 3)[**, MPI #151**].
d. Topcoat: Light industrial coating, interior, water based, semi-gloss (Gloss Level 5)[**, MPI #153**].
e. Topcoat: Light industrial coating, interior, water based, gloss (Gloss Level 6)[**, MPI #154**].

6. Alkyd System:

a. Prime Coat: Primer sealer, latex, interior[**, MPI #50**].
b. Intermediate Coat: Alkyd, interior, matching topcoat.
c. Topcoat: Alkyd, interior, flat (Gloss Level 1)[**, MPI #49**].
d. Topcoat: Alkyd, interior, (Gloss Level 3)[**, MPI #51**].
e. Topcoat: Alkyd, interior, semi-gloss (Gloss Level 5)[**, MPI #47**].
f. Topcoat: Alkyd, interior, gloss (Gloss Level 6)[**, MPI #48**].

D. CMU Substrates:

1. Latex System:

a. Block Filler: Block filler, latex, interior/exterior[**, MPI #4**].
b. Intermediate Coat: Latex, interior, matching topcoat.
c. Topcoat: Latex, interior, flat, (Gloss Level 1)[**, MPI #53**].
d. Topcoat: Latex, interior, (Gloss Level 2)[**, MPI #44**].
e. Topcoat: Latex, interior, (Gloss Level 3)[**, MPI #52**].
f. Topcoat: Latex, interior, (Gloss Level 4)[**, MPI #43**].
g. Topcoat: Latex, interior, semi-gloss, (Gloss Level 5)[**, MPI #54**].
h. Topcoat: Latex, interior, gloss, (Gloss Level 6, except minimum gloss of 65 units at 60 degrees)[**, MPI #114**].

2. Institutional Low-Odor/VOC Latex System:

a. Block Filler: Block filler, latex, interior/exterior[**, MPI #4**].
b. Intermediate Coat: Latex, interior, institutional low odor/VOC, matching topcoat.
c. Topcoat: Latex, interior, institutional low odor/VOC, flat (Gloss Level 1)[**, MPI #143**].
d. Topcoat: Latex, interior, institutional low odor/VOC, (Gloss Level 2)[**, MPI #144**].
e. Topcoat: Latex, interior, institutional low odor/VOC, (Gloss Level 3)[**, MPI #145**].
f. Topcoat: Latex, interior, institutional low odor/VOC, semi-gloss (Gloss Level 5)[**, MPI #147**].

3. High-Performance Architectural Latex System:

a. Block Filler: Block filler, latex, interior/exterior[**, MPI #4**].
b. Intermediate Coat: Latex, interior, high performance architectural, matching topcoat.
c. Topcoat: Latex, interior, high performance architectural, (Gloss Level 2)[**, MPI #138**].
d. Topcoat: Latex, interior, high performance architectural, (Gloss Level 3)[**, MPI #139**].
e. Topcoat: Latex, interior, high performance architectural, (Gloss Level 4)[**, MPI #140**].
f. Topcoat: Latex, interior, high performance architectural, semi-gloss (Gloss Level 5)[**, MPI #141**].

4. Water-Based Light Industrial Coating System:

a. Block Filler: Block filler, latex, interior/exterior[**, MPI #4**].
b. Intermediate Coat: Light industrial coating, interior, water based, matching topcoat.
c. Topcoat: Light industrial coating, interior, water based (Gloss Level 3)[**, MPI #151**].
d. Topcoat: Light industrial coating, interior, water based, semi-gloss (Gloss Level 5)[**, MPI #153**].
e. Topcoat: Light industrial coating, interior, water based, gloss (Gloss Level 6)[**, MPI #154**].

5. Alkyd System:

a. Block Filler: Block filler, latex, interior/exterior[**, MPI #4**].
b. Sealer Coat: Primer sealer, latex, interior[**, MPI #50**].
c. Intermediate Coat: Alkyd, interior, matching topcoat.
d. Topcoat: Alkyd, interior, flat (Gloss Level 1)[**, MPI #49**].
e. Topcoat: Alkyd, interior, (Gloss Level 3)[**, MPI #51**].
f. Topcoat: Alkyd, interior, semi-gloss (Gloss Level 5)[**, MPI #47**].
g. Topcoat: Alkyd, interior, gloss (Gloss Level 6)[**, MPI #48**].

E. Steel Substrates:

1. Latex over Alkyd Primer System:

a. Prime Coat: Primer, alkyd, anti-corrosive, for metal[**, MPI #79**].
b. Prime Coat: Primer, alkyd, quick dry, for metal[**, MPI #76**].
c. Prime Coat: Primer, alkyd, anti-corrosive, for metal[**, MPI #79**] or primer, alkyd, quick dry, for metal[**, MPI #76**].
d. Prime Coat: Shop primer specified in Section 05120 "Structural Steel" where substrate is specified.
e. Intermediate Coat: Latex, interior, matching topcoat.
f. Topcoat: Latex, interior, flat, (Gloss Level 1)[**, MPI #53**].
g. Topcoat: Latex, interior, (Gloss Level 2)[**, MPI #44**].
h. Topcoat: Latex, interior, (Gloss Level 3)[**, MPI #52**].
i. Topcoat: Latex, interior, (Gloss Level 4)[**, MPI #43**].
j. Topcoat: Latex, interior, semi-gloss, (Gloss Level 5)[**, MPI #54**].
k. Topcoat: Latex, interior, gloss, (Gloss Level 6, except minimum gloss of 65 units at 60 degrees)[**, MPI #114**].

2. Water-Based Dry-Fall System:

a. Prime Coat: Primer, alkyd, anti-corrosive, for metal**[, MPI #79]**.
b. Prime Coat: Primer, alkyd, quick dry, for metal**[, MPI #76]**.
c. Prime Coat: Primer, alkyd, anti-corrosive, for metal**[, MPI #79]** or primer, alkyd, quick dry, for metal**[, MPI #76]**.
d. Prime Coat: Shop primer specified in Section 05120 "Structural Steel" where substrate is specified.
e. Topcoat: Dry fall, latex, flat**[, MPI #118]**.
f. Topcoat: Dry fall, water based, for galvanized steel, flat (Gloss Level 1)**[, MPI #133]**.

3. Institutional Low-Odor/VOC Latex System:

a. Prime Coat: Primer, rust-inhibitive, water based[**MPI #107**].
b. Intermediate Coat: Latex, interior, institutional low odor/VOC, matching topcoat.
c. Topcoat: Latex, interior, institutional low odor/VOC, flat (Gloss Level 1)**[, MPI #143]**.
d. Topcoat: Latex, interior, institutional low odor/VOC, (Gloss Level 2)**[, MPI #144]**.
e. Topcoat: Latex, interior, institutional low odor/VOC, (Gloss Level 3)**[, MPI #145]**.
f. Topcoat: Latex, interior, institutional low odor/VOC, semi-gloss (Gloss Level 5)**[, MPI #147]**.

4. High-Performance Architectural Latex System:

a. Prime Coat: Primer, alkyd, anti-corrosive, for metal**[, MPI #79]**.
b. Prime Coat: Primer, alkyd, quick dry, for metal**[, MPI #76]**.
c. Prime Coat: Primer, alkyd, anti-corrosive, for metal**[, MPI #79]** or primer, alkyd, quick dry, for metal**[, MPI #76]**.
d. Prime Coat: Shop primer specified in Section 05120 "Structural Steel" where substrate is specified.
e. Intermediate Coat: Latex, interior, high performance architectural, matching topcoat.
f. Topcoat: Latex, interior, high performance architectural, (Gloss Level 2)**[, MPI #138]**.
g. Topcoat: Latex, interior, high performance architectural, (Gloss Level 3)**[, MPI #139]**.
h. Topcoat: Latex, interior, high performance architectural, (Gloss Level 4)**[, MPI #140]**.
i. Topcoat: Latex, interior, high performance architectural, semi-gloss (Gloss Level 5)**[, MPI #141]**.

5. Water-Based Light Industrial Coating System:

a. Prime Coat: Primer, rust-inhibitive, water based[**MPI #107**].
b. Intermediate Coat: Light industrial coating, interior, water based, matching topcoat.
c. Topcoat: Light industrial coating, interior, water based (Gloss Level 3)**[, MPI #151]**.
d. Topcoat: Light industrial coating, interior, water based, semi-gloss (Gloss Level 5)**[, MPI #153]**.
e. Topcoat: Light industrial coating, interior, water based, gloss (Gloss Level 6)**[, MPI #154]**.

6. Alkyd System:

a. Prime Coat: Primer, alkyd, anti-corrosive, for metal**[, MPI #79]**.

b. Prime Coat: Primer, alkyd, quick dry, for metal[**, MPI #76**].
c. Prime Coat: Primer, alkyd, anti-corrosive, for metal[**, MPI #79**] or primer, alkyd, quick dry, for metal[**, MPI #76**].
d. Prime Coat: Shop primer specified in Section 05120 "Structural Steel" where substrate is specified.
e. Intermediate Coat: Alkyd, interior, matching topcoat.
f. Topcoat: Alkyd, interior, flat (Gloss Level 1)[**, MPI #49**].
g. Topcoat: Alkyd, interior, (Gloss Level 3)[**, MPI #51**].
h. Topcoat: Alkyd, interior, semi-gloss (Gloss Level 5)[**, MPI #47**].
i. Topcoat: Alkyd, interior, gloss (Gloss Level 6)[**, MPI #48**].

7. Quick-Drying Enamel System:

a. Prime Coat: Primer, alkyd, quick dry, for metal[**, MPI #76**].
b. Intermediate Coat: Alkyd, quick dry, matching topcoat.
c. Topcoat: Alkyd, quick dry, semi-gloss (Gloss Level 5)[**, MPI #81**].
d. Topcoat: Alkyd, quick dry, gloss (Gloss Level 7)[**, MPI #96**].

8. Alkyd Dry-Fall System:

a. Prime Coat: Primer, alkyd, anti-corrosive, for metal[**, MPI #79**].
b. Prime Coat: Primer, alkyd, quick dry, for metal[**, MPI #76**].
c. Prime Coat: Primer, alkyd, anti-corrosive, for metal[**, MPI #79**] or primer, alkyd, quick dry, for metal[**, MPI #76**].
d. Prime Coat: Shop primer specified in Section 05120 "Structural Steel" where substrate is specified.
e. Topcoat: Dry fall, alkyd, flat[**, MPI #55**].

9. Aluminum Paint System:

a. Prime Coat: Primer, alkyd, anti-corrosive, for metal[**, MPI #79**].
b. Prime Coat: Primer, alkyd, quick dry, for metal[**, MPI #76**].
c. Prime Coat: Primer, alkyd, anti-corrosive, for metal[**, MPI #79**] or primer, alkyd, quick dry, for metal[**, MPI #76**].
d. Prime Coat: Shop primer specified in Section 05120 "Structural Steel" where substrate is specified.
e. Intermediate Coat: Aluminum paint[**, MPI #1**].
f. Topcoat: Aluminum paint[**, MPI #1**].

F. Galvanized-Metal Substrates:

1. Latex over Waterborne Primer System:

a. Prime Coat: Primer, galvanized, water based[**, MPI #134**].
b. Intermediate Coat: Latex, interior, matching topcoat.
c. Topcoat: Latex, interior, flat, (Gloss Level 1)[**, MPI #53**].
d. Topcoat: Latex, interior, (Gloss Level 2)[**, MPI #44**].
e. Topcoat: Latex, interior, (Gloss Level 3)[**, MPI #52**].
f. Topcoat: Latex, interior, (Gloss Level 4)[**, MPI #43**].
g. Topcoat: Latex, interior, semi-gloss, (Gloss Level 5)[**, MPI #54**].
h. Topcoat: Latex, interior, gloss, (Gloss Level 6, except minimum gloss of 65 units at 60 degrees)[**, MPI #114**].

2. Water-Based Dry-Fall System:

a. Prime Coat: Dry fall, water based, for galvanized steel, flat (Gloss Level 1)**[, MPI #133**].
b. Topcoat: Dry fall, water based, for galvanized steel, flat (Gloss Level 1)**[, MPI #133**].

3. Institutional Low-Odor/VOC Latex System:

a. Prime Coat: Primer, galvanized, water based**[, MPI #134**].
b. Intermediate Coat: Latex, interior, institutional low odor/VOC, matching topcoat.
c. Topcoat: Latex, interior, institutional low odor/VOC, flat (Gloss Level 1)**[, MPI #143**].
d. Topcoat: Latex, interior, institutional low odor/VOC, (Gloss Level 2)**[, MPI #144**].
e. Topcoat: Latex, interior, institutional low odor/VOC, (Gloss Level 3)**[, MPI #145**].
f. Topcoat: Latex, interior, institutional low odor/VOC, semi-gloss (Gloss Level 5)**[, MPI #147**].

4. High-Performance Architectural Latex System:

a. Prime Coat: Primer, galvanized, water based**[, MPI #134**].
b. Intermediate Coat: Latex, interior, high performance architectural, matching topcoat.
c. Topcoat: Latex, interior, high performance architectural, (Gloss Level 2)**[, MPI #138**].
d. Topcoat: Latex, interior, high performance architectural, (Gloss Level 3)**[, MPI #139**].
e. Topcoat: Latex, interior, high performance architectural, (Gloss Level 4)**[, MPI #140**].
f. Topcoat: Latex, interior, high performance architectural, semi-gloss (Gloss Level 5)**[, MPI #141**].

5. Water-Based Light Industrial Coating Over Waterborne Primer System:

a. Prime Coat: Primer, galvanized, water based**[, MPI #134**].
b. Intermediate Coat: Light industrial coating, interior, water based, matching topcoat.
c. Topcoat: Light industrial coating, interior, water based (Gloss Level 3)**[, MPI #151**].
d. Topcoat: Light industrial coating, interior, water based, semi-gloss (Gloss Level 5)**[, MPI #153**].
e. Topcoat: Light industrial coating, interior, water based, gloss (Gloss Level 6)**[, MPI #154**].

6. Aluminum Paint System:

a. Prime Coat: Primer, galvanized metal, as recommended in writing by topcoat manufacturer for use on galvanized-metal substrates with topcoat indicated.
b. Intermediate Coat: Aluminum paint**[, MPI #1**].
c. Topcoat: Aluminum paint**[, MPI #1**].

G. Aluminum (Not Anodized or Otherwise Coated) Substrates:

1. Latex System:

a. Prime Coat: Primer, quick dry, for aluminum**[, MPI #95**].
b. Intermediate Coat: Latex, interior, matching topcoat.

c. Topcoat: Latex, interior, flat, (Gloss Level 1)[**, MPI #53**].
d. Topcoat: Latex, interior, (Gloss Level 2)[**, MPI #44**].
e. Topcoat: Latex, interior, (Gloss Level 3)[**, MPI #52**].
f. Topcoat: Latex, interior, (Gloss Level 4)[**, MPI #43**].
g. Topcoat: Latex, interior, semi-gloss, (Gloss Level 5)[**, MPI #54**].
h. Topcoat: Latex, interior, gloss, (Gloss Level 6, except minimum gloss of 65 units at 60 degrees)[**, MPI #114**].

2. Institutional Low-Odor/VOC Latex System:

a. Prime Coat: Primer, quick dry, for aluminum[**, MPI #95**].
b. Intermediate Coat: Latex, interior, institutional low odor/VOC, matching topcoat.
c. Topcoat: Latex, interior, institutional low odor/VOC, flat (Gloss Level 1)[**, MPI #143**].
d. Topcoat: Latex, interior, institutional low odor/VOC, (Gloss Level 2)[**, MPI #144**].
e. Topcoat: Latex, interior, institutional low odor/VOC, (Gloss Level 3)[**, MPI #145**].
f. Topcoat: Latex, interior, institutional low odor/VOC, semi-gloss (Gloss Level 5)[**, MPI #147**].

3. High-Performance Architectural Latex System:

a. Prime Coat: Primer, quick dry, for aluminum[**, MPI #95**].
b. Intermediate Coat: Latex, interior, high performance architectural, matching topcoat.
c. Topcoat: Latex, interior, high performance architectural, (Gloss Level 2)[**, MPI #138**].
d. Topcoat: Latex, interior, high performance architectural, (Gloss Level 3)[**, MPI #139**].
e. Topcoat: Latex, interior, high performance architectural, (Gloss Level 4)[**, MPI #140**].
f. Topcoat: Latex, interior, high performance architectural, semi-gloss (Gloss Level 5)[**, MPI #141**].

4. Water-Based Light Industrial Coating System:

a. Prime Coat: Primer, quick dry, for aluminum[**, MPI #95**].
b. Intermediate Coat: Light industrial coating, interior, water based, matching topcoat.
c. Topcoat: Light industrial coating, interior, water based (Gloss Level 3)[**, MPI #151**].
d. Topcoat: Light industrial coating, interior, water based, semi-gloss (Gloss Level 5)[**, MPI #153**].
e. Topcoat: Light industrial coating, interior, water based, gloss (Gloss Level 6)[**, MPI #154**].

5. Alkyd System:

a. Prime Coat: Primer, vinyl wash[**, MPI #80**].
b. Prime Coat: Primer, quick dry, for aluminum[**, MPI #95**].
c. Intermediate Coat: Alkyd, interior, matching topcoat.
d. Topcoat: Alkyd, interior, flat (Gloss Level 1)[**, MPI #49**].
e. Topcoat: Alkyd, interior, (Gloss Level 3)[**, MPI #51**].
f. Topcoat: Alkyd, interior, semi-gloss (Gloss Level 5)[**, MPI #47**].
g. Topcoat: Alkyd, interior, gloss (Gloss Level 6)[**, MPI #48**].

6. Aluminum Paint System:

    a. Prime Coat: Primer, vinyl wash[**, MPI #80**].
    b. Intermediate Coat: Aluminum paint[**, MPI #1**].
    c. Topcoat: Aluminum paint[**, MPI #1**].

H. Wood Substrates: Including wood trim, architectural woodwork, doors, windows, wood-based panel products

1. Latex System:

    a. Prime Coat: Primer, latex, for interior wood[**, MPI #39**].
    b. Intermediate Coat: Latex, interior, matching topcoat.
    c. Topcoat: Latex, interior, flat, (Gloss Level 1)[**, MPI #53**].
    d. Topcoat: Latex, interior, (Gloss Level 2)[**, MPI #44**].
    e. Topcoat: Latex, interior, (Gloss Level 3)[**, MPI #52**].
    f. Topcoat: Latex, interior, (Gloss Level 4)[**, MPI #43**].
    g. Topcoat: Latex, interior, semi-gloss, (Gloss Level 5)[**, MPI #54**].
    h. Topcoat: Latex, interior, gloss, (Gloss Level 6, except minimum gloss of 65 units at 60 degrees)[**, MPI #114**].

2. Latex over Alkyd Primer System:

    a. Prime Coat: Primer sealer, alkyd, interior[**, MPI #45**].
    b. Intermediate Coat: Latex, interior, matching topcoat.
    c. Topcoat: Latex, interior, flat, (Gloss Level 1)[**, MPI #53**].
    d. Topcoat: Latex, interior, (Gloss Level 2)[**, MPI #44**].
    e. Topcoat: Latex, interior, (Gloss Level 3)[**, MPI #52**].
    f. Topcoat: Latex, interior, (Gloss Level 4)[**, MPI #43**].
    g. Topcoat: Latex, interior, semi-gloss, (Gloss Level 5)[**, MPI #54**].
    h. Topcoat: Latex, interior, gloss, (Gloss Level 6, except minimum gloss of 65 units at 60 degrees)[**, MPI #114**].

3. Institutional Low-Odor/VOC Latex System:

    a. Prime Coat: Primer, latex, for interior wood[**, MPI #39**].
    b. Intermediate Coat: Latex, interior, institutional low odor/VOC, matching topcoat.
    c. Topcoat: Latex, interior, institutional low odor/VOC, flat (Gloss Level 1)[**, MPI #143**].
    d. Topcoat: Latex, interior, institutional low odor/VOC, (Gloss Level 2)[**, MPI #144**].
    e. Topcoat: Latex, interior, institutional low odor/VOC, (Gloss Level 3)[**, MPI #145**].
    f. Topcoat: Latex, interior, institutional low odor/VOC, semi-gloss (Gloss Level 5)[**, MPI #147**].

4. High-Performance Architectural Latex System:

    a. Prime Coat: Primer, latex, for interior wood[**, MPI #39**].
    b. Intermediate Coat: Latex, interior, high performance architectural, matching topcoat.
    c. Topcoat: Latex, interior, high performance architectural, (Gloss Level 2)[**, MPI #138**].
    d. Topcoat: Latex, interior, high performance architectural, (Gloss Level 3)[**, MPI #139**].

e. Topcoat: Latex, interior, high performance architectural, (Gloss Level 4)**[, MPI #140**].
f. Topcoat: Latex, interior, high performance architectural, semi-gloss (Gloss Level 5)**[, MPI #141**].

5. Alkyd System:

a. Prime Coat: Primer sealer, alkyd, interior**[, MPI #45**].
b. Intermediate Coat: Alkyd, interior, matching topcoat.
c. Topcoat: Alkyd, interior, flat (Gloss Level 1)**[, MPI #49**].
d. Topcoat: Alkyd, interior, (Gloss Level 3)**[, MPI #51**].
e. Topcoat: Alkyd, interior, semi-gloss (Gloss Level 5)**[, MPI #47**].
f. Topcoat: Alkyd, interior, gloss (Gloss Level 6)**[, MPI #48**].

I. Wood Substrates, Traffic Surfaces:

1. Latex Floor Paint System:

a. Prime Coat: Primer sealer, alkyd, interior**[, MPI #45**].
b. Intermediate Coat: Floor paint, latex, low gloss (maximum Gloss Level 3)**[, MPI #60**].
c. Topcoat: Floor paint, latex, low gloss (maximum Gloss Level 3)**[, MPI #60**].

2. Alkyd Floor Enamel System:

a. Prime Coat: Floor enamel, alkyd, gloss (Gloss Level 6)**[, MPI #27**].
b. Intermediate Coat: Floor enamel, alkyd, gloss (Gloss Level 6)**[, MPI #27**].
c. Topcoat: Floor enamel, alkyd, gloss (Gloss Level 6)**[, MPI #27**].

J. Fiberglass and Plastic Substrates:

1. Latex System:

a. Prime Coat: Primer, bonding, water based**[, MPI #17**].
b. Prime Coat: Primer, bonding, solvent based**[, MPI #69**].
c. Intermediate Coat: Latex, interior, matching topcoat.
d. Topcoat: Latex, interior, flat, (Gloss Level 1)**[, MPI #53**].
e. Topcoat: Latex, interior, (Gloss Level 2)**[, MPI #44**].
f. Topcoat: Latex, interior, (Gloss Level 3)**[, MPI #52**].
g. Topcoat: Latex, interior, (Gloss Level 4)**[, MPI #43**].
h. Topcoat: Latex, interior, semi-gloss, (Gloss Level 5)**[, MPI #54**].
i. Topcoat: Latex, interior, gloss, (Gloss Level 6, except minimum gloss of 65 units at 60 degrees)**[, MPI #114**].

2. Institutional Low-Odor/VOC Latex System:

a. Prime Coat: Primer, bonding, water based**[, MPI #17**].
b. Prime Coat: Primer, bonding, solvent based**[, MPI #69**].
c. Intermediate Coat: Latex, interior, institutional low odor/VOC, matching topcoat.
d. Topcoat: Latex, interior, institutional low odor/VOC, flat (Gloss Level 1)**[, MPI #143**].
e. Topcoat: Latex, interior, institutional low odor/VOC, (Gloss Level 2)**[, MPI #144**].
f. Topcoat: Latex, interior, institutional low odor/VOC, (Gloss Level 3)**[, MPI #145**].

g. Topcoat: Latex, interior, institutional low odor/VOC, semi-gloss (Gloss Level 5)[**, MPI #147**].

3. High-Performance Architectural Latex System:

a. Prime Coat: Primer, bonding, water based[**, MPI #17**].
b. Prime Coat: Primer, bonding, solvent based[**, MPI #69**].
c. Intermediate Coat: Latex, interior, high performance architectural, matching topcoat.
d. Topcoat: Latex, interior, high performance architectural, (Gloss Level 2)[**, MPI #138**].
e. Topcoat: Latex, interior, high performance architectural, (Gloss Level 3)[**, MPI #139**].
f. Topcoat: Latex, interior, high performance architectural, (Gloss Level 4)[**, MPI #140**].
g. Topcoat: Latex, interior, high performance architectural, semi-gloss (Gloss Level 5)[**, MPI #141**].

4. Water-Based Light Industrial Coating System:

a. Prime Coat: Primer, bonding, water based[**, MPI #17**].
b. Prime Coat: Primer, bonding, solvent based[**, MPI #69**].
c. Intermediate Coat: Light industrial coating, interior, water based, matching topcoat.
d. Topcoat: Light industrial coating, interior, water based (Gloss Level 3)[**, MPI #151**].
e. Topcoat: Light industrial coating, interior, water based, semi-gloss (Gloss Level 5)[**, MPI #153**].
f. Topcoat: Light industrial coating, interior, water based, gloss (Gloss Level 6)[**, MPI #154**].

5. Alkyd System:

a. Prime Coat: Primer, bonding, water based[**, MPI #17**].
b. Prime Coat: Primer, bonding, solvent based[**, MPI #69**].
c. Intermediate Coat: Alkyd, interior, matching topcoat.
d. Topcoat: Alkyd, interior, flat (Gloss Level 1)[**, MPI #49**].
e. Topcoat: Alkyd, interior, (Gloss Level 3)[**, MPI #51**].
f. Topcoat: Alkyd, interior, semi-gloss (Gloss Level 5)[**, MPI #47**].
g. Topcoat: Alkyd, interior, gloss (Gloss Level 6)[**, MPI #48**].

K. **Gypsum Board** Substrates:

1. Latex System:

a. Prime Coat: Primer sealer, latex, interior[**, MPI #50**].
b. Prime Coat: Latex, interior, matching topcoat.
c. Intermediate Coat: Latex, interior, matching topcoat.
d. Topcoat: Latex, interior, flat, (Gloss Level 1)[**, MPI #53**].
e. Topcoat: Latex, interior, (Gloss Level 2)[**, MPI #44**].
f. Topcoat: Latex, interior, (Gloss Level 3)[**, MPI #52**].
g. Topcoat: Latex, interior, (Gloss Level 4)[**, MPI #43**].
h. Topcoat: Latex, interior, semi-gloss, (Gloss Level 5)[**, MPI #54**].
i. Topcoat: Latex, interior, gloss, (Gloss Level 6, except minimum gloss of 65 units at 60 degrees)[**, MPI #114**].

2. Institutional Low-Odor/VOC Latex System:

    a. Prime Coat: Primer sealer, interior, institutional low odor/VOC**[, MPI #149**].
    b. Intermediate Coat: Latex, interior, institutional low odor/VOC, matching topcoat.
    c. Topcoat: Latex, interior, institutional low odor/VOC, flat (Gloss Level 1)**[, MPI #143**].
    d. Topcoat: Latex, interior, institutional low odor/VOC, (Gloss Level 2)**[, MPI #144**].
    e. Topcoat: Latex, interior, institutional low odor/VOC, (Gloss Level 3)**[, MPI #145**].
    f. Topcoat: Latex, interior, institutional low odor/VOC, semi-gloss (Gloss Level 5)**[, MPI #147**].

3. High-Performance Architectural Latex System:

    a. Prime Coat: Primer sealer, latex, interior**[, MPI #50**].
    b. Intermediate Coat: Latex, interior, high performance architectural, matching topcoat.
    c. Topcoat: Latex, interior, high performance architectural, (Gloss Level 2)**[, MPI #138**].
    d. Topcoat: Latex, interior, high performance architectural, (Gloss Level 3)**[, MPI #139**].
    e. Topcoat: Latex, interior, high performance architectural, (Gloss Level 4)**[, MPI #140**].
    f. Topcoat: Latex, interior, high performance architectural, semi-gloss (Gloss Level 5)**[, MPI #141**].

4. Water-Based Light Industrial Coating System:

    a. Prime Coat: Primer sealer, latex, interior**[, MPI #50**].
    b. Intermediate Coat: Light industrial coating, interior, water based, matching topcoat.
    c. Topcoat: Light industrial coating, interior, water based (Gloss Level 3)**[, MPI #151**].
    d. Topcoat: Light industrial coating, interior, water based, semi-gloss (Gloss Level 5)**[, MPI #153**].
    e. Topcoat: Light industrial coating, interior, water based, gloss (Gloss Level 6)**[, MPI #154**].

5. Alkyd over Latex Primer System:

    a. Prime Coat: Primer sealer, latex, interior**[, MPI #50**].
    b. Intermediate Coat: Alkyd, interior, matching topcoat.
    c. Topcoat: Alkyd, interior, flat (Gloss Level 1)**[, MPI #49**].
    d. Topcoat: Alkyd, interior, (Gloss Level 3)**[, MPI #51**].
    e. Topcoat: Alkyd, interior, semi-gloss (Gloss Level 5)**[, MPI #47**].
    f. Topcoat: Alkyd, interior, gloss (Gloss Level 6)**[, MPI #48**].

L. Spray-Textured Ceiling Substrates:

1. Latex (Flat) System: Spray applied.

    a. Prime Coat: Latex, interior, flat, (Gloss Level 1)**[, MPI #53**].
    b. Topcoat: Latex, interior, flat, (Gloss Level 1)**[, MPI #53**].

2. Latex System: Spray applied.

a. Prime Coat: Latex, interior, matching topcoat.
b. Intermediate Coat: Latex, interior, matching topcoat.
c. Topcoat: Latex, interior, flat, (Gloss Level 1)[**, MPI #53**].
d. Topcoat: Latex, interior, (Gloss Level 2)[**, MPI #44**].
e. Topcoat: Latex, interior, (Gloss Level 3)[**, MPI #52**].
f. Topcoat: Latex, interior, (Gloss Level 4)[**, MPI #43**].
g. Topcoat: Latex, interior, semi-gloss, (Gloss Level 5)[**, MPI #54**].
h. Topcoat: Latex, interior, gloss, (Gloss Level 6, except minimum gloss of 65 units at 60 degrees)[**, MPI #114**].

3. Latex over Alkyd Primer System:

a. Prime Coat: Primer sealer, alkyd, interior[**, MPI #45**].
b. Topcoat: Latex, interior, flat, (Gloss Level 1)[**, MPI #53**].
c. Topcoat: Latex, interior, (Gloss Level 2)[**, MPI #44**].
d. Topcoat: Latex, interior, (Gloss Level 3)[**, MPI #52**].
e. Topcoat: Latex, interior, (Gloss Level 4)[**, MPI #43**].
f. Topcoat: Latex, interior, semi-gloss, (Gloss Level 5)[**, MPI #54**].
g. Topcoat: Latex, interior, gloss, (Gloss Level 6, except minimum gloss of 65 units at 60 degrees)[**, MPI #114**].

4. Alkyd (Flat) System:

a. Prime Coat: Alkyd, interior, flat (Gloss Level 1)[**, MPI #49**].
b. Topcoat: Alkyd, interior, flat (Gloss Level 1)[**, MPI #49**].

5. Alkyd System:

a. Prime Coat: Primer sealer, alkyd, interior[**, MPI #45**].
b. Intermediate Coat: Alkyd, interior, matching topcoat.
c. Topcoat: Alkyd, interior, flat (Gloss Level 1)[**, MPI #49**].
d. Topcoat: Alkyd, interior, (Gloss Level 3)[**, MPI #51**].
e. Topcoat: Alkyd, interior, semi-gloss (Gloss Level 5)[**, MPI #47**].
f. Topcoat: Alkyd, interior, gloss (Gloss Level 6)[**, MPI #48**].

M. Cotton or Canvas and ASJ Insulation-Covering Substrates: Including pipe and duct coverings

1. Latex System:

a. Prime Coat: Primer sealer, latex, interior[**, MPI #50**].
b. Intermediate Coat: Latex, interior, matching topcoat.
c. Topcoat: Latex, interior, flat, (Gloss Level 1)[**, MPI #53**].
d. Topcoat: Latex, interior, (Gloss Level 2)[**, MPI #44**].
e. Topcoat: Latex, interior, (Gloss Level 3)[**, MPI #52**].
f. Topcoat: Latex, interior, (Gloss Level 4)[**, MPI #43**].
g. Topcoat: Latex, interior, semi-gloss, (Gloss Level 5)[**, MPI #54**].
h. Topcoat: Latex, interior, gloss, (Gloss Level 6, except minimum gloss of 65 units at 60 degrees)[**, MPI #114**].

2. Institutional Low-Odor/VOC Latex System:

a. Prime Coat: Primer sealer, latex, interior[**, MPI #50**].
b. Intermediate Coat: Latex, interior, institutional low odor/VOC, matching topcoat.

c. Topcoat: Latex, interior, institutional low odor/VOC, flat (Gloss Level 1)**[, MPI #143**].
d. Topcoat: Latex, interior, institutional low odor/VOC, (Gloss Level 2)**[, MPI #144**].
e. Topcoat: Latex, interior, institutional low odor/VOC, (Gloss Level 3)**[, MPI #145**].
f. Topcoat: Latex, interior, institutional low odor/VOC, semi-gloss (Gloss Level 5)**[, MPI #147**].

3. Alkyd over Latex Primer System:

a. Prime Coat: Primer sealer, latex, interior**[, MPI #50**].
b. Intermediate Coat: Alkyd, interior, matching topcoat.
c. Topcoat: Alkyd, interior, flat (Gloss Level 1)**[, MPI #49**].
d. Topcoat: Alkyd, interior, (Gloss Level 3)**[, MPI #51**].
e. Topcoat: Alkyd, interior, semi-gloss (Gloss Level 5)**[, MPI #47**].
f. Topcoat: Alkyd, interior, gloss (Gloss Level 6)**[, MPI #48**].

4. Aluminum Paint System:

a. Prime Coat: Primer sealer, latex, interior**[, MPI #50**].
b. Intermediate Coat: Aluminum paint**[, MPI #1**].
c. Topcoat: Aluminum paint**[, MPI #1**].

END OF SECTION 09912

SECTION 09960 – HIGH-PERFORMANCE COATINGS

PART 1 – GENERAL

1.02 RELATED DOCUMENTS

Drawings, Specifications and General Conditions of The Contract, including Special Conditions, are hereby made a part of this section.

1.03 MATERIALS

A. MATERIAL QUALITY: Finished and fully cured (28 days) materials shall have the following minimum performance characteristics:

Solvent Resistance: (10 minute soak)	
Water	No effect
Detergent	No effect
Ethanol	No effect
Paint Thinner	Temporary softening
Bleach (household)	No effect
Sodium Hypochlorite (Tile-X)	No effect
409 Cleaner	No effect
Vinegar	No effect

Stain Resistance (1 hour soak and wash with Cleaner and water)	
Water	No stain visible
Blood	No stain visible
Urine	No stain visible
Coffee	No stain visible
Tea	No stain visible
Blueberry	No stain visible
Mustard	No stain visible
Bleach (household)	No stain visible
Sodium Hypochlorite (Tile-X)	No stain visible

Mark Resistance (marked 24 hour cure, wash with brush cleaner and/or bleach)	
Pencil	No mark visible
Ball point pen	No mark visible
China Marker	No mark visible
Felt tip pen (non-permanent)	No mark visible

Abrasion Resistance: Taber Abraser ASTM D4060-90	Wear Index = 0.22
Scrub Test: ASTM D2486-89	3735 Cycles to failure

B. SPECIFICATIONS:

Water-base pure acrylic resin	
Inorganic fillers	
Perm Rating: 17 perms, ASTM-E96B	21.93 Perms, English perms
Film Thickness:	
FINECOAT 2	4 mils dry (6 mils wet)

TEXTURECOAT	6-10 mils wet, 4- 8 mils dry
ASTM-E84 Flame Spread	15 or less
ASTM E-84 Smoke contribution	0
Pigments VOC level	0
Product VOC level (ISO 11890-2)	< 20 grams/liter

C. COLOR:

Color Pigments: Pigments shall be high performance and contain a zero (0) VOC level and APEO free. All pigments shall be light fast and fade resistant to discoloration by common commercial cleaning agents.

Color Selection: Provide at least eighty factory colors and factory custom color service.

D. ENVIRONMENTAL

Product shall meet criteria defined under LEED IEQ 4.2 for Low VOC products and Green Seal GS-11, section 4.0.

Production facilities shall be ISO 14001 certified for environmental practices.

E. WARRANTY:

Provide 5-year materials integrity warranty and 5-year mold/mildew warranty from manufacturer for manufacturer’s approved substrates.

1.04 QUALITY ASSURANCE

A. COMPATIBILITY: Provide primers and other undercoat materials which are produced or are specifically recommended by the same manufacturer as the finish materials to ensure compatibility and use only within recommended limits.

B. COORDINATION OF WORK: Review other sections of these specifications in which prime paints, raw substrates, or other substances might be present to ensure compatibility of total coatings systems. Upon request from other trades, furnish information or characteristics of coating materials provided for use, to ensure compatible substrate materials and finishes are used.

C. FACTORY QUALIFIED INSTALLER: Application Contractor should have attended a factory product training session and should otherwise be qualified to apply the products prior to submitting the bid. Applicator should submit photocopy of factory documentation as proof of attendance.

D. Factory shall be ISO 9001:2000 certified.

1.05 SUBMITTALS:

A. PRODUCT DATA: Submit manufacturer's technical information including installation instructions, product description, and product test data conforming to the test performances required herein.

B. SAMPLES: Prior to beginning work, Contractor shall provide Architect with a complete color set as furnished by the manufacturer for color selection purposes. After architect's color selection, Contractor shall provide three samples of each color of the specified coating applied to 12" x 12" hardboard or drywall for review. Apply materials in the same manner and with the same equipment that will be used in the field.

1.06 DELIVERY AND STORAGE:

A. DELIVER MATERIALS to jobsite in original, new and unopened packages and containers bearing manufacturer's name and label, and following information: Name or title of materials, Manufacturer's stock and/or batch number, date of manufacture, Contents of containers including Color name and number.

B. STORE MATERIALS not in active use in tightly covered containers. Maintain containers in a clean condition, free from foreign materials and residue.

C. PROTECT from freezing and maintain temperatures below 100 degrees F. Keep materials stored in an orderly and organized manner to reduce the risk of error. Do not stack materials more than three containers high. Protect from fire hazards.

1.07 JOB CONDITIONS:

A. APPLY materials only when surface temperature is between 65 degrees F or higher. Relative humidity must be 85% or lower. Protect finishes from casual impact and rain for a period of twenty-four (24) hours after installation. Protect from heavy traffic for a period of at least three days. Protect all surfaces and adjacent areas not intended to be coated and clean immediately any spillage, drippings, or other extraneous contact of the materials with other surfaces.

B. REMOVE masking tape and clean all adjacent surfaces at the end of each work day. Do not leave masking tape or waste materials in place for more than 36 hours.

PART 2 - PRODUCTS

2.01 MANUFACTURER

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
   a. Provide PLEXTURE products as manufactured by TRIARCH, 1-800-537-6111, www.triarchinc.com, consistent with color and texture selected by Architect/Designer from full range.

PART 3 - EXECUTION

3.01 INSPECTION

Applicator shall examine areas and conditions under which coating work is to be applied and notify Contractor in writing of conditions detrimental to proper and timely completion of the work. Do not proceed with work until unsatisfactory conditions have been corrected in a manner acceptable to the applicator.

3.02 GENERAL

A. DESCRIPTION OF WORK

1. EXTENT of special acrylic coating work is indicated on drawings and schedules, as herein specified.

2. The work also includes masking, protection of adjacent surfaces, priming, finishing, and cleanup of all wall and/or ceiling areas throughout the project as designated on the drawings and finish schedules. Surface preparation, surface treatment, and shop-priming where specified under other sections of the work.

3. WORK SPECIFIED IN OTHER SECTIONS: Paint, primer, other specialty coatings, fire proofing, wall coverings, tile, paneling, fabrics, acoustical treatments, shop applied finishes, and laminated plastics.

3.03 SURFACE PREPARATION:

A. CEMENTITIOUS MATERIALS: Prepare cementious surfaces to be coated, such as: concrete, concrete block, cement and lime plaster by removing efflorescence, chalk, dust, dirt, grease, oils, and waxes (form release agents). Grind or fill and float smooth all holes, honeycombs, joints, seams and other imperfections using SKIMM® as manufactured by Triarch. Allow SKIMM® to dry 24 hours. Dampen dry plaster and concrete surfaces just prior to installation of materials, but wipe away any active condensation or water sufficient to cause a wet glaze.

B. FERROUS METALS: Clean free of oil and surface contaminants with non-petroleum based solvent. Prime all bare metal surfaces with a good quality rust inhibiting primer prior to application of any acrylic coating materials. Test adequacy of adhesion of primer to substrate prior to application. Be sure to document results.

C. GALVANIZED SURFACES: Clean free of oil and surface contaminants with non-petroleum based solvent. Test adequacy of adhesion of primer to substrate prior to application. Be sure to document results.

E. DRYWALL (new): Tape, float, and finish to achieve industry standards for a non defective surface sufficient to be painted.

F. With rapid-setting type drywall joint compound, float all holes and edges flush to restore wall surface to a smooth, paintable surface. Allow wall to dry twenty-four hours. Coat all raw joint compound with fixative. Allow to dry (approximately 1 hour).

3.02 MATERIALS PREPARATION

A. STIR MATERIALS before application with a power drill and a drywall compound paddle. Stir at approximately 350 RPM for three minutes while removing material from all sides and bottom of the container. Stir only as much material as will be used in a four hour period or re-stir material left sitting in excess of four hours. RETAIN LID on containers until the material is in actual use. Do not leave containers open for more than one hour. If hardened material accumulates on the sides of the container, remove the material to a clean container before use.

B. THINNING: Thinning, if required, should be done in accordance with manufacturer’s recommendations. Should storage or shipping expose materials to excessively high or low temperatures, viscosity may be affected.

3.04 APPLICATION

A. GENERAL: Apply materials, FineCoat 2 and Texture Coat, in accordance with the manufacturer's instructions and recommendations as required to achieve the appearance of the approved design control samples and to deliver performance as specified herein.

B. SURFACE TREATMENTS, and finishes, are indicated in "schedules" of the contract documents. Final finishes shall conform to the approved samples.

C. FINAL DRY FILM thickness of FINECOAT 2 shall be a minimum of 4 mils (DFT). Total system finish, including Texture Coat, shall average 8 mils thick. Coat surfaces behind movable equipment and furniture same as similar exposed surfaces.

D. WIPE WITH DAMP SPONGE the entire surface area within 2 hours of application to remove all rough spots, abrasive burrs, etc.

E. USE SANDING POLE with 100# grit sand paper to remove any burs within 24-48 hours of application.

F. COMPLETED WORK shall be uniform in appearance and coverage. It shall be free of holidays, spotting, laps, tool marks, runs, sags, abrasive burrs, or other surface imperfections.

3.05 CLEANUP AND PROTECTION

A. CLEANUP: During progress of work, remove from site discarded coating materials, rubbish, cans, and rags at the end of each work day in accordance with all local, state, and federal requirements.

B. PROTECTION: Protect work of other trades, whether to be coated or not, against damage by coating work. Correct any damage by cleaning, repairing or replacing, and refinishing, as acceptable to Architect.

C. PROVIDE SIGNS, barricades, etc. as required to protect new work from damage by others (see General section of this division for curing times).

D. AFTER COMPLETION of work of all other trades, remove all protection materials (including other trades' if provided by them) and clean/touchup as necessary to restore coating work to new and unblemished condition.

END OF SECTION 09960

SECTION 09963 - ELASTOMERIC COATINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes surface preparation and application of elastomeric coatings to the following exterior substrates:
   1. Stucco.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Samples for Verification: For each type of elastomeric coating indicated and in each color and gloss.

   1. Submit Samples on same type of substrate as that to receive application, 8 inches (200-mm) square.
   2. Step coats on Samples to show each separate coat, including primers and block fillers as applicable.
   3. Label each coat of each Sample.
   4. Label each Sample for location and application area.

C. Product List: For each product indicated, including the following:

   1. Cross-reference to coating system and locations of application areas. Use same designations indicated on Drawings and in schedules.
   2. Manufacturer's recommended spreading rate for each separate coat, including primers and block fillers for each type of substrate as applicable.
   3. Printout of current "MPI Approved Products List" for each product category specified in Part 2 that specifies coatings approved by MPI, with the proposed product highlighted.

1.4 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that are from same production run (batch mix) as materials applied and that are packaged for storage in unopened, factory-sealed containers and identified with labels describing contents.

1. Quantity: Furnish an additional 5 percent but not less than 1 gal. (3.8 L) of each material, color, and texture applied.

1.5 QUALITY ASSURANCE

A. MPI Standards: Comply with MPI standards indicated and provide elastomeric coatings listed in the "MPI Approved Products List."

1. Preparation and Workmanship: Comply with requirements in the "MPI Architectural Painting Specification Manual" for products and coating systems indicated.

B. Mockups: Prepare two mockups of each coating system indicated and each color and finish selected to verify preliminary selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Architect will select two wall surfaces of at least 100 sq. ft. (9.3 sq. m) to represent surfaces and conditions for application of each type and texture of elastomeric coating.
2. Final approval of color and texture selections will be based on mockups.

a. If preliminary color selections are not approved, prepare additional mockups of additional color and textures selected by Architect at no added cost to Owner.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F (7 deg C).

1. Maintain containers in clean condition, free of foreign materials and residue.
2. Remove rags and waste from storage areas daily.

1.7 PROJECT CONDITIONS

A. Apply coatings only when temperature of surfaces to be coated and ambient air temperatures are between 50 and 90 deg F (10 and 32 deg C) unless otherwise permitted by manufacturer's written instructions.

B. Do not apply coatings in snow, rain, fog, or mist; when relative humidity exceeds 85 percent; at temperatures less than 5 deg F (3 deg C) above the dew point; or to damp or wet surfaces.

C. Allow wet surfaces to dry thoroughly and attain temperature and conditions specified before starting or continuing coating operation.

1.8 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace elastomeric coatings that fail within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Water penetration through the coating.
b. Deterioration of coating beyond normal weathering.

2. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

A. Material Compatibility:

1. Provide elastomeric finish coatings and crack fillers, primers, and block fillers as applicable for use within elastomeric finish coatings that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
2. For each material or coat, provide products and spreading rates recommended in writing by elastomeric coating manufacturer for use on substrate indicated.

2.2 ELASTOMERIC FINISH COATINGS

A. Exterior Flat Waterborne, Pigmented Elastomeric Coating: MPI #113.

1. Products: Subject to compliance with requirements, Provide BASF Sonneborn Colorflex or comparable product by one of the following:
a. Coronado Paint Company; Elast-O-Meric Acrylic Membrane - 20 mil.
b. Diamond Vogel Paints; Permaflex Elastomeric Latex Coating.
c. ICI Paints; Decra-Flex Elastomeric Coating.
d. Kelly-Moore Paints; Kel-Seal Terpolymer 100% Acrylic Elastomeric.
e. Miller Paint Co.; Milastic Elastomeric Coating.
f. Mills Paint; Weather Flex Elastomeric Coating.
g. Modco Technology Ltd.; Elastocoat Acrylic Elastomeric Paint.
h. Parker Paint Mfg. Co. Inc., a subsidiary of PPI; EMC Elastomeric Coating.
i. PPG Industries; Pitt-Flex Elastomeric Coating.
j. Sherwin-Williams Company (The); Sherlastic Elastomeric Coating.
k. Spectra-Tone Paint Corporation; Elasto-Coat High Build Waterproofing Coating.
l. Teifs; Professional Coatings, TeifsLastic.
m. Vista Paint; Solotex.
n. Neogard, a division of Jones-Blair Company; Neoflex.
o. Pacific Polymers International, Inc.; Elasto-Tex Wallcoating.

p. Sto Corp.; Stolastic.

2. Surface Profile: Smooth texture.
3.
4. Moisture-Vapor Transmission: Minimum 11 perms wet and 2.12 perms dry based on testing according to ASTM D 1653.

2.3 OTHER MATERIALS

A. Crack Fillers: Elastomeric coating manufacturer's recommended, factory-formulated crack fillers or sealants, including crack filler primers, compatible with substrate and other materials indicated; VOC content complying with limits of authorities having jurisdiction.

B. Primer: Elastomeric coating manufacturer's recommended, factory-formulated, alkali-resistant primer compatible with substrate and other materials indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Applicator present, for compliance with manufacturer's requirements for maximum moisture content, alkalinity, and other conditions affecting performance of work.

B. Begin coating only when moisture content of substrate is 12 percent or less when measured with an electronic moisture meter.

C. Begin coating no sooner than 28 days after substrate is constructed and is visually dry on both sides.

D. Verify that substrate is within the range of alkalinity recommended by manufacturer.

E. Verify suitability of substrates including surface conditions and compatibility with existing finishes and primers.

F. Begin coating application only after unsatisfactory conditions have been corrected and surfaces are dry.

3.2 PREPARATION

A. Comply with manufacturer's written instructions and recommendations in the "MPI Architectural Painting Specification Manual" applicable to substrates and coating systems indicated.

B. Remove hardware and hardware accessories, plates, machined surfaces, light fixtures, and similar items already installed that are not to be coated. If removal is impractical or

impossible because of size or weight of item, provide surface-applied protection before surface preparation and coating.

1. After completing coating operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.

C. Clean substrates of substances that could impair bond of coatings, including dirt, oil, grease, and incompatible paints and encapsulants. Do not coat surfaces if moisture content or alkalinity of surfaces to be coated exceeds that permitted in manufacturer's written instructions.

1. Remove incompatible primers and reprime substrate with compatible primers as required to produce coating systems indicated.
2. Perform cleaning and coating application so dust and other contaminants from cleaning process will not fall on wet, newly coated surfaces.

D. Crack Repair: Fill cracks according to manufacturer's written instructions before coating surfaces.

3.3 APPLICATION

A. Apply elastomeric coatings according to manufacturer's written instructions.

1. Use equipment and techniques best suited for substrate and type of material being applied.
2. Coat surfaces behind movable items the same as similar exposed surfaces.
3. Apply each coat separately according to manufacturer's written instructions.

B. Primers: Apply at a rate to ensure complete coverage.

C. Block Fillers: Apply at a rate to ensure complete coverage with pores filled.

D. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform finish, color, and appearance.

E. Apply coatings to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.

F. Apply coatings to prepared surfaces as soon as practicable after preparation and before subsequent surface soiling or deterioration.

G. Spray Application: Use spray equipment for application only when permitted by authorities having jurisdiction. Wherever spray application is used, do not double back with spray equipment to build up film thickness of two coats in one pass.

3.4 FIELD QUALITY CONTROL

A. Testing of Paint Materials: Owner reserves the right to invoke the following testing procedures:

1. Owner will engage the services of a qualified testing agency to sample materials being used. Samples of material delivered to Project site will be taken, identified, sealed, and certified in presence of Contractor.
2. Testing agency will perform tests for compliance of materials with product requirements.
3. Owner may direct Contractor to stop coating application if test results show materials being used do not comply with requirements. Remove noncomplying materials from Project site, pay for testing, and recoat surfaces that were coated with rejected materials. Remove rejected materials from previously coated surfaces if, on recoating with complying materials, the two coatings are incompatible.

B. Field Testing and Inspection: Owner reserves the right to engage the services of a qualified testing agency to verify installed thickness of elastomeric coatings.

3.5 CLEANING AND PROTECTION

A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.

B. After completing coating application, clean spattered surfaces. Remove spattered coatings by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.

C. Protect work of other trades against damage from coating application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.

D. At completion of construction activities, touch up and restore damaged or defaced coated surfaces.

3.6 COATING SCHEDULE

A. Stucco Substrates:

1. Primer: Stucco primer if required by manufacturer.
2. Elastomeric Finish Coat(s): Minimum two coats with a total dry film thickness of 16 to 18 mils (0.41 to 0.45 mm) .
3. Finish-Coat Color: As selected by Architect from manufacturer's full range .

END OF SECTION 09963

SECTION 09981 - CEMENTITIOUS COATINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes surface preparation and application of cementitious coating systems on the following substrates:

1. Exterior concrete.
2. Exterior concrete masonry units.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Samples for Initial Selection: For each finish coat indicated.

C. Samples for Verification: In each color and gloss of finish coat indicated.

1. Submit Samples on actual substrate, not less than 4 by 8 inches (100 by 200 mm) , with mortar joint in center.
2. Step coats on Samples to show each coat required for system.
3. Label each coat of each Sample.

1.4 INFORMATIONAL SUBMITTALS

A. Material Certificates: For each cementitious coating, from manufacturer.

B. Product Test Reports: Based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified testing agency or by a qualified testing agency, for each product formulation.

1.5 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that are from same production run (batch mix) as materials applied and that are packaged with protective covering for storage and identified with labels describing contents.

1. Quantity: Furnish an additional 5 percent of each color applied.

1.6 QUALITY ASSURANCE

A. Source Limitations: Obtain cementitious coating materials from single source from single manufacturer.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to Project site in manufacturer's original, new, unopened packages and containers bearing manufacturer's name and label, and the following information:

1. Product name or title of material.
2. Manufacturer's stock number and date of manufacture.
3. Contents by volume, for pigment and vehicle constituents.
4. Application instructions.
5. Color name and number.
6. Handling instructions and precautions.

B. Store materials not in use in tightly covered containers in a well-ventilated area at a minimum ambient temperature of 45 deg F (7 deg C). Maintain containers used in storage of coatings in a clean condition, free of foreign materials and residue.

1. Protect cementitious coating materials from freezing. Keep materials dry and storage area neat and orderly. Remove waste daily. Take necessary measures to ensure that workers and work areas are protected from health hazards resulting from handling, mixing, and applying the coating.

1.8 PROJECT CONDITIONS

A. Apply coatings only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F (10 and 35 deg C).

B. Do not apply coatings when relative humidity exceeds 85 percent; at temperatures less than 5 deg F (3 deg C) above the dew point; or to damp or wet surfaces.

PART 2 - PRODUCTS

2.1 CEMENTITIOUS COATINGS

A. Polymer-Modified Cementitious Coating: Containing portland cement, polymer, and hydrated lime or aggregates.

1. Products: Subject to compliance with requirements, provide one of the following:

a. BASF Building Systems; Thoroseal with Acryl 60.

b. Bonsal American, an Oldcastle company; Sure-Coat.
c. Euclid Chemical Company, Tamms Industries; Tamoseal.
d. Gemite Products, Inc.; Cem-Kote ST.
e. Silpro Corporation; Seal Cote.

B. Performance Requirements: Comply with the following:

1. Compressive Strength: Not less than 6030 psi at 28 days according to ASTM C 109/C 109M.
2. Tensile Strength: Not less than 440 psi at 28 days according to ASTM C 109/C 109M.
3. Flexural Strength: 1027 psi according to ASTM C 348
4. Adhesion: 418 psi test by tensile bond
5. Permeance: 12 perms according to ASTM E96
6. Accelerated Weathering: 5000 hrs according to ASTM G 26
7. Salt-Spray Resistance: ASTM B 117

C. Other Materials: Provide crack fillers, block fillers, and related materials that are compatible with cementitious finish-coat materials and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.

D. Sources Using Small-Scale Environmental Chambers."

E. Colors: As selected by Architect from manufacturer's full range .

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Applicator present, for compliance with requirements and other conditions affecting performance of the Work.

B. Verify suitability of substrates, including surface conditions and compatibility.

C. Begin coating application only after unsatisfactory conditions have been corrected and surfaces are dry.

1. Beginning coating application constitutes Contractor's acceptance of substrates and conditions.

3.2 PREPARATION

A. Comply with manufacturer's written instructions for mixing and preparing materials and as applicable to substrates indicated.

B. Remove plates, machined surfaces, and similar items already in place that are not to be coated. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and coating.

1. After completing coating operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.

C. Clean substrates of substances that could impair bond of coatings, including dirt, oil, grease, incompatible coatings, and loose substrate materials.

D. Cementitious and Masonry Surfaces: Remove release agents, curing compounds, efflorescence, and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.

E. Crack Repair: Fill cracks according to manufacturer's written instructions before coating surfaces.

1. Cracks Larger Than 1/32 Inch (0.8 mm): Cut out static cracks, voids, or honeycombing larger than 1/32 inch (0.8 mm) and patch with materials recommended in writing by coating manufacturer. Identify dynamic cracks and treat according to manufacturer's written instructions before beginning application.

3.3 APPLICATION

A. Apply coatings according to manufacturer's written instructions. Use applicators and techniques suited for coating and substrate indicated.

1. Dampen substrate of surfaces to receive cementitious coatings one hour before beginning application to prevent surface drag. Immediately before applying coatings, redampen substrate. Substrates shall be saturated surface dry at time of application.
2. Brushes: Use tampico or masonry brushes best suited for material being applied.
3. Spray Equipment: Use spray equipment recommended in writing by manufacturer for material and texture required.

B. Apply each material at not less than manufacturer's recommended spreading rate. Provide total cured material thickness indicated or as recommended in writing by manufacturer.

C. Brush Application: Brush-out and work brush coats into surfaces in an even film, filling all pores and voids at rate recommended in writing by manufacturer to achieve cured material thickness indicated. Finish coat with smooth, horizontal strokes.

D. Spray Application: Apply each coat according to manufacturer's written instructions to provide the equivalent hiding of brush-applied coats. Follow spray application with a general light brooming of coated surface to impart a slight texture.

3.4 FIELD QUALITY CONTROL

A. Testing of Coating Materials: Owner reserves the right to invoke the following procedure at any time and as often as Owner deems necessary during the period when coating operations are being conducted:

1. Owner will engage the services of a qualified testing agency to sample coating materials being used. Samples of material delivered to Project site will be taken, identified, sealed, and certified in presence of Contractor.
2. Testing agency will perform tests for compliance with the following product requirements.

    a. Quantitative material analysis.
    b. Compressive strength.
    c. Tensile strength.
    d. Flexural strength.
    e. Permeance.
    f. Accelerated weathering.

3. Owner may direct Contractor to stop coating application if test results show materials being used do not comply with requirements. Contractor shall remove noncomplying materials from Project site, pay for testing, and recoat surfaces coated with rejected materials. Contractor will be required to remove rejected materials from previously coated surfaces if, on recoating with complying materials, the two coatings are incompatible.

3.5 CLEANING AND PROTECTION

A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.

B. After completing coating application, clean spattered surfaces. Remove spattered coatings by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.

C. Protect work of other trades against damage from coating application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.

D. At completion of construction activities of other trades, touch up and restore damaged or defaced coated surfaces.

3.6 COATING SCHEDULE

A. General: Apply additional coats when undercoats or other conditions show through final coat until cured film is of uniform coating finish, color, and appearance.

B. Above-Grade Concrete and Masonry: Two finish coats with total cured thickness not less than 40 mils (1.0 mm).

1. First Coat: Apply polymer-modified cementitious coating material at the rate of 2 lb/sq. yd. (1 kg/sq. m) to achieve a total cured thickness of 25 mils (0.6 mm).
2. Second Coat: Apply polymer-modified cementitious coating material at the rate of 1 lb/sq. yd. (0.5 kg/sq. m) to achieve a total cured thickness of 15 mils (0.4 mm).

C. .

END OF SECTION 09981

DIVISION 10

SECTION 10110 - VISUAL DISPLAY SURFACES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Markerboards.
2. Tackboards.
3. Visual display units.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

1. Include rated capacities, operating characteristics, electrical characteristics and individual panel weights for sliding visual display units.

B. Shop Drawings: For visual display surfaces. Include plans, elevations, sections, details, and attachments to other work.

1. Show locations of panel joints.
2. Include sections of typical trim members.
3. Wiring Diagrams: For power, signal, and control wiring.

C. Samples: For each exposed product and for each color and texture specified.

1.3 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified Installer.

B. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for surface-burning characteristics of fabrics.

C. Warranties: Sample of special warranties.

1.4 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For visual display surfaces and power-operated units to include in maintenance manuals.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of motor-operated, sliding visual display units required for this Project.

B. Surface-Burning Characteristics: As determined by testing identical products according to ASTM E 84 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Flame-Spread Index: 25 or less.
2. Smoke-Developed Index: 50 or less.

C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

D. Preinstallation Conference: Conduct conference at Project site.

1.6 WARRANTY

A. Special Warranty for Porcelain-Enamel Face Sheets: Manufacturer's standard form in which manufacturer agrees to repair or replace porcelain-enamel face sheets that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Surfaces lose original writing and erasing qualities.
b. Surfaces exhibit crazing, cracking, or flaking.

2. Warranty Period: 50 years from date of Substantial Completion.
3. Warranty Period: Life of the building.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

A. Porcelain-Enamel Face Sheet: Manufacturer's standard steel sheet with porcelain-enamel coating fused to steel; uncoated thickness indicated.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. Claridge Products and Equipment, Inc.
b. PolyVision Corporation; a Steelcase company.

B. Melamine: Thermally fused, melamine-impregnated decorative paper complying with LMA SAT-1.

C. High-Pressure Plastic Laminate: NEMA LD 3.

D. Natural Cork Sheet: Seamless, single-layer, compressed fine-grain cork sheet; bulletin board quality; face sanded for natural finish with surface-burning characteristics indicated.

E. Plastic-Impregnated Cork Sheet: Seamless, homogeneous, self-sealing sheet consisting of granulated cork, linseed oil, resin binders, and dry pigments that are mixed and calendared onto fabric backing; with washable vinyl finish and integral color throughout with surface-burning characteristics indicated.

F. Vinyl Fabric: Mildew resistant, washable, complying with FS CCC-W-408D, Type II, burlap weave; weighing not less than 13 oz./sq. yd. (440 g/sq. m); with surface-burning characteristics indicated.

G. Polyester Fabric: Nondirectional weave, 100 percent polyester; weighing not less than 15 oz./sq. yd. (508 g/sq. m); with surface-burning characteristics indicated.

H. Hardboard: ANSI A135.4, tempered.

I. Particleboard: ANSI A208.1, Grade M-1, that complies with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

J. Fiberboard: ASTM C 208.

K. Extruded Aluminum: ASTM B 221 (ASTM B 221M), Alloy 6063.

L. Laminating Adhesives: Manufacturer's standard product that complies with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

2.2 MARKERBOARD ASSEMBLIES

A. Porcelain-Enamel Markerboards: Balanced, high-pressure, factory-laminated markerboard assembly of three-ply construction consisting of backing sheet, core material, and 0.021-inch-(0.53-mm-) thick, porcelain-enamel face sheet with low-gloss finish.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

   a. AARCO Products, Inc.
   b. ADP Lemco, Inc.

c. Aywon.
d. Bangor Cork Company, Inc.
e. Best-Rite Manufacturing.
f. Claridge Products and Equipment, Inc.
g. Egan Visual Inc.
h. Ghent Manufacturing, Inc.
i. Marsh Industries, Inc.; Visual Products Group.
j. Platinum Visual Systems; a division of ABC School Equipment, Inc.
k. PolyVision Corporation; a Steelcase company.
l. Tri-Best Visual Display Products.
m. .

2. Hardboard Core: 1/4 inch (6 mm) thick; with 0.005-inch- (0.127-mm-) thick, aluminum foil backing.
3. Particleboard Core: 1/2 inch (13 mm) thick; with 0.013-inch- (0.35-mm-) thick, galvanized-steel sheet backing.
4. Fiberboard Core: 1/2 inch (13 mm) thick; with 0.013-inch- (0.35-mm-) thick, galvanized-steel sheet backing.
5. Manufacturer's Standard Core: Minimum 1/4 inch (6 mm) thick, with manufacturer's standard moisture-barrier backing.
6. Laminating Adhesive: Manufacturer's standard, moisture-resistant thermoplastic type.

B. Melamine Markerboards: Fabricated from 1/4-inch- (6-mm-) thick, sealed and primed hardboard panels permanently bonded with melamine or another high-pressure-laminate writing surface.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. AARCO Products, Inc.
b. Ghent Manufacturing, Inc.
c. Marsh Industries, Inc.; Visual Products Group.
d. .

C. High-Pressure-Laminate Markerboard Assembly: Balanced, high-pressure, factory-laminated chalkboard assembly of three-ply construction consisting of backing sheet, fiberboard core material, and high-pressure-laminate writing surface.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. Best-Rite Manufacturing.
b. EverProducts by Glenroy Inc.
c. Marsh Industries, Inc.; Visual Products Group.
d. .

2.3 TACKBOARD ASSEMBLIES

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. A-1 Visual Systems.
2. AARCO Products, Inc.
3. ADP Lemco, Inc.
4. Aywon.
5. Bangor Cork Company, Inc.
6. Best-Rite Manufacturing.
7. Claridge Products and Equipment, Inc.
8. Egan Visual Inc.
9. EverProducts by Glenroy Inc.
10. Ghent Manufacturing, Inc.
11. Marsh Industries, Inc.; Visual Products Group.
12. Platinum Visual Systems; a division of ABC School Equipment, Inc.
13. PolyVision Corporation; a Steelcase company.
14. Tri-Best Visual Display Products.
15. .

B. Natural-Cork Tackboard: 1/4-inch- (6-mm-) thick, natural cork sheet factory laminated to 1/4-inch- (6-mm-) thick hardboard backing.

C. .

2.4 MARKERBOARD AND TACKBOARD ACCESSORIES

A. Aluminum Frames and Trim: Fabricated from not less than 0.062-inch- (1.57-mm-) thick, extruded aluminum; standard size and shape.

1. Field-Applied Trim: Manufacturer's standard, screw-on trim with Phillips flat-head screws.
2. Factory-Applied Trim: Manufacturer's standard.

B. Factory-Applied Wood Trim: Red oak Walnut Manufacturer's standard species, not less than 1/2 inch (13 mm) thick; standard size and shape.

C. Field-Applied Wood Trim: Comply with requirements specified in Section 062000 "Finish Carpentry" Section 064023 "Interior Architectural Woodwork."

D. Map Rail: Provide the following accessories:

1. Display Rail: Continuous and integral with map rail; fabricated from cork approximately 1 to 2 inches (25 to 50 mm) wide.
2. End Stops: Located at each end of map rail.
3. Map Hooks: Two map hooks for every 48 inches (1219 mm) of map rail or fraction thereof.

4. Map Hooks and Clips: Two map hooks with flexible metal clips for every 48 inches (1219 mm) of map rail or fraction thereof.
5. Flag Holder: One for each room.
6. Paper Holder: Extruded aluminum; designed to hold paper by clamping action.

2.5 FABRICATION

A. Porcelain-Enamel Visual Display Assemblies: Laminate porcelain-enamel face sheet and backing sheet to core material under heat and pressure with manufacturer's standard flexible, waterproof adhesive.

B. Visual Display Boards: Factory assemble visual display boards unless otherwise indicated.

1. Where factory-applied trim is indicated, trim shall be assembled and attached to visual display boards at manufacturer's factory before shipment.

C. Factory-Assembled Visual Display Units: Coordinate factory-assembled units with trim and accessories indicated. Join parts with a neat, precision fit.

1. Make joints only where total length exceeds maximum manufactured length. Fabricate with minimum number of joints, as indicated on approved Shop Drawings.
2. Provide manufacturer's standard mullion trim at joints between markerboards and tackboards of combination units.
3. Where size of visual display boards or other conditions require support in addition to normal trim, provide structural supports or modify trim as indicated or as selected by Architect from manufacturer's standard structural support accessories to suit conditions indicated.

D. Modular Visual Display Boards: Fabricated with integral panel clips attached to core material.

E. Aluminum Frames and Trim: Fabricate units straight and of single lengths, keeping joints to a minimum. Miter corners to a neat, hairline closure.

1. Where factory-applied trim is indicated, trim shall be assembled and attached to visual display units at manufacturer's factory before shipment.

2.6 ALUMINUM FINISHES

A. Clear Anodic Finish: AAMA 611, AA-M12C22A31, Class II, 0.010 mm or thicker.

B. Color Anodic Finish: AAMA 611, AA-M12C22A32/A34, Class II, 0.010 mm or thicker.

C. Baked-Enamel or Powder-Coat Finish: AAMA 2603 except with a minimum dry film thickness of 1.5 mils (0.04 mm).

2.7 VISUAL DISPLAY SURFACE SCHEDULE

A. Visual Display Board: Factory assembled.

1. Markerboard: High-pressure-laminate markerboard assembly.

a. Color: As selected by Architect from full range of industry colors.

2. Corners: Square.
3. Width: As indicated on Drawings.
4. Height: As indicated on Drawings.
5. Mounting: Wall.
6. Mounting Height: As indicated on Drawings.
7. Factory Field-Applied Aluminum Trim: Manufacturer's standard Insert description with clear anodic color anodic baked-enamel powder-coat finish.

a. Color: As selected by Architect from full range of industry colors and color densities.

8. Factory-Applied Wood Trim: with opaque finish.
9. Factory-Applied Vinyl Trim: As selected by Architect from full range of industry colors.
10. Accessories:

a. Chalktray: Box type.
b. Map rail with display rail end stops map hooks map hooks and clips and flag holder.

B. Tackboard: Factory Field assembled.

1. Tack Surface: Natural-cork tackboard assembly.

a. Color: As selected by Architect from full range of industry colors.

2. Corners: Square.
3. Width: As indicated on Drawings.
4. Height: As indicated on Drawings.
5. Mounting: Wall.
6. Mounting Height: As indicated on Drawings.
7. Edges: Concealed by trim.

a. Factory Field-Applied Aluminum Trim: Manufacturer's standard style, with powder-coat finish.

1) Color: As selected by Architect from full range of industry colors and color densities.

b. Factory Field-Applied Wood Trim: with opaque finish.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Prepare surfaces to achieve a smooth, dry, clean surface free of flaking, unsound coatings, cracks, defects, projections, depressions, and substances that will impair bond between visual display surfaces and wall surfaces.

B. General: Install visual display surfaces in locations and at mounting heights indicated on Drawings. Keep perimeter lines straight, level, and plumb. Provide grounds, clips, backing materials, adhesives, brackets, anchors, trim, and accessories necessary for complete installation.

C. Field-Assembled Visual Display Units: Coordinate field-assembled units with grounds, trim, and accessories indicated. Join parts with a neat, precision fit.

1. Make joints only where total length exceeds maximum manufactured length. Fabricate with minimum number of joints, as indicated on approved Shop Drawings.
2. Provide manufacturer's standard vertical-joint spline H-trim system between abutting sections of chalkboards markerboards.

D. Visual Display Boards: Attach visual display boards to wall surfaces with egg-size adhesive gobs at 16 inches (400 mm) o.c., horizontally and vertically.

E. Visual Display Boards: Attach concealed clips, hangers, and grounds to wall surfaces and to visual display boards with fasteners at not more than 16 inches (400 mm) o.c. Secure both top and bottom of boards to walls.

1. Field-Applied Aluminum Trim: Attach trim over edges of visual display boards and conceal grounds and clips. Attach trim to boards with fasteners at not more than 24 inches (610 mm) o.c.

a. Attach chalktrays to boards with fasteners at not more than 12 inches (300 mm) o.c.

2. Field-Applied Wood Trim: Install trim according to requirements in Section 062000 "Finish Carpentry" Section 064023 "Interior Architectural Woodwork."

3. Mounting Height: [**72 inches (1829 mm)**] <**Insert dimension**> above finished floor to top of cabinet.

F. Clean visual display surfaces according to manufacturer's written instructions. Attach one cleaning label to visual display surface in each room. Cover and protect visual display surfaces.

END OF SECTION 101100

SECTION 10155 - TOILET COMPARTMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Steel toilet compartments configured as toilet enclosures entrance screens and urinal screens.

B. Related Sections:
1. Section 06105 "Miscellaneous Carpentry" for blocking .
2. Section 10801 "Toilet and Bath Accessories" for toilet tissue dispensers, grab bars, purse shelves, and similar accessories.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.

B. Shop Drawings: For toilet compartments. Include plans, elevations, sections, details, and attachments to other work.

1. Show locations of cutouts for compartment-mounted toilet accessories.
2. Show locations of reinforcements for compartment-mounted grab bars.
3. Show locations of centerlines of toilet fixtures.
4. Show overhead support or bracing locations.

C. Samples for Initial Selection: For each type of unit indicated. Include Samples of hardware and accessories involving material and color selection.

1.4 INFORMATIONAL SUBMITTALS

A. Product Certificates: For each type of toilet compartment, from manufacturer.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For toilet compartments to include in maintenance manuals.

1.6 QUALITY ASSURANCE

A. Comply with requirements in GSA's CID-A-A-60003, "Partitions, Toilets, Complete."

B. Regulatory Requirements: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA) and Architectural Barriers Act (ABA) Accessibility Guidelines for Buildings and Facilities" and ICC/ANSI A117.1 for toilet compartments designated as accessible.

1.7 PROJECT CONDITIONS

A. Field Measurements: Verify actual locations of toilet fixtures, walls, columns, ceilings, and other construction contiguous with toilet compartments by field measurements before fabrication.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Aluminum Castings: ASTM B 26/B 26M.

B. Aluminum Extrusions: ASTM B 221 (ASTM B 221M).

C. Steel Sheet: Commercial steel sheet for exposed applications; mill phosphatized and selected for smoothness.

D. Zamac: ASTM B 86, commercial zinc-alloy die castings.

2.2 STEEL UNITS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. ASI Accurate Partitions.
2. All American Metal Corp.
3. ASI Global Partitions
4. Bradley Corporation; Mills Partitions.
5. Flush Metal Partition Corp.
6. General Partitions Mfg. Corp.
7. Global Steel Products Corp.
8. Hadrian Manufacturing Inc.

9. Metpar Corp.
10. Rockville Partitions Incorporated.
11. Sanymetal; a Crane Plumbing company.

B. Toilet-Enclosure Style: Overhead braced Floor anchored .

C. Door, Panel, and Pilaster Construction: Seamless, metal facing sheets pressure laminated to core material; with continuous, interlocking molding strip or lapped-and-formed edge closures; corners secured by welding or clips and exposed welds ground smooth. Exposed surfaces shall be free of pitting, seam marks, roller marks, stains, discolorations, telegraphing of core material, or other imperfections.

1. Core Material: Manufacturer's standard sound-deadening honeycomb of resin-impregnated kraft paper in thickness required to provide finished thickness of 1 inch (25 mm) for doors and panels and 1-1/4 inches (32 mm) for pilasters.
2. Grab-Bar Reinforcement: Provide concealed internal reinforcement for grab bars mounted on units.
3. Tapping Reinforcement: Provide concealed reinforcement for tapping (threading) at locations where machine screws are used for attaching items to units.

D. Facing Sheets and Closures: Electrolytically coated steel sheet with nominal base-metal (uncoated) thicknesses as follows:

1. Pilasters, Braced at Both Ends: Manufacturer's standard thickness, but not less than 0.036 inch (0.91 mm).
2. Panels: Manufacturer's standard thickness, but not less than 0.030 inch (0.76 mm).
3. Doors: Manufacturer's standard thickness, but not less than 0.030 inch (0.76 mm).

E. Pilaster Shoes and Sleeves (Caps): Stainless-steel sheet, not less than 0.031-inch (0.79-mm) nominal thickness and 3 inches (76 mm) high, finished to match hardware.

F. Brackets (Fittings):

1. Stirrup Type: Ear or U-brackets; chrome-plated zamac stainless steelor chrome-plated brass.

G. Steel-Sheet Finish: Immediately after cleaning and pretreating, apply manufacturer's standard baked-on finish, including thermosetting, electrostatically applied, and powder coatings. Comply with coating manufacturer's written instructions for applying and baking. Apply one color in each room.

1. Color: As selected by Architect from manufacturer's full range.

2.3 ACCESSORIES

A. Hardware and Accessories: Manufacturer's standard design, heavy-duty operating hardware and accessories.

1. Material: Chrome-plated zamac Stainless steelor Chrome-plated brass.
2. Hinges: Manufacturer's standard paired, self-closing type that can be adjusted to hold doors open at any angle up to 90 degrees .
3. Latch and Keeper: Manufacturer's standard surface-mounted latch unit designed for emergency access and with combination rubber-faced door strike and keeper. Provide units that comply with regulatory requirements for accessibility at compartments designated as accessible.
4. Coat Hook: Manufacturer's standard combination hook and rubber-tipped bumper, sized to prevent in-swinging door from hitting compartment-mounted accessories.
5. Door Bumper: Manufacturer's standard rubber-tipped bumper at out-swinging doors.
6. Door Pull: Manufacturer's standard unit at out-swinging doors that complies with regulatory requirements for accessibility. Provide units on both sides of doors at compartments designated as accessible.

B. Overhead Bracing: Manufacturer's standard continuous, extruded-aluminum head rail with antigrip profile and in manufacturer's standard finish.

C. Anchorages and Fasteners: Manufacturer's standard exposed fasteners of stainless steel or chrome-plated steel or brass, finished to match the items they are securing, with theft-resistant-type heads. Provide sex-type bolts for through-bolt applications. For concealed anchors, use stainless steel, hot-dip galvanized steel, or other rust-resistant, protective-coated steel.

2.4 FABRICATION

A. Overhead-Braced Units: Provide manufacturer's standard corrosion-resistant supports, leveling mechanism, and anchors at pilasters to suit floor conditions. Provide shoes at pilasters to conceal supports and leveling mechanism.

B. Floor-Anchored Units: Provide manufacturer's standard corrosion-resistant anchoring assemblies with leveling adjustment nuts at pilasters for structural connection to floor. Provide shoes at pilasters to conceal anchorage.

C. Door Size and Swings: Unless otherwise indicated, 36-inch- (914-mm-) wide, out-swinging doors with a minimum 32-inch- (813-mm-) wide, clear opening for compartments designated as accessible.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General: Comply with manufacturer's written installation instructions. Install units rigid, straight, level, and plumb. Secure units in position with manufacturer's recommended anchoring devices.

1. Maximum Clearances:

   a. Pilasters and Panels: 1/2 inch (13 mm).
   b. Panels and Walls: 1 inch (25 mm).

2. Stirrup Brackets: Secure panels to walls and to pilasters with no fewer than three brackets attached at midpoint and near top and bottom of panel.

   a. Locate wall brackets so holes for wall anchors occur in masonry or tile joints.
   b. Align brackets at pilasters with brackets at walls.

B. Overhead-Braced Units: Secure pilasters to floor and level, plumb, and tighten. Set pilasters with anchors penetrating not less than 1-3/4 inches (44 mm) into structural floor unless otherwise indicated in manufacturer's written instructions. Secure continuous head rail to each pilaster with no fewer than two fasteners. Hang doors to align tops of doors with tops of panels, and adjust so tops of doors are parallel with overhead brace when doors are in closed position.

C. Floor-Anchored Units: Set pilasters with anchors penetrating not less than 2 inches (51 mm) into structural floor unless otherwise indicated in manufacturer's written instructions. Level, plumb, and tighten pilasters. Hang doors and adjust so tops of doors are level with tops of pilasters when doors are in closed position.

3.2 ADJUSTING

A. Hardware Adjustment: Adjust and lubricate hardware according to hardware manufacturer's written instructions for proper operation. Set hinges on in-swinging doors to hold doors open approximately 30 degrees from closed position when unlatched. Set hinges on out-swinging doors to return doors to fully closed position.

END OF SECTION 10155

SECTION 102600 - WALL AND DOOR PROTECTION

TIPS:

To view non-printing **Editor's Notes** that provide guidance for editing, click on MasterWorks/Single-File Formatting/Toggle/Editor's Notes.

To read **detailed research, technical information about products and materials, and coordination checklists**, click on MasterWorks/Supporting Information.

Content Requests:

<Double click here to submit questions, comments, or suggested edits to this Section.>

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Wall guards.
2. Impact-resistant handrails.
3. Bed locators.
4. Corner guards.
5. End-wall guards.
6. Abuse-resistant wall coverings.
7. Door-edge protection.
8. Door-frame protection.
9. Door-hardware protection.

B. Related Requirements:

1. Section 055000 "Metal Fabrications" for [**steel angle corner guards**] [**pipe guards**] [**and**] [**wheel guards**].
2. Section 057300 "Decorative Metal Railings" for metal handrails without plastic bumpers.
3. Section 064023 "Interior Architectural Woodwork for solid-wood handrails, bumper rails, chair rails, or corner moldings without plastic bumpers.
4. [**Section 087100 "Door Hardware"**] [**Section 087111 "Door Hardware (Descriptive Specification)"**] for metal[**and plastic**] protective trim units, according to BHMA A156.6, used for armor, kick, mop, and push plates.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, impact strength, dimensions of individual components and profiles, and finishes.
2. Include fire ratings of units recessed in fire-rated walls and listings for door-protection items attached to fire-rated doors.

B. Sustainable Design Submittals:

1. <Double click to insert sustainable design text for certified wood.>
2. <Double click to insert sustainable design text for certified wood.>
3. <Double click to insert sustainable design text for adhesives.>
4. <Double click to insert sustainable design text for composite wood.>

C. Shop Drawings: For each type of wall and door protection showing locations and extent.

1. Include plans, elevations, sections, and attachment details.[**Show handrail design and support spacing required to withstand structural loads.**]

D. Samples for Initial Selection: For each type of impact-resistant wall-protection unit indicated, in each color and texture specified.

1. Include Samples of accent strips and accessories to verify color selection.

E. Samples for Verification: For each type of exposed finish on the following products, prepared on Samples of size indicated below:

1. Wall Guards: 12 inches (300 mm) long. Include examples of joinery, corners, [**end caps,**] [**top caps,**] and field splices.
2. Handrails: 12 inches (300 mm) long. Include examples of joinery, corners, and field splices.
3. Bed Locators: 12 inches (300 mm) long. Include example of end caps.
4. [**Corner**] [**and**] [**End-Wall**] Guards: 12 inches (300 mm) long. Include example top caps.
5. Abuse-Resistant Wall Covering: 6 by 6 inches (150 by 150 mm) square.
6. Door-Surface Protection: 6 by 6 inches (150 by 150 mm) square.
7. Door[**-Edge**] [**and**] [**-Frame**] Protectors: 12 inches (300 mm) long.
8. Door-Knob and -Lever Protectors: Full-size unit of each type.

1.4 INFORMATIONAL SUBMITTALS

A. Product Certificates: For each type of handrail.

B. Material Certificates: For each type of exposed plastic material.

C. Sample Warranty: For special warranty.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For each type of wall and door protection product to include in maintenance manuals.

1. Include recommended methods and frequency of maintenance for maintaining best condition of plastic covers under anticipated traffic and use conditions. Include precautions against using cleaning materials and methods that may be detrimental to finishes and performance.

1.6 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials**[, from the same product run,]** that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. [**Wall-Guard**] [**and**] [**Handrail**] Covers: Full-size plastic covers of maximum length equal to [**2**] <**Insert number**> percent of each type, color, and texture of cover installed, but no fewer than [**two, 96-inch- (2400-mm-)**] <**Insert number and size**> long units.
2. Bed-Locator Covers: Full-size plastic covers equal to [**2**] <**Insert number**> percent of each type, color, and texture of cover installed, but no fewer than [**two**] <**Insert number**> units.
3. Corner-Guard Covers: Full-size plastic covers of maximum length equal to [**2**] <**Insert number**> percent of each type, color, and texture of cover installed, but no fewer than [**two, 48-inch- (1200-mm-)**] <**Insert number and size**> long units.
4. Mounting and Accessory Components: Amounts proportional to the quantities of extra materials. Package mounting and accessory components with each extra material.

1.7 QUALITY ASSURANCE

A. <Double click to insert sustainable design text for manufacturer qualifications.>

B. <Double click to insert sustainable design text for vendor qualifications.>

1.8 DELIVERY, STORAGE, AND HANDLING

A. Store wall and door protection in original undamaged packages and containers inside well-ventilated area protected from weather, moisture, soiling, extreme temperatures, and humidity.

1. Maintain room temperature within storage area at not less than 70 deg F (21 deg C) during the period plastic materials are stored.
2. Keep plastic materials out of direct sunlight.
3. Store plastic wall- and door-protection components for a minimum of 72 hours, or until plastic material attains a minimum room temperature of 70 deg F (21 deg C).

a. Store corner-guard covers in a vertical position.
b. Store [**wall-guard**] [**bed-locator**] [**and**] [**handrail**] covers in a horizontal position.

1.9 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of wall- and door-protection units that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Structural failures including detachment of components from each other or from the substrates, delamination, and permanent deformation beyond normal use.
b. Deterioration of metals, metal finishes, plastics, and other materials beyond normal use.

2. Warranty Period: [**Five**] <**Insert number**> years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations: Obtain wall- and door-protection products[**of each type**] from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

A. Surface Burning Characteristics: Comply with ASTM E84 or UL 723; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Flame-Spread Index: 25 or less.
2. Smoke-Developed Index: 450 or less.

B. Regulatory Requirements: Comply with applicable provisions in [**the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines for Buildings and Facilities**] [**and**] [**ICC A117.1**] <**Insert requirement**>.

2.3 WALL GUARDS

A. Crash Rail <**Insert drawing designation**>: Heavy-duty[**, PVC-free**] assembly consisting of continuous snap-on plastic cover installed over concealed retainer; designed to withstand impacts.

1. <Double click here to find, evaluate, and insert list of manufacturers and products.>
2. Cover: Extruded rigid plastic, minimum 0.100-inch (2.5-mm) wall thickness; [**as follows:**] [**in dimensions and profiles indicated on Drawings.**]

    a. Profile: [**Flat**] [**Convex**] <**Insert description**>.

        1) Dimensions: Nominal [**6 inches high by 1 inch deep (150 mm high by 25 mm deep)**] [**8 inches high by 1 inch deep (200 mm high by 25 mm deep)**] <**Insert dimensions**>.
        2) Surface: [**Uniform**] [**Uniform with coextruded accent inlay strip in contrasting color**] [**Grooved**] <**Insert description**>.

            a) Accent Inlay Strip: Nominal [**2 inches (50 mm)**] <**Insert dimension**> high by length of rail.

    b. Color and Texture: [**As indicated by manufacturer's designations**] [**Match Architect's sample**] [**As selected by Architect from manufacturer's full range**] <**Insert color and texture**>.

3. Continuous Retainer: Minimum 0.080-inch- (2.0-mm-) thick, one-piece, extruded aluminum.
4. Retainer Clips: Manufacturer's standard impact-absorbing clips designed for heavy-duty performance.
5. Bumper: Continuous, resilient bumper cushion(s).
6. End Caps and Corners: Prefabricated, injection-molded plastic; [**matching color**] [**contrasting with color**] <**Insert color**> cover; field adjustable for close alignment with snap-on cover.

7. Accessories: Concealed splices and mounting hardware.
8. Mounting: [**Surface mounted directly to wall**] [**Reveal mounted on bumper cushion(s)**] [**Extended mounting on injection-molded plastic mounting brackets**].

B. Bumper Rail <**Insert drawing designation**>: Standard-duty[**, PVC-free**] assembly consisting of continuous snap-on plastic cover installed over concealed retainer; designed to withstand impacts.

1. <Double click here to find, evaluate, and insert list of manufacturers and products.>
2. Cover: Extruded rigid plastic, minimum 0.078-inch (2.0-mm) wall thickness; [**as follows:**] [**in dimensions and profiles indicated on Drawings.**]

    a. Profile: [**Half-round profile, nominal 1 inch high by 1 inch deep (25 mm high by 25 mm deep)**] [**Rounded bullnose profile, nominal 4 inches high by 2 inches deep (100 mm high by 50 mm deep)**] [**Angled profile with rounded bullnose front edge, nominal 4 inches high by 2 inches deep (100 mm high by 50 mm deep)**] [**Flat profile, nominal 4 inches high by 1 inch deep (100 mm high by 25 mm deep)**] <**Insert profile and dimensions**>.
    b. Color and Texture: [**As indicated by manufacturer's designations**] [**Match Architect's sample**] [**As selected by Architect from manufacturer's full range**] <**Insert color and texture**>.

3. Continuous Retainer: Minimum 0.080-inch- (2.0-mm-) thick, one-piece, extruded aluminum.
4. Retainer Clips: Manufacturer's standard impact-absorbing clips.
5. Bumper: Continuous, resilient bumper cushion(s).
6. End Caps and Corners: Prefabricated, injection-molded plastic; [**matching color**] [**contrasting with color**] <**Insert color**> cover; field adjustable for close alignment with snap-on cover.
7. Accessories: Concealed splices and mounting hardware.
8. Mounting: [**Surface mounted directly to wall**] [**Reveal mounted on bumper cushions**] [**Extended mounting on injection-molded plastic mounting brackets**].

C. Rub Rail <**Insert drawing designation**>: Standard-duty[**, PVC-free**] assembly consisting of continuous snap-on cover installed over concealed, continuous retainer.

1. <Double click here to find, evaluate, and insert list of manufacturers and products.>
2. Cover: Extruded plastic, minimum 0.078-inch (2.0-mm) wall thickness; [**as follows:**] [**in dimensions and profiles indicated on Drawings.**]

    a. Profile: [**Half-round profile, nominal 1-1/8 inches high by 1-1/8 inches deep (30 mm high by 30 mm deep)**] [**Rounded bullnose profile, nominal 2 inches high by 1 inch deep (50 mm high by 25 mm deep)**] <**Insert profile and dimensions**>.
    b. Color and Texture: [**As indicated by manufacturer's designations**] [**Match Architect's sample**] [**As selected by Architect from manufacturer's full range**] <**Insert color and texture**>.

3. Retainer: Minimum 0.0625-inch- (1.6-mm-) thick, one-piece, extruded aluminum.
4. End Caps and Corners: Prefabricated, injection-molded plastic; color matching cover; field adjustable for close alignment with snap-on cover.
5. Accessories: Concealed splices and mounting hardware.
6. Mounting: [**Surface mounted directly to wall**] [**Reveal mounted on bumper cushions**].

D. Wood Chair Rail with Bumper <**Insert drawing designation**>: Standard-duty[**, PVC-free**] assembly consisting of continuous sculpted, solid-wood rail, with continuous bumper insert installed in continuous recessed retainer.

1. <Double click here to find, evaluate, and insert list of manufacturers and products.>
2. Wood Rail: [**3-1/2 inches high by 7/8 inch deep (89 mm high by 22 mm deep)**] [**5-1/2 inches high by 1-1/2 inches deep (140 mm high by 38 mm deep)**] [**Size and profile indicated on Drawings**] <**Insert dimensions**>.

    a. Wood Species: [**Red oak**] [**Maple**] [**Ash**] [**Beech**] <**Insert species**>.
    b. Finish: [**Clear**] [**Stained**].
    c. Color: [**As indicated by manufacturer's designations**] [**Match Architect's sample**] [**As selected by Architect from manufacturer's full range**] <**Insert color**>.

3. Bumper: Extruded plastic, minimum 0.078-inch (2.0-mm) wall thickness; [**as follows:**] [**in dimensions and profiles indicated on Drawings.**]

    a. Profile: [**Half-round profile, nominal 2 inches high by 1 inch deep (50 mm high by 25 mm deep)**] [**Small rounded profile, nominal 1-1/8 inches high by 1-1/8 inches deep (30 mm high by 30 mm deep)**] <**Insert profile and dimensions**>.
    b. Color and Texture: [**As indicated by manufacturer's designations**] [**Match Architect's sample**] [**As selected by Architect from manufacturer's full range**] <**Insert color and texture**>.
    c. End Caps and Corners: Prefabricated, injection-molded plastic; color matching bumper; field adjustable for close alignment with snap-on bumper.

4. Retainer: Minimum 0.0625-inch- (1.6-mm-) thick, one-piece, extruded aluminum.

    a. Finish: [**Mill**] [**Brass colored**].

5. Accessories: Concealed splices and mounting hardware.
6. Mounting: Surface mounted directly to wall.

E. Opaque-Plastic Chair Rail <**Insert drawing designation**>: Standard-duty[**, PVC-free**] assembly consisting of continuous snap-on cover installed over continuous retainer.

1. <Double click here to find, evaluate, and insert list of manufacturers and products.>
2. Cover: Extruded rigid plastic, minimum 0.070-inch (1.8-mm) wall thickness; [**as follows:**] [**in dimensions and profiles indicated on Drawings.**]

    a. Profile: [**Rounded bullnose profile, nominal 2 inches high by 1 inch deep (50 mm high by 25 mm deep)**] [**Half-round profile, nominal 1-1/8 inches high by 1-1/8 inches deep (30 mm high by 30 mm deep)**] <**Insert profile and dimensions**>.
    b. Color and Texture: [**As indicated by manufacturer's designations**] [**Match Architect's sample**] [**As selected by Architect from manufacturer's full range**] <**Insert color and texture**>.

3. Retainer: Minimum 0.060-inch- (1.5-mm-) thick, one-piece, extruded aluminum.
4. Bumper: Continuous, resilient bumper cushion(s).
5. End Caps and Corners: Prefabricated, injection-molded plastic; color matching cover; field adjustable for close alignment with snap-on cover.
6. Accessories: Concealed splices and mounting hardware.
7. Mounting: [**Surface mounted directly to wall**] [**Reveal mounted on bumper cushions**].

F. Transparent-Plastic Chair Rail <**Insert drawing designation**>: Consisting of clear polycarbonate plastic sheet.

1. <Double click here to find, evaluate, and insert list of manufacturers and products.>
2. Height: [**3 inches (75 mm) nominal**] [**4 inches (100 mm) nominal**] [**As indicated on Drawings**] <**Insert dimension**>.
3. Mounting: Surface mounted using flat-head countersunk screws through factory-drilled mounting holes.

G. Rub Strip <**Insert drawing designation**>: Continuous[**, PVC-free**] strip, consisting of minimum [**0.040-inch- (1.0-mm-)**] [**0.060-inch- (1.5-mm-)**] <**Insert dimension**> thick, semirigid, plastic sheet wall-covering material.

1. <Double click here to find, evaluate, and insert list of manufacturers and products.>
2. Height: [**8 inches (200 mm) nominal**] <**Insert dimension**>.
3. Color and Texture: [**As indicated by manufacturer's designations**] [**Match Architect's sample**] [**As selected by Architect from manufacturer's full range**] <**Insert color and texture**>.
4. Mounting: Surface mounted with adhesive.

2.4 IMPACT-RESISTANT HANDRAILS

A. Structural Performance: Handrails, including attachment to building construction, shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:

1. Uniform load of 50 lbf/ft. (0.73 kN/m) <**Insert requirement**> applied in any direction.
2. Concentrated load of 200 lbf (0.89 kN) applied in any direction.
3. Uniform and concentrated loads need not be assumed to act concurrently.

B. Plastic, Impact-Resistant Handrails <**Insert drawing designation**>: Manufacturer's standard[**, PVC-free**] assembly consisting of snap-on plastic cover installed over continuous retainer.

1. <Double click here to find, evaluate, and insert list of manufacturers and products.>
2. Cover: Minimum [**0.078-inch- (2.0-mm-)**] [**0.100-inch- (2.5-mm-)**] <**Insert dimension**> thick, extruded rigid plastic; [**as follows:**] [**in dimensions and profiles indicated on Drawings.**]

    a. Single Handrail: Cylindrical tube profile cover with continuous retainer; with mounting brackets supporting bottom of rail.

        1) Tube Diameter: <**Insert dimension**>.

    b. Bumper Rail: Cover with [**flat**] [**sculpted with contoured thumb recess on**] <**Insert description**> front side; with 1-1/2-inch- (38-mm-) diameter gripping surface and finger recess on back side; supported by concealed, continuous retainer and extended mounting brackets.

        1) Bumper-Rail Dimensions: Nominal [**5-1/2 inches high by 1-1/2 inches deep (140 mm high by 38 mm deep)**] [**5-1/2 inches high by 2 inches deep (140 mm high by 50 mm deep)**] <**Insert dimensions**>.

2) Bumper Surface: [**Smooth**] [**Smooth with coextruded accent inlay strip in contrasting color**] [**Smooth with coextruded accent inlay strips in contrasting color**] [**Grooved**] <**Insert description**>.
3) Accent Inlay Strip(s): [**One strip**] [**Two strips**], nominal [**2 inches (50 mm)**] <**Insert dimension**> high by length of rail.

c. Double Handrail with Bumper-Rail Profile: Two tubes mounted above and below nominal, flat-faced bumper rail; each tube with 1-1/2-inch- (38-mm-) diameter gripping surface and finger recess on back side; supported by concealed, continuous retainer and extended mounting brackets.

1) Bumper-Rail Dimensions: Nominal [**4 inches high by 1-1/2 inches deep (100 mm high by 38 mm deep)**] <**Insert dimensions**>.
2) Bumper Surface: [**Smooth**] [**Smooth with coextruded accent inlay strip in contrasting color**] [**Smooth with coextruded accent inlay strips in contrasting color**] [**Grooved**] <**Insert description**>.
3) Accent Inlay Strip(s): [**One strip**] [**Two strips**], nominal [**2 inches (50 mm)**] <**Insert dimension**> high by length of rail.

d. Color and Texture: [**As indicated by manufacturer's designations**] [**Match Architect's sample**] [**As selected by Architect from manufacturer's full range**] <**Insert color and texture**>.

3. Retainer: Minimum 0.080-inch- (2.0-mm-) thick, one-piece, extruded aluminum.
4. Mounting Bracket: Extended mounting on [**injection-molded plastic**] [**anodized-aluminum**] <**Insert description**> mounting brackets.
5. End Caps and Corners: Prefabricated, injection-molded plastic; [**matching color**] [**contrasting with color**] <**Insert color**> cover; field adjustable for close alignment with snap-on cover.
6. Accessories: Concealed splices, cushions, and mounting hardware.

C. Combination Wood-Plastic Bumper Handrail <**Insert drawing designation**>: Manufacturer's standard[**, PVC-free**] assembly consisting of solid-wood handrail mounted above plastic bumper rail, both mounted on continuous retainer; with reveal between handrail and bumper serving as thumb recess on front side; with 1-1/2-inch- (38-mm-) diameter gripping surface and finger recess on back side.

1. <Double click here to find, evaluate, and insert list of manufacturers and products.>
2. Wood Handrail: 1-1/2 inches (38 mm) in diameter; with matching end caps and corners.

a. Wood Species: [**Red oak**] [**Maple**] [**Ash**] [**Beech**] <**Insert species**>.
b. Finish: [**Clear**] [**Stained**].
c. Color: [**As indicated by manufacturer's designations**] [**Match Architect's sample**] [**As selected by Architect from manufacturer's full range**] <**Insert color**>.

3. Bumper: Extruded rigid plastic, minimum [**0.078-inch- (2.0-mm-)**] [**0.100-inch- (2.5-mm-)**] wall thickness; [**as follows:**] [**in dimensions and profiles indicated on Drawings.**]

a. Profile: [**Flat**] [**Convex**] <**Insert profile**> profile, nominal [**4 inches high by 1 inch deep (100 mm high by 25 mm deep)**] <**Insert profile and dimensions**>.
b. Accent Inlay Strip: Nominal [**2 inches (50 mm)**] <**Insert dimension**> high by length of rail.

c. Color and Texture: [**As indicated by manufacturer's designations**] [**Match Architect's sample**] [**As selected by Architect from manufacturer's full range**] <**Insert color and texture**>.
d. End Caps and Corners: Prefabricated, injection-molded plastic; color matching bumper; field adjustable for close alignment with snap-on bumper.

4. Retainer: Minimum 0.0625-inch- (1.6-mm-) thick, one-piece, extruded aluminum.
5. Reveal: Extruded rigid plastic over aluminum retainer.

a. Color: [**Brass**] [**Chrome**] [**As indicated by manufacturer's designations**] [**Match Architect's sample**] [**As selected by Architect from manufacturer's full range**] <**Insert color**>.

6. Accessories: Concealed splices, cushion(s), and mounting hardware.

D. Wood Handrail with Bumper <**Insert drawing designation**>: Manufacturer's standard[**, PVC-free**] assembly consisting of continuous sculpted, solid-wood handrail, with bumper insert installed in continuous retainer recessed into the face of the wood.

1. <Double click here to find, evaluate, and insert list of manufacturers and products.>
2. Wood Handrail: [**As indicated on Drawings**] <**Insert dimensions**> with 1-1/2-inch- (38-mm-) diameter gripping surface.

a. End Caps, Returns, Corners, and Mounting Brackets: Solid wood that matches rail.
b. Wood Species: [**Red oak**] [**Maple**] [**Ash**] [**Beech**] [**Bamboo**] <**Insert species**>.
c. Finish: [**Clear**] [**Stained**].
d. Color: [**As indicated by manufacturer's designations**] [**Match Architect's sample**] [**As selected by Architect from manufacturer's full range**] <**Insert color**>.

3. Bumper: Extruded plastic, minimum 0.078-inch (2.0-mm) wall thickness; [**as follows:**] [**in dimensions and profiles indicated on Drawings**].

a. Profile: [**Half-round profile, nominal 2 inches high by 1 inch deep (50 mm high by 25 mm deep)**] [**Small rounded profile, nominal 1-1/8 inches high by 1-1/8 inches deep (30 mm high by 30 mm deep)**] <**Insert profile and dimensions**>.
b. Color and Texture: [**As indicated by manufacturer's designations**] [**Match Architect's sample**] [**As selected by Architect from manufacturer's full range**] <**Insert color and texture**>.
c. End Caps and Corners: Prefabricated, injection-molded plastic; color matching bumper; field adjustable for close alignment with snap-on bumper.

4. Retainer: Minimum 0.0625-inch- (1.6-mm-) thick, one-piece, extruded aluminum.

a. Finish: [**Mill**] [**Brass colored**].

5. Accessories: Concealed splices and mounting hardware.

2.5 BED LOCATORS

A. Bed Locators <**Insert drawing designation**>: Manufacturer's standard[**, PVC-free**] assembly consisting of continuous snap-on plastic cover installed over continuous retainer; with two bed-locator end caps and mounting hardware; cover designed to spring back when hit.

1. <Double click here to find, evaluate, and insert list of manufacturers and products.>
2. Cover: Extruded rigid plastic, minimum [**0.078-inch (2.0-mm)**] <**Insert dimension**> wall thickness.

    a. Profile: Large, rounded [**angled**] [**bullnose**] profile, nominal 4 inches high by 2 inches deep (100 mm high by 50 mm deep).
    b. Color and Texture: [**As indicated by manufacturer's designations**] [**Match Architect's sample**] [**As selected by Architect from manufacturer's full range**] <**Insert color and texture**>.

3. Retainer: Minimum 0.080-inch- (2.0-mm-) thick, one-piece, extruded aluminum.
4. Bed-Locator End Caps: Prefabricated, injection-molded plastic; color matching cover; field adjustable for close alignment with snap-on cover.
5. Mounting Type: [**Surface mounted on 1/2-inch- (13-mm-) thick cushion spacers**] [**Extended mounting on injection-molded plastic mounting brackets**] [**Extended mounting on aluminum mounting brackets**].

2.6 CORNER GUARDS

A. Surface-Mounted, Plastic-Cover Corner Guards <**Insert drawing designation**>: Manufacturer's standard[**, PVC-free**] assembly consisting of snap-on, resilient plastic cover installed over retainer; including mounting hardware; fabricated with 90- or 135-degree turn to match wall condition.

1. <Double click here to find, evaluate, and insert list of manufacturers and products.>
2. Cover: Extruded rigid plastic, minimum [**0.078-inch (2.0-mm)**] [**0.100-inch (2.5-mm)**] <**Insert dimension**> wall thickness; [**as follows:**] [**in dimensions and profiles indicated on Drawings.**]

    a. Profile: Nominal [**2-inch- (50-mm-) long leg and 1/4-inch (6-mm) corner radius**] [**3-inch- (75-mm-) long leg and 1/4-inch (6-mm) corner radius**] [**3-inch- (75-mm-) long leg and 1-1/4-inch (32-mm) corner radius**] <**Insert dimensions**>.
    b. Height: [**4 feet (1.2 m)**] [**8 feet (2.4 m)**] <**Insert dimension**>.
    c. Color and Texture: [**As indicated by manufacturer's designations**] [**Match Architect's sample**] [**As selected by Architect from manufacturer's full range**] <**Insert color and texture**>.

3. Continuous Retainer: [**Minimum 0.060-inch- (1.5-mm-) thick, one-piece, extruded aluminum**] [**One-piece extruded plastic**].
4. Retainer Clips: Manufacturer's standard impact-absorbing clips.
5. Top and Bottom Caps: Prefabricated, injection-molded plastic; color matching cover; field adjustable for close alignment with snap-on cover.

B. Flush-Mounted, Plastic-Cover Corner Guards <**Insert drawing designation**>: Manufacturer's standard[**, PVC-free**] assembly consisting of snap-on, resilient plastic cover that is flush with adjacent wall surface, installed over retainer; including mounting hardware; fabricated with 90- or 135-degree turn to match wall condition; full wall height.

1. <Double click here to find, evaluate, and insert list of manufacturers and products.>
2. Cover: Extruded rigid plastic, minimum [**0.078-inch (2.0-mm)**] [**0.100-inch (2.5-mm)**] <**Insert dimension**> wall thickness; [**as follows:**] [**in dimensions and profiles indicated on Drawings.**]

a. Profile: Nominal [**2-inch- (50-mm-) long leg and 1/4-inch (6-mm) corner radius**] [**3-inch- (75-mm-) long leg and 1/4-inch (6-mm) corner radius**] [**3-inch- (75-mm-) long leg and 1-1/4-inch (32-mm) corner radius**] <**Insert dimensions**>.
b. Height: [**4 feet (1.2 m)**] [**8 feet (2.4 m)**] <**Insert dimension**>.
c. Color and Texture: [**As indicated by manufacturer's designations**] [**Match Architect's sample**] [**As selected by Architect from manufacturer's full range**] <**Insert color and texture**>.

3. Continuous Retainer: Minimum 0.060-inch- (1.5-mm-) thick, one-piece, extruded aluminum.
4. Retainer Clips: Manufacturer's standard impact-absorbing clips.
5. Aluminum Cove Base: Nominal [**4 inches (100 mm)**] [**6 inches (150 mm)**] <**Insert dimension**> high.

C. Fire-Rated, Flush-Mounted, Plastic-Cover Corner Guards <**Insert drawing designation**>: Manufacturer's standard[**, PVC-free**] assembly consisting of snap-on, resilient plastic cover that is flush with adjacent wall surface, installed over continuous retainer and intumescent fire barrier; including mounting hardware; fabricated with 90- or 135-degree turn to match wall condition; full wall height.

1. <Double click here to find, evaluate, and insert list of manufacturers and products.>
2. Fire Rating: [**1 hour**] [**2 hours**] [**Same rating as wall in which corner guard is installed**]; UL listed and labeled according to ASTM E1966 or UL 2079.

a. L-Rating at Smoke Barriers: Not exceeding 5.0 cfm/ft. (0.00775 cu. m/s x m) of joint at 0.30 inch wg (74.7 Pa) at both ambient and elevated temperatures according to UL 2079.

3. Cover: Extruded rigid plastic, minimum [**0.078-inch (2.0-mm)**] [**0.100-inch (2.5-mm)**] <**Insert dimension**> wall thickness; [**as follows:**] [**in dimensions and profiles indicated on Drawings.**]

a. Leg: Nominal [**2 inches (50 mm)**] [**3 inches (75 mm)**].
b. Corner Radius: [**1/4 inch (6 mm)**] [**1-1/4 inches (32 mm)**].
c. Color and Texture: [**As indicated by manufacturer's designations**] [**Match Architect's sample**] [**As selected by Architect from manufacturer's full range**] <**Insert color and texture**>.

4. Retainer: Minimum 0.070-inch- (1.8-mm-) thick, one-piece, extruded aluminum.
5. Aluminum Cove Base: Nominal [**4 inches (100 mm)**] [**6 inches (150 mm)**] <**Insert dimension**> high.

D. Surface-Mounted, Opaque-Plastic Corner Guards <**Insert drawing designation**>: Fabricated as one piece from [**PVC plastic**] [**PVC-free plastic**] [**acrylic-modified vinyl sheet**] [**or**] [**opaque polycarbonate sheet**]; with formed edges; fabricated with 90- or 135-degree turn to match wall condition.

1. <Double click here to find, evaluate, and insert list of manufacturers and products.>
2. Wing Size: Nominal [**3/4 by 3/4 inch (20 by 20 mm)**] [**1-1/8 by 1-1/8 inches (30 by 30 mm)**] [**2-1/2 by 2-1/2 inches (65 by 65 mm)**] <**Insert dimensions**>.
3. Mounting: [**Countersunk screws through factory-drilled mounting holes**] [**Adhesive**].
4. Color and Texture: [**As indicated by manufacturer's designations**] [**Match Architect's sample**] [**As selected by Architect from manufacturer's full range**] <**Insert color and texture**>.

E. Surface-Mounted, Transparent-Plastic Corner Guards <**Insert drawing designation**>: Fabricated as one piece from clear polycarbonate plastic sheet; with formed edges; fabricated with 90- or 135-degree turn to match wall condition.

1. <Double click here to find, evaluate, and insert list of manufacturers and products.>
2. Wing Size: Nominal [**3/4 by 3/4 inch (20 by 20 mm)**] [**1-1/8 by 1-1/8 inches (30 by 30 mm)**] [**2-1/2 by 2-1/2 inches (65 by 65 mm)**] <**Insert dimensions**>.
3. Thickness: Minimum [**0.050 inch (1.3 mm)**] [**0.075 inch (1.9 mm)**] [**0.100 inch (2.5 mm)**] <**Insert dimension**>.
4. Mounting: [**Countersunk screws through factory-drilled mounting holes**] [**Corner clips**].

F. Surface-Mounted, Metal Corner Guards <**Insert drawing designation**>: Fabricated as one piece from formed or extruded metal with formed edges; with 90- or 135-degree turn to match wall condition.

1. <Double click here to find, evaluate, and insert list of manufacturers and products.>
2. Material: Stainless-steel sheet, [**Type 304**] [**Type 430**].
    a. Thickness: Minimum [**0.0500 inch (1.3 mm)**] [**0.0625 inch (1.6 mm)**] [**0.0781 inch (2.0 mm)**] <**Insert dimension**>.
    b. Finish: [**Directional satin, No. 4**] [**Bright annealed**].
3. Material: Extruded aluminum, minimum 0.0625 inch (1.6 mm) thick, with clear anodic finish.
4. Material: Brass sheet, minimum 0.0500 inch (1.3 mm) thick, with [**buffed, smooth specular**] [**fine satin**] finish.
5. Wing Size: Nominal [**1-1/2 by 1-1/2 inches (38 by 38 mm)**] [**2-1/2 by 2-1/2 inches (65 by 65 mm)**] [**3-1/2 by 3-1/2 inches (90 by 90 mm)**] <**Insert dimensions**>.
6. Corner Radius: [**1/8 inch (3 mm)**] [**3/4 inch (19 mm)**] <**Insert dimension**>.
7. Mounting: [**Flat-head, countersunk screws through factory-drilled mounting holes**] [**Oval head, countersunk screws through factory-drilled mounting holes**] [**Adhesive**].

2.7 END-WALL GUARDS

A. Surface-Mounted, Plastic-Cover, End-Wall Guard <**Insert drawing designation**>: Manufacturer's standard[**, PVC-free**] assembly consisting of snap-on, resilient plastic cover installed over [**continuous retainer**] [**continuous retainer at each corner, with end of wall covered by semirigid, abuse-resistant wall covering**]; including mounting hardware.

1. <Double click here to find, evaluate, and insert list of manufacturers and products.>
2. Cover: Extruded rigid plastic, minimum [**0.078-inch (2.0-mm)**] [**0.100-inch (2.5-mm)**] wall thickness; [**as follows:**] [**in dimensions and profiles indicated on Drawings.**]
    a. Profile: Nominal [**2-inch- (50-mm-) long leg and 1/4-inch (6-mm) corner radius**] [**3-inch- (75-mm-) long leg and 1/4-inch (6-mm) corner radius**] [**3-inch- (75-mm-) long leg and 1-1/4-inch (32-mm) corner radius**] <**Insert dimensions**>.
    b. Height: [**4 feet (1.2 m)**] [**8 feet (2.4 m)**] <**Insert dimension**>.
    c. Color and Texture: [**As indicated by manufacturer's designations**] [**Match Architect's sample**] [**As selected by Architect from manufacturer's full range**] [**Match corner guards**] <**Insert color and texture**>.
3. Retainer: Minimum 0.060-inch- (1.5-mm-) thick, one-piece, extruded aluminum.

4. Top and Bottom Caps: Prefabricated, injection-molded plastic; color matching cover; field adjustable for close alignment with snap-on cover.

B. Flush-Mounted, Plastic-Cover, End-Wall Guard <**Insert drawing designation**>: Manufacturer's standard[**, PVC-free**] assembly consisting of snap-on, resilient plastic cover that is flush with adjacent wall surface and that covers entire end of wall, installed over [**continuous retainer**] [**continuous retainer at each corner, with end of wall covered by semirigid, abuse-resistant wall covering**]; including mounting hardware.

1. <Double click here to find, evaluate, and insert list of manufacturers and products.>
2. Cover: Extruded rigid plastic, minimum [**0.078-inch (2.0-mm)**] [**0.100-inch (2.5-mm)**] <**Insert dimension**> wall thickness; [**as follows:**] [**in dimensions and profiles indicated on Drawings.**]

    a. Profile: Nominal [**2-inch- (50-mm-) long leg and 1/4-inch (6-mm) corner radius**] [**3-inch- (75-mm-) long leg and 1/4-inch (6-mm) corner radius**] [**3-inch- (75-mm-) long leg and 1-1/4-inch (32-mm) corner radius**] <**Insert dimensions**>.
    b. Height: [**4 feet (1.2 m)**] [**8 feet (2.4 m)**] <**Insert dimension**>.
    c. Color and Texture: [**As indicated by manufacturer's designations**] [**Match Architect's sample**] [**As selected by Architect from manufacturer's full range**] [**Match corner guards**] <**Insert color and texture**>.

3. Retainer: Minimum 0.060-inch- (1.5-mm-) thick, one-piece, extruded aluminum.
4. Aluminum Cove Base: Nominal [**4 inches (100 mm)**] [**6 inches (150 mm)**] <**Insert dimension**> high.

C. Fire-Rated, Flush-Mounted, Plastic-Cover, End-Wall Guard <**Insert drawing designation**>: Manufacturer's standard[**, PVC-free**] assembly consisting of snap-on, resilient plastic cover that is flush with adjacent wall surface and that covers entire end of wall, installed over continuous retainer and intumescent fire barrier; including mounting hardware; full wall height.

1. <Double click here to find, evaluate, and insert list of manufacturers and products.>
2. Fire Rating: [**1 hour**] [**2 hours**] [**Same rating as wall in which end guard is installed**]; UL listed and labeled according to UL 2079.
3. Cover: Extruded rigid plastic, minimum [**0.078-inch (2.0-mm)**] [**0.100-inch (2.5-mm)**] <**Insert dimension**> wall thickness; [**as follows:**] [**in dimensions and profiles indicated on Drawings.**]

    a. Leg: Nominal [**2 inches (50 mm)**] [**3 inches (75 mm)**] <**Insert dimension**>.
    b. Corner Radius: [**1/4 inch (6 mm)**] [**1-1/4 inches (32 mm)**] <**Insert dimension**>.
    c. Color and Texture: [**As indicated by manufacturer's designations**] [**Match Architect's sample**] [**As selected by Architect from manufacturer's full range**] [**Match corner guards**] <**Insert color and texture**>.

4. Retainer: Minimum 0.070-inch- (1.8-mm-) thick, one-piece, extruded aluminum.
5. Aluminum Cove Base: Nominal [**4 inches (100 mm)**] [**6 inches (150 mm)**] <**Insert dimension**> high.

D. Surface-Mounted, Metal, End-Wall Guards <**Insert drawing designation**>: Fabricated from one-piece, formed or extruded metal that covers entire end of wall; with formed edges.

1. <Double click here to find, evaluate, and insert list of manufacturers and products.>
2. Material: Stainless-steel sheet, [**Type 304**] [**Type 430**].

a. Thickness: Minimum [**0.0500 inch (1.3 mm)**] [**0.0625 inch (1.6 mm)**] [**0.0781 inch (2.0 mm)**] <**Insert dimension**>.
b. Finish: [**Directional satin, No. 4**] [**Bright annealed**].

3. Material: Extruded aluminum, minimum 0.0625 inch (1.6 mm) thick, with clear anodic finish.
4. Material: Brass sheet, minimum 0.0500 inch (1.3 mm) thick, with [**buffed, smooth specular**] [**fine satin**] finish.
5. Wing Size: Nominal [**1-1/2 by 1-1/2 inches (38 by 38 mm)**] [**2-1/2 by 2-1/2 inches (65 by 65 mm)**] [**3-1/2 by 3-1/2 inches (90 by 90 mm)**] <**Insert dimensions**>.
6. Corner Radius: [**1/8 inch (3 mm)**] [**3/4 inch (19 mm)**] <**Insert dimension**>.
7. Mounting: [**Flat-head, countersunk screws through factory-drilled mounting holes**] [**Oval head, countersunk screws through factory-drilled mounting holes**] [**Adhesive**].

2.8 ABUSE-RESISTANT WALL COVERINGS

A. Abuse-Resistant Sheet Wall Covering <**Insert drawing designation**>: Fabricated from semirigid, plastic sheet wall-covering material.

1. <Double click here to find, evaluate, and insert list of manufacturers and products.>
2. Size: [**48 by 96 inches (1219 by 2438 mm) for sheet**] [**48 by 120 inches (1219 by 3048 mm) for roll**] [**As indicated**] <**Insert dimensions**>.
3. Sheet Thickness: [**0.022 inch (0.56 mm)**] [**0.028 inch (0.7 mm)**] [**0.040 inch (1.0 mm)**] [**0.060 inch (1.5 mm)**] [**0.080 inch (2.0 mm)**] [**0.093 inch (2.4 mm)**] [**0.125 inch (3.0 mm)**] <**Insert dimension**>.
4. Color and Texture: [**As indicated by manufacturer's designations**] [**Match Architect's sample**] [**As selected by Architect from manufacturer's full range**] <**Insert color and texture**>.
5. Height: [**Full wall**] [**Wainscot**] [**As indicated**] <**Insert dimension**>.
6. Trim and Joint Moldings: Extruded rigid plastic that matches wall-covering color.
7. Mounting: Adhesive.

B. Laminated, Impact-Resistant Wall Panels <**Insert drawing designation**>: Rigid wall panels consisting of semirigid, plastic sheet wall covering material factory laminated to high-impact-resistant core, with moisture-resistant vapor barrier factory laminated to reverse side of panel for stability.

1. <Double click here to find, evaluate, and insert list of manufacturers and products.>
2. Composition: [**0.028-inch- (0.70-mm-) thick plastic sheet laminated to 3/8-inch- (9.5-mm-) thick particleboard or medium-density fiberboard core**] [**0.04-inch- (1.02-mm-) thick plastic sheet laminated to 3/8-inch- (9.5-mm-) thick particleboard or medium-density fiberboard core**] <**Insert description**>.
3. Sheet Size: [**48 by 96 inches (1219 by 2438 mm)**] [**48 by 108 inches (1219 by 2743 mm)**] [**48 by 120 inches (1219 by 3048 mm)**] [**As indicated**] <**Insert dimensions**>.
4. Height: [**Full wall**] [**Wainscot**] [**As indicated**] <**Insert dimension**>.
5. Sheet Edge: [**Square**] [**Beveled**].
6. Trim and Joint Moldings: Extruded rigid plastic that matches wall-covering color.
7. Color and Texture: [**As indicated by manufacturer's designations**] [**Match Architect's sample**] [**As selected by Architect from manufacturer's full range**] <**Insert color and texture**>.
8. Mounting: Adhesive.

2.9 PLASTIC DOOR-PROTECTION PLATES

A. General: Manufacturer's standard plastic products of thicknesses and sizes indicated.

1. <Double click here to find, evaluate, and insert list of manufacturers and products.>
2. Fire-Rated Doors: Where the tops of door-protection plates indicated for field installation on fire-rated doors are more than 16 inches (406 mm) above the door bottoms, provide door-protection plates complying with NFPA 80 that are listed and labeled by a qualified testing and inspection agency acceptable to authorities having jurisdiction.

B. Full-Height Door-Surface Protection <**Insert drawing designation**>: Minimum [**0.040-inch (1.0-mm)**] [**0.060-inch (1.5-mm)**] [**0.080-inch (2.0-mm)**] <**Insert dimension**> wall thickness; with 90-degree bend for edge return to protect door edge.

1. Color and Texture: [**As indicated by manufacturer's designations**] [**Match Architect's sample**] [**As selected by Architect from manufacturer's full range**] <**Insert color and texture**>.
2. Mounting: [**Adhesive**] [**Countersunk screws through factory-drilled mounting holes**].

C. Armor Plates <**Insert drawing designation**>: Minimum [**0.040-inch (1.0-mm)**] [**0.060-inch (1.5-mm)**] [**0.080-inch (2.0-mm)**] <**Insert dimension**> wall thickness; beveled four sides.

1. Size: [**32 inches (813 mm)**] [**36 inches (914 mm)**] [**40 inches (1016 mm)**] [**42 inches (1067 mm)**] <**Insert dimension**> high by door width, with allowance for frame stops.
2. Color and Texture: [**As indicated by manufacturer's designations**] [**Match Architect's sample**] [**As selected by Architect from manufacturer's full range**] <**Insert color and texture**>.
3. Mounting: [**Adhesive**] [**Countersunk screws through factory-drilled mounting holes**].

D. Kick Plates <**Insert drawing designation**>: Minimum [**0.040-inch (1.0-mm)**] [**0.060-inch (1.5-mm)**] [**0.080-inch (2.0-mm)**] <**Insert dimension**> wall thickness; beveled four sides.

1. Size: [**8 inches (203 mm)**] [**10 inches (254 mm)**] [**12 inches (305 mm)**] <**Insert dimension**> high by door width, with allowance for frame stops.
2. Color and Texture: [**As indicated by manufacturer's designations**] [**Match Architect's sample**] [**As selected by Architect from manufacturer's full range**] <**Insert color and texture**>.
3. Mounting: [**Adhesive**] [**Countersunk screws through factory-drilled mounting holes**].

E. Mop Plates <**Insert drawing designation**>: Minimum [**0.040-inch (1.0-mm)**] [**0.060-inch (1.5-mm)**] [**0.080-inch (2.0-mm)**] <**Insert dimension**> wall thickness; beveled four sides.

1. Size: [**4 inches (102 mm)**] [**6 inches (152 mm)**] <**Insert dimension**> high by 1 inch (25 mm) less than door width.
2. Color and Texture: [**As indicated by manufacturer's designations**] [**Match Architect's sample**] [**As selected by Architect from manufacturer's full range**] <**Insert color and texture**>.
3. Mounting: [**Adhesive**] [**Countersunk screws through factory-drilled mounting holes**].

F. Stretcher Plates <**Insert drawing designation**>: Minimum [**0.040-inch (1.0-mm)**] [**0.060-inch (1.5-mm)**] [**0.080-inch (2.0-mm)**] <**Insert dimension**> wall thickness; beveled four sides.

1. Size: [**6 inches (152 mm)**] [**8 inches (203 mm)**] <**Insert dimension**> high by door width, with allowance for frame stops.

2. Color and Texture: [**As indicated by manufacturer's designations**] [**Match Architect's sample**] [**As selected by Architect from manufacturer's full range**] <**Insert color and texture**>.
3. Mounting: [**Adhesive**] [**Countersunk screws through factory-drilled mounting holes**].

G. Push Plates <**Insert drawing designation**>: Minimum [**0.040-inch (1.0-mm)**] [**0.060-inch (1.5-mm)**] [**0.080-inch (2.0-mm)**] <**Insert dimension**> wall thickness; beveled four sides.

1. Size: [**12 inches high by 4 inches wide (305 mm high by 102 mm wide)**] [**16 inches high by 4 inches wide (406 mm high by 102 mm wide)**] <**Insert dimensions**>.
2. Color and Texture: [**As indicated by manufacturer's designations**] [**Match Architect's sample**] [**As selected by Architect from manufacturer's full range**] <**Insert color and texture**>.
3. Mounting: [**Adhesive**] [**Countersunk screws through factory-drilled mounting holes**].

2.10 DOOR-EDGE PROTECTION

A. Door Edging <**Insert drawing designation**>: Fabricated from extruded rigid plastic, minimum [**0.040-inch (1.0-mm)**] [**0.060-inch (1.5-mm)**] <**Insert dimension**> wall thickness; formed to fit over door edge without mortising.

1. <Double click here to find, evaluate, and insert list of manufacturers and products.>
2. Shape: [**L**] [**U**].
3. Color and Texture: [**As indicated by manufacturer's designations**] [**Match Architect's sample**] [**As selected by Architect from manufacturer's full range**] <**Insert color and texture**>.
4. Mounting: [**Adhesive**] [**Countersunk screws through factory-drilled mounting holes**].

2.11 DOOR-FRAME PROTECTION

A. Door-Frame Protector <**Insert drawing designation**>: One piece fabricated from extruded rigid plastic, minimum [**0.040-inch (1.0-mm)**] [**0.050-inch (1.3-mm)**] [**0.060-inch (1.5-mm)**] <**Insert dimension**> wall thickness; formed to fit entire door-frame profile.

1. <Double click here to find, evaluate, and insert list of manufacturers and products.>
2. Height: [**36 inches (914 mm)**] [**48 inches (1219 mm)**] <**Insert dimension**>.
3. Color and Texture: [**As indicated by manufacturer's designations**] [**Match Architect's sample**] [**As selected by Architect from manufacturer's full range**] <**Insert color and texture**>.
4. Mounting: [**Adhesive**] [**Countersunk screws through factory-drilled mounting holes**].

B. Door-Frame Protector Assembly <**Insert drawing designation**>: Assembly consisting of snap-on plastic cover installed over continuous retainer; formed to fit half of door frame on opposite side of door swing.

1. <Double click here to find, evaluate, and insert list of manufacturers and products.>
2. Cover: Extruded rigid plastic, minimum 0.080-inch (2.0-mm) wall thickness; in dimensions and profiles indicated.

a. Height: [**36 inches (914 mm)**] [**48 inches (1219 mm)**] <**Insert dimension**>.
b. Corner Radius: [**1/4 inch (6 mm)**] [**1-1/4 inches (32 mm)**].

c. Color and Texture: [**As indicated by manufacturer's designations**] [**Match Architect's sample**] [**As selected by Architect from manufacturer's full range**] <**Insert color and texture**>.

3. Retainer: Minimum 0.080-inch- (2.0-mm-) thick, one-piece, extruded aluminum.

2.12 DOOR-HARDWARE PROTECTION

A. Door[**-Knob**] [**and**] [**-Lever**] Protector <**Insert drawing designation**>: Fabricated from injection-molded plastic, minimum 0.060-inch (1.5-mm) wall thickness.

1. <Double click here to find, evaluate, and insert list of manufacturers and products.>
2. Color and Texture: [**As indicated by manufacturer's designations**] [**Match Architect's sample**] [**As selected by Architect from manufacturer's full range**] <**Insert color and texture**>.
3. Mounting: Countersunk screws through factory-drilled mounting holes.

2.13 MATERIALS

A. Plastic Materials: Chemical- and stain-resistant, high-impact-resistant plastic with integral color throughout; extruded and sheet material as required, thickness as indicated.

B. Polycarbonate Plastic Sheet: ASTM D6098, S-PC01, Class 1 or Class 2, abrasion resistant; with a minimum impact-resistance rating of 15 ft.-lbf/in. (800 J/m) of notch when tested according to ASTM D256, Test Method A.

C. Solid Wood: Clear hardwood lumber of species indicated, free of appearance defects, and selected for compatible grain and color.

1. <Double click to insert sustainable design text for certified wood.>

D. <Double click to insert sustainable design text for composite wood products.>

E. Fasteners: Aluminum, nonmagnetic stainless-steel, or other noncorrosive metal screws, bolts, and other fasteners compatible with items being fastened. Use security-type fasteners where exposed to view.

F. Adhesive: As recommended by protection product manufacturer.

1. <Double click to insert sustainable design text for VOC content of adhesive.>
2. <Double click to insert sustainable design text for low emitting adhesives.>

2.14 FABRICATION

A. Fabricate wall and door protection according to requirements indicated for design, performance, dimensions, and member sizes, including thicknesses of components.

B. Curved Panels: Preform curved semirigid, abuse-resistant sheet wall covering in factory for radius and sheet thickness as follows:

1. Sheet Thickness of 0.040 Inch (1.0 mm): 24-inch (610-mm) radius.
2. Sheet Thickness of 0.060 Inch (1.5 mm): 36-inch (914-mm) radius.

3. <**Insert thickness and radius**>.

C. Factory Assembly: Assemble components in factory to greatest extent possible to minimize field assembly. Disassemble only as necessary for shipping and handling.

D. Quality: Fabricate components with uniformly tight seams and joints and with exposed edges rolled. Provide surfaces free of wrinkles, chips, dents, uneven coloration, and other imperfections. Fabricate members and fittings to produce flush, smooth, and rigid hairline joints.

E. Wood Handrails: Miter corners and ends of wood handrails for returns.

2.15 FINISHES

A. Protect finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and wall areas, with Installer present, for compliance with requirements for installation tolerances[**, fire rating,**] and other conditions affecting performance of the Work.

B. Examine walls to which wall and door protection will be attached for blocking, grounds, and other solid backing that have been installed in the locations required for secure attachment of support fasteners.

1. For wall and door protection attached with adhesive, verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Complete finishing operations, including painting, before installing wall and door protection.

B. Before installation, clean substrate to remove dust, debris, and loose particles.

3.3 INSTALLATION

A. Installation Quality: Install wall and door protection according to manufacturer's written instructions, level, plumb, and true to line without distortions. Do not use materials with chips, cracks, voids, stains, or other defects that might be visible in the finished Work.

B. Mounting Heights: Install wall and door protection in locations and at mounting heights indicated on Drawings.[**If not indicated on Drawings, install at heights indicated below:**]

1. Crash Rails: <**Insert dimension**> above finished floor.
2. Bumper Rails: <**Insert dimension**> above finished floor.
3. Rub Rails: <**Insert dimension**> above finished floor.
4. Chair Rails: <**Insert dimension**> above finished floor.
5. Handrails: <**Insert dimension**> above finished floor.
6. Bed Locators: <**Insert dimension**> above finished floor.

C. Accessories: Provide splices, mounting hardware, anchors, trim, joint moldings, and other accessories required for a complete installation.

1. Provide anchoring devices and suitable locations to withstand imposed loads.
2. Where splices occur in horizontal runs of more than 20 feet (6.1 m), splice aluminum retainers and plastic covers at different locations along the run, but no closer than 12 inches (305 mm) apart.
3. Adjust [**end**] [**and**] [**top**] caps as required to ensure tight seams.

D. Abuse-Resistant Wall Covering: Install top and edge moldings, corners, and divider bars as required for a complete installation.

E. Door-Frame Protectors: Install on both door jams.

F. Fire Doors: Install protection according to the listing of each item.

3.4 CLEANING

A. Immediately after completion of installation, clean plastic covers and accessories using a standard ammonia-based household cleaning agent.

B. Remove excess adhesive using methods and materials recommended in writing by manufacturer.

END OF SECTION 102600

SECTION 10431 - SIGNAGE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Plaques.
2. Panel signs.

B. Related Sections include the following:

1. Division 1 Section "Temporary Facilities and Controls" for temporary Project identification signs and for temporary information and directional signs.
2. Division 14 Section "Electric Traction Elevators" for code-required elevator signage.
3. Division 15 Section "Mechanical Identification" for labels, tags, and nameplates for mechanical equipment.
4. Division 16 Sections for electrical service and connections for illuminated signs.
5. Division 16 Section "Electrical Identification" for labels, tags, and nameplates for electrical equipment.
6. Division 16 Section "Interior Lighting" for illuminated Exit signs.

1.3 DEFINITIONS

A. ADA-ABA Accessibility Guidelines: U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities; Architectural Barriers Act (ABA) Accessibility Guidelines."

1.4 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: Show fabrication and installation details for signs.

1. Show sign mounting heights, locations of supplementary supports to be provided by others, and accessories.
2. Provide message list, typestyles, graphic elements, including tactile characters and Braille, and layout for each sign.
3. Wiring Diagrams: Power, signal, and control wiring.

C. Samples for Initial Selection: Manufacturer's color charts consisting of actual units or sections of units showing the full range of colors available.

D. Samples for Verification: For each of the following products and for the full range of color, texture, and sign material indicated, of sizes indicated:

1. Plaque[Casting]: 6 inches square including border.
2. Panel Signs: Not less than 12 inches square including border.

E. Sign Schedule: Use same designations indicated on Drawings.

F. Qualification Data: For Installer and fabricator.

G. Maintenance Data: For signs to include in maintenance manuals.

H. Warranty: Special warranty specified in this Section.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Fabricator of products

B. Fabricator Qualifications: Shop that employs skilled workers who custom-fabricate products similar to those required for this Project and whose products have a record of successful in-service performance.

C. Source Limitations for Signs: Obtain each sign type indicated from one source from a single manufacturer.

D. Regulatory Requirements: Comply with applicable provisions in [ADA-ABA Accessibility Guidelines] [and] [ICC/ANSI A117.1].

E. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

1.6 PROJECT CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit installation of signs in exterior locations to be performed according to manufacturers' written instructions and warranty requirements.

B. Field Measurements: Verify recess openings by field measurements before fabrication and indicate measurements on Shop Drawings.

1.7 COORDINATION

A. Coordinate placement of anchorage devices with templates for installing signs.

1.8 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of signs that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

   a. Deterioration of metal finishes beyond normal weathering.
   b. Deterioration of embedded graphic image colors and sign lamination

2. Warranty Period: **Five** years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Aluminum Castings: ASTM B 26/B 26M, of alloy and temper recommended by sign manufacturer for casting process used and for use and finish indicated.

B. Aluminum Sheet and Plate: ASTM B 209 (ASTM B 209M), alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated, and with at least the strength and durability properties of Alloy 5005-H32.

C. Aluminum Extrusions: ASTM B 221 (ASTM B 221M), alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated, and with at least the strength and durability properties of Alloy 6063-T5.

D. Brass Castings: ASTM B 584, Alloy UNS No. C85200 (high-copper yellow brass).

E. Brass, Yellow, Sheet: ASTM B 36/B 36M, Alloy UNS No. C26000.

F. Bronze Castings: ASTM B 584, Alloy UNS No. C86500 (No. 1 manganese bronze).

G. Bronze Plate: ASTM B 36/B 36M.

H. Copper Sheet: ASTM B 152/B 152M.

I. Steel:

1. Galvanized Steel Sheet: ASTM A 653/A 653M, G90 (Z275) coating, either commercial or forming steel.
2. Stainless-Steel Sheet: ASTM A 240/A 240M or ASTM A 666, Type [**304**] [**316**], stretcher-leveled standard of flatness.
3. Steel Members Fabricated from Plate or Bar Stock: ASTM A 529/A 529M or ASTM A 572/A 572M, 42,000-psi (290-MPa) minimum yield strength.
4. For steel exposed to view on completion, provide materials having flat, smooth surfaces without blemishes. Do not use materials whose surfaces exhibit pitting, seam marks, roller marks, rolled trade names, or roughness.

J. Fiberglass Sheet: Molded, seamless, thermosetting, glass-fiber-reinforced polyester panels with a minimum tensile strength of 15,000 psi (103 MPa) when tested according to ASTM D 638 and with a minimum flexural strength of 30,000 psi (207 MPa) when tested according to ASTM D 790.

K. Acrylic Sheet: ASTM D 4802, Category A-1 (cell-cast sheet), Type UVA (UV absorbing).

L. Polycarbonate Sheet: Of thickness indicated, manufactured by extrusion process, coated on both surfaces with abrasion-resistant coating:

1. Impact Resistance: 16 ft-lbf/in. (854 J/m) per ASTM D 256, Method A.
2. Tensile Strength: 9000 lbf/sq. in. (62 MPa) per ASTM D 638.
3. Flexural Modulus of Elasticity: 340,000 lbf/sq. in. (2345 MPa) per ASTM D 790.
4. Heat Deflection: 265 deg F (129 deg C) at 264 lbf/sq. in. (1.82 MPa) per ASTM D 648.
5. Abrasion Resistance: 1.5 percent maximum haze increase for 100 revolutions of a Taber abraser with a load of 500 g per ASTM D 1044.

M. Applied Vinyl: Die-cut characters from vinyl film of nominal thickness of 3 mils (0.076 mm) with pressure-sensitive adhesive backing, suitable for exterior applications.

2.2 PLAQUES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Advance Corporation; Braille-Tac Division.
2. A. R. K. Ramos.
3. Gemini Incorporated.
4. Matthews International Corporation; Bronze Division.
5. Metal Arts; Div. of L&H Mfg. Co.
6. Mills Manufacturing Company.
7. Nelson-Harkins Industries.
8. Southwell Company (The).

B. Cast Plaques: Provide castings free of pits, scale, sand holes, and other defects, as follows:

1. Plaque Material: Bronze.
2. Background Texture: Manufacturer's standard leatherette > texture.
3. Border Style: Square, polished >.
4. Mounting: Concealed studs**,** noncorroding for substrates encountered.

C. Plaque Schedule:

1. Plaque Type Entry Vestibule:

   a. Plaque Size: 24”w x 36”h X 3/4” d
   b. Character Size: TBD
   c. Character Finish/Color: Dark oxidized background/satin bronze raised areas.
   d. Text/Message: TBD
   e. Location: Entry Vestibule
   f. Quantity: 1

2.3 PANEL SIGNS

1. Basis-of-Design Product: Provide ASI InTouch from ASI Signage Innovations or comparable products by one of the following**;** ASI Signage Innovations, Inc.
2. Best Sign Systems Inc.
3. Gemini Incorporated.
4. Innerface Sign Systems, Inc.
5. Mohawk Sign Systems.

2.4 SIGN MATERIALS

A. Sign Face: High impact P95 frosted cast acrylic with 3d printed text and braille.

B. Tactile Graphics and Text: Provide tactile copy (and Grade II braille) raised 1/32" minimum from plaque surface using manufacturer's 3d printing technology
   1. Provide lettering and graphics precisely formed, uniformly opaque to comply with relevant ADA regulations and requirements indicated for size, style, spacing, content, position, and colors.
   2. Colors: Background color is second surface painted. Text Color is Intregrally colored and printed first surface. Silkscreened text is not allowed.
   3. Non- climate-controlled environments (stairwells, exterior, etc.) to use ASIntac method with applied characters and raster braille or ASI SPE Series

C. Sign Types and Quantities
   1. Restroom ID
      a. ASIntouch III
      b. 8"h x 6"wx 3/8" thick
      c. Taped mounted
   2. Room ID signs for Electrical, Mechanical and Janitor Spaces
      a. ASIntouch III
      b. 8"h x 8"wx 3/8" thick
      c. Taped Mounted
   3. Office/Room Signs
      a. ASIntouch III
      b. 9.5" w x 7" h x 3/8" thick
      c. Tape Mounted
   4. Projecting Restroom Sign
      a. ASIntouch II Sign w/ T-Fixture Bracket
      b. 8"h x 8"w x .064" thick ASIntouch III Plaque
      c. Screw mount
   5. Directional ID (2 quantity)
      a. ASIntouch III
      b. 10" h x 10" w x 3/8" thick
      c. Tape Mounted
   6. Changeable Message Sign (4 quantity)
      a. ASItouch III
      b. 10" h x 10" w x 3/8" thick
      c. Tape Mounted
   7. Maximum Occupancy (4 quantity)
      a. ASIntouch III
      b. 8" w x 8" h x 3/8" thick
      c. Tape Mounted

D. FABRICATION – GENERAL
   1. General: Comply with requirements indicated for materials, thicknesses, finishes, colors, designs, shapes, and details of construction.
   2. Preassemble signs in the shop o the greatest extend possible to minimize field assembly.

Disassemble signs only as necessary for shipping and handling limitations. Clearly mark units for reassembly and installation, in a location not exposed to view after final assembly.

3. Conceal fasteners if possible; otherwise, locate fasteners to appear inconspicuous.
4. Form panels to require size and shape. Comply with requirements indicated for design, dimensions, finish, color and details of construction.
5. Coordinate dimensions and attachment methods to produce message panels with closely fitting joints. Align edges and surfaces with one another in the relationship indicated.

E. INSTALLATION METHOD

1. Panel Signage:

Tape Mount or Screw Mount w/ Counter Sunk Holes and Silicone. Signs on glass to have vinyl backer. Backers to have counter sunk holes with face piece tape mounted over backer to conceal mounting.

F.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Site Verification of Conditions: Verify installation conditions previously established under other sections area acceptable for product installation in accordance with the manufacturer's instructions.performance of work.

B. Scheduling of installation by Owner or its representative implies that substrate and conditions are prepared and ready for product installation. Proceeding with installation implied installer's acceptance of substrate and conditions.

3.2 INSTALLATION

A. Install product in accordance with supplier's instruction

B. Install product in locations indicated using mounting methods recommended by manufacturers and free from distortion, warp, or defect adversely affecting appearance.

C. Install product at heights to conform to Americans with Disabilities Act Accessibility Guidelines (ADAAG) and applicable local amendments and regulations.

D. Install signs within the following tolerances and in accordance with manufacturer's recommendations.

1. Within ¼" vertically and horizontally of intended location.

E. Cast-Metal Plaques: Mount plaques using standard fastening methods to comply with manufacturer's written instructions for type of wall surface indicated.

1. Concealed Mounting: Mount plaques by inserting threaded studs into tapped lugs on back of plaque. Set in predrilled holes filled with quick-setting cement.
2. Face Mounting: Mount plaques using exposed fasteners with rosettes attached through face of plaque into wall surface.

3.3 CLEANING AND PROTECTION

A. Repair scratched and other damage which might have occurred during installation. Replace components where repairs were made but are still visible to the unaided eye from a distance of 5 feet.

B. Remove temporary coverings and protection to adjacent work areas. Clean installed products in accordance with manufacturer’s instructions prior to Owner’s acceptance. Remove construction debris from project in accordance with provisions in Division 1.

C. After installation, clean soiled sign surfaces according to manufacturer's written instructions. Protect signs from damage until acceptance by Owner.

SECTION 10432 - DIMENSIONAL LETTER SIGNAGE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Exterior Cast dimensional characters.

1.3 ACTION SUBMITTALS

A. Shop Drawings: For dimensional letter signs.

1. Include fabrication and installation details and attachments to other work.
2. Show sign mounting heights, locations of supplementary supports to be provided by others, and accessories.
3. Show message list, typestyles, graphic elements, and layout for each sign at least half size.

B. Samples for Verification: For each type of sign assembly showing all components and with the required finish(es), in manufacturer's standard size unless otherwise indicated and as follows:

1. Dimensional Characters: Half-size Sample of dimensional character.
2. Exposed Accessories: Half-size Sample of each accessory type.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer and manufacturer.

B. Sample Warranty: For special warranty.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For signs to include in maintenance manuals.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.

1.7 FIELD CONDITIONS

A. Field Measurements: Verify locations of electrical service embedded in permanent construction by other installers by field measurements before fabrication, and indicate measurements on Shop Drawings.

1.8 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of signs that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Deterioration of finishes beyond normal weathering.
b. Separation or delamination of sheet materials and components.

2. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 DIMENSIONAL LETTER SIGNS, GENERAL

2.2 DIMENSIONAL CHARACTERS

A. Cast Characters for signage on Main Entrance Courtyard Fence: Characters with uniform faces, sharp corners, and precisely formed lines and profiles, and as follows:
1. Basis-of-Design Product: Subject to compliance with requirements, provide A.R.K. Ramos Cast metal letters or comparable product by one of the following:

a. ACE Sign Systems, Inc.
b. Allen Markings International.
c. APCO Graphics, Inc.
d. ASI Sign Systems, Inc.
e. Diskey Sign Company.
f. Gemini Incorporated.
g. Matthews International Corporation; Bronze Division.
h. Metal Arts; Division of L & H Mfg. Co.
i. Metallic Arts.
j. Seton Identification Products.
k. Southwell Company (The).

2. Character Material: Cast aluminum.
3. Character Height: As indicated.
4. Thickness: Manufacturer's standard for size of character.
5. Finishes:
   a. Integral Aluminum Finish: Clear anodized .

6. Mounting: Projected mount bolted from the rear.
7. Typeface: Futura or architect approved equal.

2.3 DIMENSIONAL CHARACTER MATERIALS

A. Aluminum Castings: ASTM B 26/B 26M, alloy and temper recommended by sign manufacturer for casting process used and for type of use and finish indicated.

B. Aluminum Sheet and Plate: ASTM B 209 (ASTM B 209M), alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated.

C. Aluminum Extrusions: ASTM B 221 (ASTM B 221M), alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated.

2.4 ACCESSORIES

A. Fasteners and Anchors: Manufacturer's standard as required for secure anchorage of signage, noncorrosive and compatible with each material joined, and complying with the following:

1. Use concealed fasteners and anchors unless indicated to be exposed.
2. For exterior exposure, furnish stainless-steel devices unless otherwise indicated.
3. Exposed Metal-Fastener Components, General:

   a. Fabricated from same basic metal and finish of fastened metal unless otherwise indicated.
   b. Fastener Heads: For nonstructural connections, use flathead screws and bolts with tamper-resistant slots unless otherwise indicated.

4. Sign Mounting Fasteners:
   a. Projecting Studs: Threaded studs with sleeve spacer, welded or brazed to back of sign material, screwed into back of sign assembly, or screwed into tapped lugs cast integrally into back of cast sign material, unless otherwise indicated.
   b. Through Fasteners: Exposed metal fasteners matching sign finish, with type of head indicated, installed in predrilled holes.

B. Adhesives: As recommended by sign manufacturer and that comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

2.5 FABRICATION

A. General: Provide manufacturer's standard sign assemblies according to requirements indicated.

1. Preassemble signs and assemblies in the shop to greatest extent possible. Disassemble signs and assemblies only as necessary for shipping and handling limitations. Clearly mark units for reassembly and installation; apply markings in locations concealed from view after final assembly.
2. Mill joints to a tight, hairline fit. Form assemblies and joints exposed to weather to resist water penetration and retention.
3. Comply with AWS for recommended practices in welding and brazing. Provide welds and brazes behind finished surfaces without distorting or discoloring exposed side. Clean exposed welded and brazed connections of flux, and dress exposed and contact surfaces.
4. Conceal connections if possible; otherwise, locate connections where they are inconspicuous.
5. Internally brace signs for stability and for securing fasteners.
6. Provide rebates, lugs, and brackets necessary to assemble components and to attach to existing work. Drill and tap for required fasteners. Use concealed fasteners where possible; use exposed fasteners that match sign finish.
7. Castings: Fabricate castings free of warp, cracks, blowholes, pits, scale, sand holes, and other defects that impair appearance or strength. Grind, wire brush, sandblast, and buff castings to remove seams, gate marks, casting flash, and other casting marks before finishing.

B. Brackets: Fabricate brackets, fittings, and hardware for bracket-mounted signs to suit sign construction and mounting conditions indicated. Modify manufacturer's standard brackets as required.

2.6 GENERAL FINISH REQUIREMENTS

A. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

C. Directional Finishes: Run grain with long dimension of each piece and perpendicular to long dimension of finished trim or border surface unless otherwise indicated.

D. Organic, Anodic, and Chemically Produced Finishes: Apply to formed metal after fabrication but before applying contrasting polished finishes on raised features unless otherwise indicated.

2.7 ALUMINUM FINISHES

A. Clear Anodic Finish: AAMA 611, Class I, 0.018 mm or thicker.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of signage work.

B. Verify that sign-support surfaces are within tolerances to accommodate signs without gaps or irregularities between backs of signs and support surfaces unless otherwise indicated.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. General: Install signs using mounting methods indicated and according to manufacturer's written instructions.

1. Install signs level, plumb, true to line, and at locations and heights indicated, with sign surfaces free of distortion and other defects in appearance.
2. Before installation, verify that sign surfaces are clean and free of materials or debris that would impair installation.
3. Corrosion Protection: Coat concealed surfaces of exterior aluminum in contact with grout, concrete, masonry, wood, or dissimilar metals, with a heavy coat of bituminous paint.

B. Mounting Methods:

1. Projecting Studs: Using a template, drill holes in substrate aligning with studs on back of sign. Remove loose debris from hole and substrate surface.
   a. Thin or Hollow Surfaces: Place spacers on studs, place sign in position with spacers pinched between sign and substrate, and install washers and nuts on stud ends projecting through opposite side of surface, and tighten.

2. Through Fasteners: Drill holes in substrate using predrilled holes in sign as template. Countersink holes in sign if required. Place sign in position and flush to surface. Install through fasteners and tighten.

3.3 ADJUSTING AND CLEANING

A. Remove and replace damaged or deformed characters and signs that do not comply with specified requirements. Replace characters with damaged or deteriorated finishes

or components that cannot be successfully repaired by finish touchup or similar minor repair procedures.

B. Remove temporary protective coverings and strippable films as signs are installed.

C. On completion of installation, clean exposed surfaces of signs according to manufacturer's written instructions, and touch up minor nicks and abrasions in finish. Maintain signs in a clean condition during construction and protect from damage until acceptance by Owner.

END OF SECTION 10432

SECTION 10522 - FIRE EXTINGUISHER CABINETS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Fire protection cabinets for the following:

a. Portable fire extinguishers.

B. Related Sections:
1. Section 10523 "Fire Extinguishers."

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for fire protection cabinets.

1. Fire Protection Cabinets: Include roughing-in dimensions, details showing mounting methods, relationships of box and trim to surrounding construction, door hardware, cabinet type, trim style, and panel style.

1.4 CLOSEOUT SUBMITTALS

A. Maintenance Data: For fire protection cabinets to include in maintenance manuals.

1.5 COORDINATION

A. Coordinate size of fire protection cabinets to ensure that type and capacity of fire extinguishers indicated are accommodated.

B. Coordinate sizes and locations of fire protection cabinets with wall depths.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B.

B. Aluminum: Alloy and temper recommended by aluminum producer and manufacturer for type of use and finish indicated, and as follows:

1. Sheet: ASTM B 209 (ASTM B 209M).
2. Extruded Shapes: ASTM B 221 (ASTM B 221M).

C. Tempered Float Glass: ASTM C 1048, Kind FT, Condition A, Type I, Quality q3, 3 mm thick, Class 1 (clear).

2.2 FIRE PROTECTION CABINET

A. Cabinet Type: Suitable for fire extinguisher.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
   a. J. L. Industries, Inc., a division of Activar Construction Products Group; Ambassador or Academy Series.

B. Cabinet Construction: Nonrated.

C. Cabinet Material: Steel or Aluminum sheet.

1. Shelf: Same metal and finish as cabinet.

D. Recessed Cabinet: Cabinet box recessed in walls of sufficient depth to suit style of trim indicated.
1. Exposed Flat Trim: One-piece combination trim and perimeter door frame overlapping surrounding wall surface with exposed trim face and wall return at outer edge (backbend).

E. Cabinet Trim Material: Same material and finish as door.

F. Door Material: Steel sheet or Aluminum sheet .

G. Door Style: Vertical duo panel with frame .

H. Door Glazing: Tempered float glass (clear) .

I. Door Hardware: Manufacturer's standard door-operating hardware of proper type for cabinet type, trim style, and door material and style indicated.

1. Provide manufacturer's standard.
2. Provide manufacturer's standard hinge permitting door to open 180 degrees.

J. Accessories:

1. Mounting Bracket: Manufacturer's standard steel, designed to secure fire extinguisher to fire protection cabinet, of sizes required for types and capacities of fire extinguishers indicated, with plated or baked-enamel finish.
2. Door Lock: Cam lock that allows door to be opened during emergency by pulling sharply on door handle.
3. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location. Locate as indicated.

    a. Identify fire extinguisher in fire protection cabinet with the words "FIRE EXTINGUISHER."

        1) Location: Applied to cabinet door .
        2) Application Process: Engraved.
        3) Lettering Color: Red.
        4) Orientation: Horizontal.

4. Alarm: Manufacturer's standard alarm that actuates when fire protection cabinet door is opened and that is powered by low voltage, complete with transformer.

K. Finishes:

1. Manufacturer's standard baked-enamel paint for the following:

    a. Exterior of cabinet, door, and trim except for those surfaces indicated to receive another finish.
    b. Interior of cabinet and door.

2. Aluminum: Clear anodic .
3. Steel: Baked enamel or powder coat.

2.3 FABRICATION

A. Fire Protection Cabinets: Provide manufacturer's standard box (tub) with trim, frame, door, and hardware to suit cabinet type, trim style, and door style indicated.

1. Weld joints and grind smooth.
2. Provide factory-drilled mounting holes.
3. Prepare doors and frames to receive locks.
4. Install door locks at factory.

B. Cabinet Doors: Fabricate doors according to manufacturer's standards, from materials indicated and coordinated with cabinet types and trim styles selected.

1. Fabricate door frames with tubular stiles and rails and hollow-metal design, minimum 1/2 inch (13 mm) thick.
2. Miter and weld perimeter door frames.

C. Cabinet Trim: Fabricate cabinet trim in one piece with corners mitered, welded, and ground smooth.

2.4 GENERAL FINISH REQUIREMENTS

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Protect mechanical finishes on exposed surfaces of fire protection cabinets from damage by applying a strippable, temporary protective covering before shipping.

C. Finish fire protection cabinets after assembly.

D. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.5 ALUMINUM FINISHES

A. Clear Anodic Finish: AAMA 611, AA-M12C22A41, Class I, 0.018 mm or thicker.

2.6 STEEL FINISHES

A. Surface Preparation: Remove mill scale and rust, if present, from uncoated steel, complying with SSPC-SP 5/NACE No. 1, "White Metal Blast Cleaning" . After cleaning, apply a conversion coating suited to the organic coating to be applied over it.

B. Factory Prime Finish: Apply manufacturer's standard, fast-curing, lead- and chromate-free, universal primer immediately after surface preparation and pretreatment.

C. Baked-Enamel or Powder-Coat Finish: Immediately after cleaning and pretreating, apply manufacturer's standard two-coat, baked-on finish consisting of prime coat and thermosetting topcoat. Comply with coating manufacturer's written instructions for applying and baking to achieve a minimum dry film thickness of 2 mils (0.05 mm).

1. Color and Gloss: As selected by Architect from manufacturer's full range.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine walls and partitions for suitable framing depth and blocking where recessed and semirecessed cabinets will be installed.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Prepare recesses for recessed and semirecessedfire protection cabinets as required by type and size of cabinet and trim style.

3.3 INSTALLATION

A. General: Install fire protection cabinets in locations and at mounting heights indicated or, if not indicated, at heights acceptable to authorities having jurisdiction.

1. Fire Protection Cabinets: 54 inches (1372 mm) above finished floor to top of cabinet.

B. Fire Protection Cabinets: Fasten cabinets to structure, square and plumb.

1. Unless otherwise indicated, provide recessed fire protection cabinets. If wall thickness is not adequate for recessed cabinets, provide semirecessed fire protection cabinets.
2. Provide inside latch and lock for break-glass panels.
3. Fasten mounting brackets to inside surface of fire protection cabinets, square and plumb.

3.4 ADJUSTING AND CLEANING

A. Remove temporary protective coverings and strippable films, if any, as fire protection cabinets are installed unless otherwise indicated in manufacturer's written installation instructions.

B. Adjust fire protection cabinet doors to operate easily without binding. Verify that integral locking devices operate properly.

C. On completion of fire protection cabinet installation, clean interior and exterior surfaces as recommended by manufacturer.

D. Touch up marred finishes, or replace fire protection cabinets that cannot be restored to factory-finished appearance. Use only materials and procedures recommended or furnished by fire protection cabinet and mounting bracket manufacturers.

E. Replace fire protection cabinets that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 10522

SECTION 10523 - FIRE EXTINGUISHERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes portable, hand-carried fire extinguishers and mounting brackets for fire extinguishers.

B. Related Sections:

1. Section 10522 "Fire Extinguisher Cabinets."
2. Section 15870 "Commercial Kitchen Hoods" for fire extinguishing systems provided as part of commercial kitchen exhaust hoods.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated. Include rating and classification, material descriptions, dimensions of individual components and profiles, and finishes for fire extinguisher and mounting brackets.

B. Product Schedule: For fire extinguishers. Coordinate final fire extinguisher schedule with fire protection cabinet schedule to ensure proper fit and function.

1.4 INFORMATIONAL SUBMITTALS

A. Warranty: Sample of special warranty.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For fire extinguishers to include in maintenance manuals.

1.6 QUALITY ASSURANCE

A. NFPA Compliance: Fabricate and label fire extinguishers to comply with NFPA 10, "Portable Fire Extinguishers."

B. Fire Extinguishers: Listed and labeled for type, rating, and classification by an independent testing agency acceptable to authorities having jurisdiction.

1. Provide fire extinguishers approved, listed, and labeled by FMG.

1.7 COORDINATION

A. Coordinate type and capacity of fire extinguishers with fire protection cabinets to ensure fit and function.

1.8 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace fire extinguishers that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Failure of hydrostatic test according to NFPA 10.
b. Faulty operation of valves or release levers.

2. Warranty Period: Six years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PORTABLE, HAND-CARRIED FIRE EXTINGUISHERS

A. Fire Extinguishers: Type, size, and capacity for each fire protection cabinet and mounting bracket indicated.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. Amerex Corporation.
b. Ansul Incorporated; Tyco International Ltd.
c. Badger Fire Protection; a Kidde company.
d. Buckeye Fire Equipment Company.
e. Fire End & Croker Corporation.
f. J. L. Industries, Inc.; a division of Activar Construction Products Group.
g. Kidde Residential and Commercial Division; Subsidiary of Kidde plc.
h. Larsen's Manufacturing Company.
i. Moon-American.
j. Pem All Fire Extinguisher Corp.; a division of PEM Systems, Inc.
k. Potter Roemer LLC.
l. Pyro-Chem; Tyco Safety Products.

2. Valves: Manufacturer's standard.
3. Handles and Levers: Manufacturer's standard.
4. Instruction Labels: Include pictorial marking system complying with NFPA 10, Appendix B and bar coding for documenting fire extinguisher location, inspections, maintenance, and recharging.

B. Stored-Pressure Water Type: UL-rated 2-A, 2.5-gal. (9.5-L) nominal capacity, with water in stainless-steel container; with pressure-indicating gage.

2.2 MOUNTING BRACKETS

A. Mounting Brackets: Manufacturer's standard steel, designed to secure fire extinguisher to wall or structure, of sizes required for types and capacities of fire extinguishers indicated, with plated or red baked-enamel finish.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. Amerex Corporation.
b. Ansul Incorporated; Tyco International Ltd.
c. Badger Fire Protection; a Kidde company.
d. Buckeye Fire Equipment Company.
e. Fire End & Croker Corporation.
f. J. L. Industries, Inc.; a division of Activar Construction Products Group.
g. Larsen's Manufacturing Company.
h. Potter Roemer LLC.

B. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location. Locate as indicated by Architect.

1. Identify bracket-mounted fire extinguishers with the words "FIRE EXTINGUISHER" in red letter decals applied to mounting surface.

a. Orientation: Vertical.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine fire extinguishers for proper charging and tagging.

1. Remove and replace damaged, defective, or undercharged fire extinguishers.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. General: Install fire extinguishers and mounting brackets in locations indicated and in compliance with requirements of authorities having jurisdiction.

1. Mounting Brackets: 54 inches (1372 mm) above finished floor to top of fire extinguisher.

B. Mounting Brackets: Fasten mounting brackets to surfaces, square and plumb, at locations indicated.

END OF SECTION 10523

INSERT OPERABLE PANEL PARTITIONS

SECTION 10651 - OPERABLE PANEL PARTITIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Manually operated, acoustical panel partitions.

B. Related Requirements:

1. Section 07 "Metal Fabrications" for supports that attach supporting tracks to overhead structural system.
2. Section 09 "Gypsum Board" for fire-rated assemblies and sound barrier construction above the ceiling at track.

1.3 DEFINITIONS

A. NIC: Noise Isolation Class.

B. NRC: Noise Reduction Coefficient.

C. STC: Sound Transmission Class.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For operable panel partitions.

1. Include plans, elevations, sections, details, numbered panel installation sequence, and attachments to other work.
2. Indicate stacking and operating clearances. Indicate location and installation requirements for hardware and track, blocking, and direction of travel.

C. Samples for Initial Selection: For each type of exposed material, finish, covering, or facing.

1. Include Samples of accessories involving color selection.

D. Samples for Verification: For each type of exposed material, finish, covering, or facing, prepared on Samples of size indicated below:
1. Panel Facing Material: Manufacturer's standard-size unit, not less than 3 inches (75 mm) square.
2. Panel Edge Material: Not less than 3 inches (75 mm) long.
3. Chair Rail: Manufacturer's standard-size unit, 6 inches (150 mm) long.
4. Hardware: One of each exposed door-operating device.
5. Color samples demonstrating full range of finishes and available to architect. Verification samples will be available in same thickness and material indicated for Work.

E. Delegated-Design Submittal: For operable panel partitions.

1. Include design calculations for seismic restraints.

1.6 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Reflected ceiling plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:

1. Partition track, track supports and bracing, switches, turning space, and storage layout.
2. Suspended ceiling components.
3. Structural members to which suspension systems are attached.
4. Size and location of initial access modules for acoustical tile.
5. Items penetrating finished ceiling, including the following:

a. Lighting fixtures.
b. HVAC ductwork, outlets, and inlets.
c. Speakers.
d. Sprinklers.
e. Smoke detectors.
f. Access panels.

6. Plenum acoustical barriers.

1. Setting Drawings: For embedded items and cutouts required in other work, including support-beam, mounting-hole template, including support beam punching template.

B. Qualification Data: For qualified Installer manufacturer and vendor.

C. Seismic Qualification Certificates: For operable panel partitions, tracks, accessories, and components, from manufacturer. Include seismic capacity of partition assemblies to remain in vertical position during a seismic event and the following:

1. Basis for Certification: Indicate whether certification is based on analysis, testing, or experience data, according to ASCE/SEI 7.
2. Detailed description of partition anchorage devices on which the certification is based and their installation requirements.

D. Product Certificates: For each type of operable panel partition.

1. Include approval letter signed by manufacturer acknowledging Owner-furnished panel facing material complies with requirements.

E. Product Test Reports: For each operable panel partition, for tests performed by a qualified testing agency.

F. Field quality-control reports.

G. Sample Warranty: For manufacturer's special warranty.

1.7 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For operable panel partitions to include in maintenance manuals.

1. In addition to items specified in Section 01770 "Closeout Procedures," include the following:

a. Panel finish facings and finishes for exposed trim and accessories. Include precautions for cleaning materials and methods that could be detrimental to finishes and performance.
b. Seals, hardware, track, track switches, carriers, and other operating components.

1.8 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials, from the same production run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Panel Finish-Facing Material: Furnish full width in quantity to cover both sides of two panels when installed.

1.9 QUALITY ASSURANCE

A. Manufacturer Qualifications: A qualified manufacturer that is certified for chain of custody by an FSC-accredited certification body.

B. Vendor Qualifications: A vendor that is certified for chain of custody by an FSC-accredited certification body.

C. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.

D. Acoustical Performance: Test operable partitions in an independent acoustical laboratory in accordance with ASTM E90 test procedure to attain no less than the STC rating specified. Provide a complete and unedited written test report by the testing laboratory upon request.

E. Preparation of the opening shall conform to the criteria set forth per ASTM E557 “Standard Practice for Architectural Application and Installation of Operable Partitions.”

1.10 DELIVERY, STORAGE, AND HANDLING

A. Protectively package and sequence panels in order for installation. Clearly mark packages and panels with numbering system used on Shop Drawings. Do not use permanent markings on panels.

1.11 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of operable panel partitions that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

   a. Faulty operation of operable panel partitions.
   b. Deterioration of metals, metal finishes, and other materials beyond normal use.

2. Warranty Period: Two years from date of Substantial Completion. Track warranty: 5 years from date of substantial completion

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer, as defined in Section 01400 "Quality Requirements," to design seismic bracing of tracks to structure above.

B. Acoustical Performance: Provide operable panel partitions tested by a qualified testing agency for the following acoustical properties according to test methods indicated:

1. Sound-Transmission Requirements: Operable panel partition assembly tested for laboratory sound-transmission loss performance according to ASTM E 90, determined by ASTM E 413, and rated for not less than the STC indicated.
2. Noise-Reduction Requirements: Operable panel partition assembly, identical to partition tested for STC, tested for sound-absorption performance according to ASTM C 423, and rated for not less than the NRC indicated.
3. Noise-Isolation Requirements: Installed operable panel partition assembly, identical to partition tested for STC, tested for NIC according to ASTM E 336, determined by ASTM E 413, and rated for 10 dB less than STC value indicated.

C. Fire-Test-Response Characteristics: Provide panels with finishes complying with one of the following as determined by testing identical products by UL or another testing and inspecting agency acceptable to authorities having jurisdiction:

1. Surface-Burning Characteristics: Comply with ASTM E 84 or UL 723; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

   a. Flame-Spread Index: 25 or less.
   b. Smoke-Developed Index: 450 or less.

2. Fire Growth Contribution: Complying with acceptance criteria of local code and authorities having jurisdiction when tested according to NFPA 265 Method B Protocol or NFPA 286.

2.2 OPERABLE ACOUSTICAL PANELS

A. Operable Acoustical Panels: Partition system, including panels, seals, finish facing, suspension system, operators, and accessories.

1. Basis of Design Product: Provide Modernfold, Inc Acousti-Seal Paired Panel Systems 932 or comparable product of one of the following:

   a. FolDoor.
   b. Hulcor Inc
   c. KWIK-WALL Company.

Panel Operation: Manually operated, paired panels, top supported with operable floor seals

B. Panel Construction: As required to support panel from suspension components and with reinforcement for hardware attachment. Fabricate panels with tight hairline joints and concealed fasteners. Fabricate panels so finished in-place partition is rigid; level; plumb; aligned, with tight joints and uniform appearance; and free of bow, warp, twist, deformation, and surface and finish irregularities.

C. Dimensions: Fabricate operable acoustical panel partitions to form an assembled system of dimensions indicated and verified by field measurements.

1. Panel Width: Standard widths.

D. STC: Not less than 52.

E. NRC: Not less than 0.65.

F. Panel Weight: not less than 12 lb/sq. ft. maximum (40 kg/sq. m).

G. Panel Thickness: Not less than 3 inches
1. Steel Frame: Steel sheet, manufacturer’s standard nominal minimum thickness for uncoated steel

H. Panel Materials:

1. Steel Frame: Steel sheet, manufacturer's standard .
2. Steel Face/Liner Sheets: Tension-leveled steel sheet, manufacturer's standard .
3. Medium-Density Fiberboard: ANSI A208.2

I. Panel Closure: Manufacturer's standard unless otherwise indicated.

J. Hardware: Manufacturer's standard as required to operate operable panel partition and accessories; with decorative, protective finish.

1. Hinges: Manufacturer's standard.

K. Finish Facing: Fabric Wall covering

2.3 SEALS

A. General: Provide seals that produce operable panel partitions complying with performance requirements and the following:

1. Manufacturer's standard seals unless otherwise indicated.
2. Seals made from materials and in profiles that minimize sound leakage.
3. Seals fitting tight at contact surfaces and sealing continuously between adjacent panels and between operable panel partition perimeter and adjacent surfaces, when operable panel partition is extended and closed.

B. Vertical Seals: Deep-nesting, interlocking steel astragals mounted on each edge of panel, with continuous PVC acoustical seal.

C. Horizontal Top Seals: Continuous-contact, extruded-PVC seal exerting uniform constant pressure on track or PVC faced, mechanical, retractable, constant-force-contact seal exerting uniform constant pressure on track when extended.

D. Horizontal Bottom Seals: Manufacturer's standard continuous-contact seal exerting uniform constant pressure on floor.

E. Horizontal Bottom Seals: PVC-faced, mechanical, retractable, constant-force-contact seal exerting uniform constant pressure on floor when extended, ensuring horizontal and vertical sealing and resisting panel movement.

1. Mechanically Operated for Acoustical Panels: Extension and retraction of bottom seal by operating handle or built-in operating mechanism, with operating range not less than 2 inches between retracted seal and floor finish.

2.4 PANEL FINISH FACINGS

A. General: Provide finish facings for panels that comply with indicated fire-test-response characteristics and that are factory applied to operable panel partitions with appropriate backing,

using mildew-resistant nonstaining adhesive as recommended by facing manufacturer's written instructions.

1. Apply one-piece, seamless facings free of air bubbles, wrinkles, blisters, and other defects, with edges tightly butted, with invisible seams complying with Shop Drawings for location, and with no gaps or overlaps. Horizontal seams are not permitted. Tightly secure and conceal raw and selvage edges of facing for finished appearance.
2. Where facings with directional, repeating patterns or repeating, or matching grain are indicated, mark facing top and attach facing in same direction.
3. Match facing pattern 72 inches (1830 mm) above finished floor.

B. Fabric Wall Covering: 100 Percent polyolefin woven fabric, from same dye lot, treated to resist staining.
1. Color/Pattern: As selected by Architect from manufacturer full range

C. Trimless Edges: Fabricate exposed panel edges so finish facing wraps uninterrupted around panel, covering edge and resulting in an installed partition with facing visible on vertical panel edges, without trim, for minimal sightlines at panel-to-panel joints.

2.5 SUSPENSION SYSTEMS

A. Tracks: Steel or aluminum with adjustable steel hanger rods for overhead support, designed for operation, size, and weight of operable panel partition indicated. Size track to support partition operation and storage without damage to suspension system, operable panel partitions, or adjacent construction. Limit track deflection to no more than 0.10 inch (2.54 mm) between bracket supports. Provide a continuous system of track sections and accessories to accommodate configuration and layout indicated for partition operation and storage.

1. Panel Guide: Aluminum guide on both sides of the track to facilitate straightening of the panels; finished with factory-applied, decorative, protective finish.
2. Head Closure Trim: As required for acoustical performance; with factory-applied, decorative, protective finish.

B. Carriers: Trolley system as required for configuration type, size, and weight of partition and for easy operation; with ball-bearing wheels.

C. Track Intersections, Switches, and Accessories: As required for operation, storage, track configuration, and layout indicated for operable panel partitions, and compatible with partition assembly specified. Fabricate track intersections and switches from steel or aluminum.
1.
2.
3.
4.

D. Steel Finish: Manufacturer's standard, factory-applied, corrosion-resistant, protective coating unless otherwise indicated.

2.6 ACCESSORIES

A. Pass Doors: Swinging door built into and matching panel materials, construction, acoustical qualities, finish and thickness, complete with frames and operating hardware. Hinges finished to match other exposed hardware.

1. Accessibility Standard: Fabricate doors to comply with applicable provisions in ICC A117.1 and the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines for Buildings and Facilities.
2. Single Pass Door: 36 by 84 inches .
3. Pass-Door Hardware: Equip pass door with the following:

a. Door Seals: Sweep floor seals.
b. Panic hardware.
c. Concealed door closer.
d. Door Viewer: Installed with view in direction of swing.
e. Exit Sign: Recessed, self-illuminated.
f. Latchset: Passage set.
g. Lock: Key-operated lock with cylinder, keyed to master key system, operable from both sides of door. Include two keys per lock.
h. Lock: Deadlock to receive cylinder, operable from both sides of door. See Section 08710 "Door Hardware" for lock cylinder and keying requirements.

B. Storage Pocket Door: Full height at end of partition runs to conceal stacked partition; of same materials, finish, construction, thickness, and acoustical qualities as panels; complete with operating hardware and acoustical seals at soffit, floor, and jambs. Hinges in finish to match other exposed hardware.

1. Manufacturer's standard method to secure storage pocket door in closed position.
2. Rim Lock: Key-operated lock cylinder, keyed to master key system**,** to secure storage pocket door in closed position. Include two keys per lock.
3. Rim Lock: Deadlock to receive cylinder, to secure storage pocket door in closed position. See Section 08710 "Door Hardware" for lock cylinder and keying requirements.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine flooring, structural support, and opening, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of operable panel partitions.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. General: Comply with ASTM E 557 except as otherwise required by operable panel partition manufacturer's written installation instructions.

B. Install operable panel partitions and accessories after other finishing operations, including painting, have been completed in area of partition installation.

C. Install panels from marked packages in numbered sequence indicated on Shop Drawings.

D. Broken, cracked, chipped, deformed, or unmatched panels are not acceptable.

E. Broken, cracked, deformed, or unmatched gasketing or gasketing with gaps at butted ends is not acceptable.

F. Light-Leakage Test: Illuminate one side of partition installation and observe vertical joints and top and bottom seals for voids. Adjust partitions for alignment and full closure of vertical joints and full closure along top and bottom seals. Perform test and make adjustments before NIC testing.]

3.3 FIELD QUALITY CONTROL

A. NIC Testing: Engage a qualified testing agency to perform tests and inspections.

1. Testing Extent: Testing agency shall randomly select two operable panel partition installation(s) for testing.
2. Testing Methodology: Perform testing of installed operable panel partition for noise isolation according to ASTM E 336, determined by ASTM E 413, and rated for not less than NIC indicated. Adjust and fit partitions to comply with NIC test method requirements.

B. An operable panel partition installation will be considered defective if it does not pass tests and inspections.

C. Prepare test and inspection reports.

3.4 ADJUSTING

A. Adjust operable panel partitions, hardware, and other moving parts to function smoothly, and lubricate as recommended by manufacturer.

B. Adjust pass doors and storage pocket doors to operate smoothly and easily, without binding or warping.

C. Verify that safety devices are properly functioning.

3.5 MAINTENANCE SERVICE

A. Maintenance Service: Beginning at Substantial Completion, maintenance service shall include 12 months' full maintenance by manufacturer's authorized service representative. Include quarterly preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper operable-partition operation. Parts and supplies shall be manufacturer's authorized replacement parts and supplies.

3.6 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain operable panel partitions.

END OF SECTION 10631

SECTION 10670 - STORAGE SHELVING

PART 1 - GENERAL

1.1 SELECTION INCLUDES

A. Vinyl-coated ventilated shelving.

B. Adjustable shelf systems.

C. Storage accessories.

1.2 RELATED SECTIONS

A. Section 06105 – Miscellaneous Carpentry

B. Section 09111 – Non-load bearing steel framing

C. Section 09260 – Gypsum Board Assemblies.

1.3 SUBMITTALS

A. Submit under provisions of Section 01330.

B. Product Data: Manufacturer’s catalog data, details sheets, and specifications.

C. Shop Drawings: Prepared specifically for this project; show dimensions of shelving and interface with other products.

D. Selection Samples: For each finish product specified, two complete sets of color chips representing manufacturer’s full range of available color and patterns.

E. Verification Samples: For each finish product specified, two samples, minimum size 6 inches (150 mm) square representing actual product, color, and patterns.

1.4 QUALITY ASSURANCE

A. Manufacturer Qualifications: All primary products specified in this section will be supplied by a single manufacturer with a minimum of ten years experience.

B. Installer Qualifications: All products listed in this section are to be installed by a single installer with a minimum of five years demonstrated experience in installing products of the same type and scope as specified.

C. Mock-Up: Provide a mock-up for evaluation of surface preparation techniques and application workmanship.

1. Finish areas designated by Architect.

2. Do not proceed with remaining work until workmanship, color, and sheen are approved by Architect.

3. Refinish mock-up area as required to produce acceptable work.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturer’s unopened packaging until ready for installation.

1.6 PROJECT CONDITIONS

A. Maintain environmental conditions (temperature, humidity, and verification) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

1.7 WARRANTY

A. At project closeout, provide Owner or Owner's representative an executed copy of the manufacturer's standard limited warranty against manufacturing defect, outlining its terms, conditions, and exclusions from coverage.

PART 2 - PRODUCTS

2.1 MANUFACTURERS PRODUCTS: Subject to compliance with requirements, available products that may be incorporated into the work include, but not limited to, the following:

A. ClosetMaid Corp., www.closetmaid.com

B. Knape and Vogt Manufacturing Company; https://www.knapeandvogt.com/

C. Rubbermaid ; https://www.rubbermaid.com

D. Provide all storage shelving from a single manufacturer.

2.2 MATERIALS

A. Steel Wire: Basic cold drawn, Grade C-1006; average tensile strength over 100,00 psi (690 MPa); coated.

B. Wire Coatings: Proprietary heavy-duty polyvinyl chloride (PVC) formula resin, plasticizers, stabilizers, pigments, and other additives.

1. Thickness: 7 to 17 mil (0.178 to 0.432 mm).

2. Classification: No ingredients listed as hazardous per OSHA 29CFR1910.0017.

2.3 MANUFACTURED UNITS

A. Coated Wire Shelving:

1. Linen: 1 inch (25 mm) spacing.

a. Color: White Wire.

b. Color: Satin Chrome.

c. Pre-loaded Side Wall Bracket: Part # 979.

2. Close Mesh: 5/8 inch (16 mm) spacing.

a. Color: White Wire.

b. Color: Satin Chrome.

B. Accessories: As required and as manufactured by single source manufacturer.

1. Wall clips.

2. End brackets.
3. Support brackets.
4. Standards.
5. Shelf brackets.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verification of Conditions:

1. Prepared spaces are sized and located in accordance with shop drawings.
2. Framing, reinforcements, and anchoring devices are correct type and are located in accordance with shop drawings.

B. Installer’s Examination:

1. Examine conditions under which installation is preformed; submit written notification if such conditions are unacceptable.
2. Installation activities started before unacceptable conditions have been corrected is prohibited.
3. Installation indicates installer’s acceptance of conditions.

3.2 INSTALLATION

A. Cut shelves ½ inch to 1-3/8 inches (12.7 to 35 mm) shorter than actual wall measurements; cap all exposed ends.

B. Install shelving plumb and level at heights indicated in accordance with shop drawings and manufacturer’s printed installation instructions.

C. Place wall clip every 10 to 12 (254 to 305 mm) on level line.

D. Install end brackets on same level line as wall clips, centered on the front rods of shelves. Support shelves 36 inches (914 mm) maximum with end brackets, support brackets, or poles.

E. Drill holes where required using sharp bit; do not punch.

F. Drywall: Drill ¼ inch (6 mm) hole, insert No. 910 or 911 wall clip. Use No. 658 # 8 x 1 inch (25 mm) pin to expand anchor if unloaded.

G. Wood: Drill ¼ inch (6 mm) hole into wood, secure wall clip with No. 8 x 1 inch (25 mm) screw or secure pole clip No. 978 directly to wood with No. 8 x 1-1/4 inch (31 mm) screws.

H. Concrete: Drill ¼ inch (6 mm) hole with masonry bit, insert wall clip with No. 911 or 978 with 250 anchor, secure with No. 8 x 1 inch (25 mm) screws.

I. Standards and Brackets: Install per manufacturer’s written instructions.

J. Shelf support: Install per manufacturer’s written instructions.

3.3 CLEANING

A. As work proceeds, maintain premises free of unnecessary accumulation of tools, equipment, surplus materials, and debris related to work.

B. Upon completion of installation, clean all surfaces that have become soiled during installation.

SECTION 10801 - TOILET AND BATH ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Washroom and shower room accessories.
2. Childcare accessoriesUnderlavatory guards.
3. Custodial accessories.

1.2 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Product Schedule: Indicating types, quantities, sizes, and installation locations by room of each accessory required.

1. Identify locations using room designations indicated.
2. Identify products using designations indicated.

C. Maintenance data.

D. Warranty: Sample of special warranty.

1.3 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

1.4 WARRANTY

A. Special Mirror Warranty: Manufacturer's standard form in which manufacturer agrees to replace mirrors that develop visible silver spoilage defects and that fail in materials or workmanship within specified warranty period.

1. Warranty Period: 15 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 ACCESSORIES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following :
1. American Specialties, Inc.
2. Bobrick Washroom Equipment, Inc.
3. Bradley Corporation.
4. GAMCO Specialty Accessories; a division of Bobrick Washroom Equipment, Inc.

B. Toilet Tissue (Roll) Dispenser :

1. Basis-of-Design Product: Bobrick ClassicSeries Surface-mounted multi-roll toilet tissue dispenser #B-2888.

C. Paper Towel (Folded) Dispenser :

1. Basis-of-Design Product: Bobrick ClassicSeries Surface Mounted Paper Towel Dispenser #B-262.

D. Liquid-Soap Dispenser :

1. Basis-of-Design Product: Bobrick ClassicSeries Surface Mount Soap Dispenser - B-2111.

E. Grab Bar :

1. Basis-of-Design Product: Bobrick Concealed Mounting with Snap Flange.
2. Material: Stainless steel, 0.05 inch thick.

a. Finish: Smooth, No. 4 finish (satin) on ends and slip-resistant texture in grip area.

3. Outside Diameter: 1-1/2 inches.
4. Configuration and Length: As indicated on Drawings .

F. Mirror Unit :

1. Basis-of-Design Product: Bobrick frameless mirrors – B-1556.

2. Size: As indicated on Drawings .

G. ADA Mirror Unit :

1. Basis-of-Design Product: Bobrick fixed position tilt-mirror - B-293.

2. Size: As indicated on Drawings .

H. Shower Curtain Rod :

1. Basis-of-Design Product: Bobrick Shower Curtain Rod with Concealed Mounting - B-207.
2. Finish: No. 4 (satin)
3. Size: As indicated on drawings.

I. Shower Curtain :

1. Basis-of-Design Product: Bobrick Vinyl Shower Curtain - 204-2 with (7) Shower Curtain Hooks - 204-1.

J. Folding Shower Seat :

1. Basis-of-Design Product: Bobrick Reversible Folding Shower Seat - B-5181.

K. Recessed Soap Dish :

1. Basis-of-Design Product: Bobrick Recessed Heavy-Duty Soap Dish and Bar - B-4390.

L. Wall Mount Soap Dish:

1. Basis-of-Design Product: Bobrick ClassicSeries Surface-Mounted Soap Dish – B-76807.

M. Coat Hook:

1. Basis-of-Design Product: Bobrick Utility Hook – B-6707.

N. Towel Bar:

1. Basis-of-Design Product: Bobrick ClassicSeries Surface-Mounted Towel Shelf with Towel Bar 0 b-76767.

O. Diaper Changing Station:

1. Basis-of-Design Product: Koala Kare Products; a division of Bobrick Washroom Equipment
2. Horizontal Recessed Mounted: KB110-SSRE
3. Surface Mounted: KB110-SSWM

2.2 UNDERLAVATORY GUARDS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Plumberex Specialty Products, Inc.

2. Truebro by IPS Corporation.

B. Underlavatory Guard:
1. Description: Insulating pipe covering for supply and drain piping assemblies that prevent direct contact with and burns from piping; allow service access without removing coverings.
2. Material and Finish: Antimicrobial, molded plastic, white.

2.3 CUSTODIAL ACCESSORIES

A. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
1. American Specialties, Inc.
2. Bobrick Washroom Equipment, Inc.
3. Bradley Corporation.
4. GAMCO Specialty Accessories; a division of Bobrick Washroom Equipment, Inc.

B. Mop and Broom Holder with Utility Shelf:

1. Basis-of-Design Product: Bobrick Shelf with mop and broom holders and hooks – B-239.

2.4 FABRICATION

A. Keys: Provide universal keys for internal access to accessories for servicing and resupplying. Provide minimum of six keys to Owner's representative.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install accessories according to manufacturers' written instructions, using fasteners appropriate to substrate indicated and recommended by unit manufacturer. Install units level, plumb, and firmly anchored in locations and at heights indicated.

B. Grab Bars: Install to withstand a downward load of at least 250 lbf, when tested according to ASTM F 446.

3.2 ACCESSORY SCHEDULE

A. Kitchen 110
1. (2) Paper Towel (Folded) Dispenser
2. (2) Liquid-Soap Dispenser

B. Sick Room 124
   1. (1) Toilet Tissue (Roll) Dispenser
   2. (1) Paper Towel (Folded) Dispenser
   3. (1) Liquid-Soap Dispenser
   4. (2) Grab Bar
   5. (1) ADA Mirror Unit
   6. (1) Under lavatory guard
   7. (1) Shower Curtain Rod
   8. (2) Shower Curtain
   9. (1) Soap Dish
   10. (1) towel bar
   11. (2) grab bar
   12. (1) Folding Shower seat
   13. (1) fold down diaper station (recessed)

C. Infants 128
   1. (2) Paper Towel (Folded) Dispenser
   2. (2) Liquid-Soap Dispenser

D. Toddlers 130 & 135
   1. (1) Paper Towel (Folded) Dispenser
   2. (1) Liquid-Soap Dispenser

E. Preschool 136 & 140 Each
   1. (1) Paper Towel (Folded) Dispenser
   2. (1) Liquid-Antibacterial Dispenser

F. Utility 132
   1. (1) Paper Towel (Folded) Dispenser
   2. (1) Liquid-Soap Dispenser

G. Restroom 133
   1. (2) Toilet Tissue (Roll) Dispenser
   2. (1) Paper Towel (Folded) Dispenser
   3. (2) Liquid-Soap Dispenser
   4. (2) Mirror Unit
   5. (1) Shower Curtain Rod
   6. (1) Shower Curtain
   7. (1) Soap Dish
   8. (2) grab bar

H. Room 117,118,217 Janitor’s Closet Each
   1. (2) Mop and Broom Holder with Utility Shelf

I. Restroom 139
   1. (4) Toilet Tissue (Roll) Dispenser
   2. (1) Paper Towel (Folded) Dispenser
   3. (1) Liquid-Soap Dispenser
   4. (2) Mirror Unit
   5. (4) grab bars

J. Restroom 122
   1. (1) Toilet Tissue (Roll) Dispenser
   2. (1) Paper Towel (Folded) Dispenser
   3. (1) Liquid-Soap Dispenser
   4. (1) Mirror Unit
   5. (1) grab bars
   6. (1) fold down diaper station (recessed)
   7. (3) Robe Hook

K. Restroom 121
   1. (3) Toilet Tissue (Roll) Dispenser
   2. (1) Paper Towel (Folded) Dispenser
   3. (1) Liquid-Soap Dispenser
   4. (2) Mirror Unit
   5. (1) grab bars
   6. (1) fold down diaper station (recessed)

L. Restroom 218
   1. (3) Toilet Tissue (Roll) Dispenser
   2. (1) Paper Towel (Folded) Dispenser
   3. (1) Liquid-Soap Dispenser
   4. (2) Mirror Unit
   5. (1) grab bars
   6. (1) fold down diaper station (surface mounted)

M. Restroom 219
   1. (3) Toilet Tissue (Roll) Dispenser
   2. (1) Paper Towel (Folded) Dispenser
   3. (1) Liquid-Soap Dispenser
   4. (2) Mirror Unit
   5. (1) grab bars
   6. (1) fold down diaper station (recessed)
   7. (2) Coat Hook

END OF SECTION 10801

DIVISION 11

SECTION 11400 - FOODSERVICE EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes equipment for foodservice facilities.

1. Stainless-steel countertops, including integral sinks.
2. Stainless-steel base cabinets
3. Stainless-steel shelving
4. Food Equipment

B. See Division 15 Sections for supply and exhaust fans; exhaust ductwork; service roughing-ins; drain traps; atmospheric vents; valves, pipes, and fittings; fire-extinguishing systems; and other materials required to complete foodservice equipment installation.

C. See Division 15 Section "Commercial Kitchen Hoods" for ventilation hoods.

D. See Division 16 Sections for connections to fire-alarm systems, wiring, disconnect switches, and other electrical materials required to complete foodservice equipment installation.

1.2 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: For fabricated equipment. Include plans, elevations, sections, roughing-in dimensions, fabrication details, utility service requirements, and attachments to other work.

C. Samples: For each exposed product and for each color and texture specified.

D. Coordination Drawings: For foodservice facilities.

1. Indicate locations of foodservice equipment and connections to utilities.
2. Key equipment using same designations as indicated on Drawings.
3. Include plans and elevations; clearance requirements for equipment access and maintenance; details of equipment supports; and utility service characteristics.

E. Operation and maintenance data.

F. Sample warranties.

1.3 QUALITY ASSURANCE

A. NSF Standards: Provide equipment that bears NSF Certification Mark or UL Classification Mark certifying compliance with applicable NSF standards.

B. BISSC Standards: Provide bakery equipment that complies with BISSC/Z50.2.

1. Provide BISSC-certified equipment, with certification verified by a third-party agency.

C. UL Certification: Provide electric and fuel-burning equipment and components that are evaluated by UL for fire, electric shock, and casualty hazards according to applicable safety standards, and that are UL certified for compliance and labeled for intended use.

D. Steam Equipment: Provide steam-generating and direct-steam heating equipment that is fabricated and labeled to comply with ASME Boiler and Pressure Vessel Code.

E. Regulatory Requirements: Install equipment to comply with the following:

1. ASHRAE 15, "Safety Code for Mechanical Refrigeration."
2. NFPA 54, "National Fuel Gas Code."
3. NFPA 70, "National Electrical Code."
4. NFPA 96, "Ventilation Control and Fire Protection of Commercial Cooking Operations."

F. Seismic Restraints: Comply with SMACNA's "Kitchen Ventilation Systems and Food Service Equipment Fabrication and Installation Guidelines," Appendix A, "Seismic Restraint Details," unless otherwise indicated.

G. Preinstallation Conference: Conduct conference at Project site .

1.4 WARRANTY

A. Refrigeration Compressor Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace compressors that fail in materials or workmanship within specified warranty period.

1. Failure includes, but is not limited to, inability to maintain set temperature.
2. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 FABRICATED EQUIPMENT

A. Integral Stainless-Steel Sinks: .

a. SEE SHEET FS-1 FOR EQUIPMENT SCHEDULE

2. Stainless- Steel Tables, Carts, Wall Mount Shelving & Base Cabinets:

   The following manufacturers and models are the basis of design but available manufacturers offering project comparable may be submitted:

   a. Item 1C: 1 ea. Metro Model No. NK3 Packed
   b. Item 14: Metro Model No. MW103 Packed/MW Standard Duty Utility Cart, MW100 series (2) solid shelves, open base, shelf size 24" x 18"D, tubular stainless steel frame with (2) push handles, with (4) swivel/resilient tread casters, NSF
   c. Item 15: (2) ea Overshelf, Eagle Group Model SWS1560-16/4 Packed ea
      Wall shelf snap-n-slide, 1 ½" rolled front edge, 15: x 60, 16 gauge type 430 stainless steel, 1 ½" upturn on rear and ends, stainless steel wall brackets mount to wall studs, no wall backing required. 225 lb weight capacity, NSF

   d. Item 17: (2) ea Overshelf, Eagle Group Model No. SWS1536-16/4 X packed: ea. Wal shelf, snap-n-slide, 1 ½" rolled front edge, 15" x 36", 16 gauge type 430 stainless steel, 1 ½" upturn on rear and ends, stainless steel wall brackets mount to wall studs, no wall backing required, 135 lb weight capacity, NSF

   e. Item 22 :(2) Overshelf, Eagle Group No SWS1536-16/4-X Packed ea, Wall Shelf, Snap-n-slide, 1 ½" rolled front edge, 15" x 36", 16 gauge type 430 stainless steel, 1 ½" upturn on rear and ends, stainless steel wall brackets mount to wall studs, no wall backing required, 135lb. weight capacity, NSF.

   f. Item 23: (1) ea Dry Storage Shelving, Metro, (5) ea. A2448NK3 Super Adjustable Super Erecta Shelf, wire, 48"w 24" D, Metroseal 3(corrosion-resistant) finish, corner release system, with Microban antimicrobial protection, NSF. (5) ea. A2460NK3 Super Adjustable Super Erecta Shelf, wire, 60"w 24" D, Metroseal 3(corrosion-resistant) finish, corner release system, with Microban antimicrobial protection, NSF. (8) EA 74PK3 Super Electa SiteSelect Post, 74- 5/8" H, adjustable leveling bolt, posts are grooved at 1" increments & numbers at 2" increments, double grooved every 8", Metroseal 3 epoxy coated corrosion-resistant finish with Micoban antimicrobial protection

   g. Item 24: (1) ea Can Rack Eagle Group Model No OCR-10-4AP-X Packed: ea Panco Can Rack, half size, mobile design, self feeding gravity fed shelves, designed for (72) #10 or (96) #5 cans, aluminum welded frame with poly top, 4" swivel plate casters, NSF (Flyer)

   h. Item 25: (1) ea Hot Food Serving Counter, Duke Manufacturing Model No. E302 Packed: ea Aerohot Steamtable Hot Food Unit, 30-3/8 L, electric (2) 12" x 20" hot food wells with exposed elements, infinite controls, stainless steel top with ½" thick x 7" wide poly carving board, stainless steel open base with undershelf, legs & fee (1) ea 120v/60/1-ph, 1000 watts, 8.3 amps, NEMA 5-15

i. Item 26: (1) ea Work Table Eagle Group Model No. T24120SEB-BS Packed ea Deluxe Work table, 120' x 24" d, 16/304 Stainless steel top with 4 ½" backsplash, rolled front edge, square turndown ends, Uni-Lok gusset system, heavy gauges/s undershelf, (6) 1 5/8" diameter heavy guage s/s legs with 1" adjustable s/s/fee, NSF

j. Item 28: (2) ea Overshelf, Eagle Group Model No. SWS1548-16/4-X Packed: ea. Wall shelf, snap-n-slide, 1 ½" rolled front edge, 15" x 48", 16 gauge type 430 stainless steel, 1 ½" upturn on rear and ends, stainless steel wall brackets mount to wall studs, no wall backing required, 180lb weight capacity, NSF

(1) Ea SW1560-16/4-X Wall Shelf, snap-n-slide, 1 ½" rolled front edge, 15" x 60", 16- gauge type stainless steel, 1 ½" upturn on rear and ends, stainless steel wall brackets mount to wall studs, no wall backing required, 225 lb weight capacity, NSF

2.2 FOODSERVICE EQUIPMENT

a. SEE SHEET FS-1 FOR EQUIPMENT SCHEDULE

2.3 MISCELLANEOUS MATERIALS

A. Installation Accessories, General: NSF certified for end-use application indicated.

B. Elastomeric Joint Sealant: ASTM C 920; silicone . Type S (single component), Grade NS (nonsag), Class 25, Use NT (nontraffic) related to exposure, and Use M, G, A, or O as applicable to joint substrates indicated.

1. Public Health and Safety Requirements:

a. Sealant is certified for compliance with NSF standards for end-use application indicated.
b. Washed and cured sealant complies with the FDA's regulations for use in areas that come in contact with food.

2. Cylindrical Sealant Backing: ASTM C 1330, Type C, closed-cell polyethylene, in diameter greater than joint width.

2.4 FINISHES

A. Stainless-Steel Finishes:

1. Surface Preparation: Remove tool and die marks and stretch lines, or blend into finish.
2. Polished Finishes: Grind and polish surfaces to produce uniform finish, free of cross scratches.

a. Run grain of directional finishes with long dimension of each piece.

b. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install foodservice equipment level and plumb, according to manufacturer's written instructions.

1. Connect equipment to utilities.
2. Provide cutouts in equipment, neatly formed, where required to run service lines through equipment to make final connections.

B. Complete equipment assembly where field assembly is required.

1. Provide closed butt and contact joints that do not require a filler.
2. Grind field welds on stainless-steel equipment until smooth and polish to match adjacent finish.

C. Install equipment with access and maintenance clearances that comply with manufacturer's written installation instructions and with requirements of authorities having jurisdiction.

D. Install cabinets and similar equipment on bases in a bed of sealant.

E. Install closure-trim strips and similar items requiring fasteners in a bed of sealant.

F. Install joint sealant in joints between equipment and abutting surfaces with continuous joint backing unless otherwise indicated. Produce airtight, watertight, vermin-proof, sanitary joints.

3.2 CLEANING AND PROTECTING

A. After completing installation of equipment, repair damaged finishes.

B. Clean and adjust equipment as required to produce ready-for-use condition.

C. Protect equipment from damage during remainder of the construction period.

3.3 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain foodservice equipment.

END OF SECTION 11400

SECTION 11451 - CLEANING APPLIANCES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. Cleaning appliances.

1.2 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Samples: For each exposed product and for each color and texture.

C. Product certificates.

D. Field quality-control reports.

E. Operation and maintenance data.

F. Warranties: Sample of special warranties.

1.3 QUALITY ASSURANCE

A. Installer Qualifications: An employer of workers trained and approved by manufacturer for installation and maintenance of units required for this Project.

1.4 WARRANTY

A. Special Warranties: Manufacturer's standard form in which manufacturer agrees to repair or replace residential appliances or components that fail in materials or workmanship within specified warranty period.

1. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 CLOTHES WASHERS AND DRYERS (STACKABLE UNITS)

A. Clothes Washer : Complying with ASSE 1007.

1. Basis-of-Design Product: Whirlpool CE model– 3.1 cu.ft. Capacity washer.

B. Clothes Dryer : Complying with AHAM HLD-1.

1. Basis-of-Design Product: Whirlpool CE model – 6.7 cu. ft.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Freestanding Equipment: Place units in final locations after finishes have been completed in each area. Verify that clearances are adequate to properly operate equipment.

B. Utilities: See Divisions 15 and 16 for plumbing and electrical requirements.

3.2 FIELD QUALITY CONTROL

A. Perform tests and inspections.

1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.

B. Tests and Inspections:

1. Perform visual, mechanical, and electrical inspection and testing for each appliance according to manufacturers' written recommendations. Certify compliance with each manufacturer's appliance-performance parameters.
2. Leak Test: After installation, test for leaks. Repair leaks and retest until no leaks exist.
3. Operational Test: After installation, start units to confirm proper operation.
4. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and components.

C. Prepare test and inspection reports.

END OF SECTION 11451

DIVISION 12

SECTION 12366 - SOLID SURFACING COUNTERTOPS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Solid surface material countertops.
2. Solid surface material windowsills.
3. Countertop support brackets.

1.2 ACTION SUBMITTALS

A. Product Data: For countertop and windowsill materials.

B. Samples for Verification: For the following products:

1. Countertop and Windowsill material, 6 inches square.

1.3 CLOSEOUT SUBMITTALS

A. Maintenance Data: For solid surface material to include in maintenance manuals. Include Product Data for care products used or recommended by Installer and names, addresses, and telephone numbers of local sources for products.

1.4 QUALITY ASSURANCE

A. Fabricator Qualifications: Shop that employs skilled workers who custom-fabricate countertops similar to that required for this Project, and whose products have a record of successful in-service performance.

B. Installer Qualifications: Fabricator of countertops.

1.5 FIELD CONDITIONS

A. Field Measurements: Verify dimensions of countertops and windowsills by field measurements before windowsill fabrication is complete.

1.6 COORDINATION

A. Coordinate locations of utilities that will penetrate countertops and windowsills or backsplashes.

PART 2 - PRODUCTS

2.1 SOLID SURFACE COUNTERTOP MATERIALS

A. Solid Surface Material: Homogeneous-filled plastic resin complying with ICPA SS-1.

1. Subject to compliance with requirements, provide product indicated on Finish Schedule or comparable product by one of the following:

a. DuPont de Nemours, Inc.; Corian.

b. Formica;

c. Hanwha Surfaces.

d. Transolid;

e. Wilsonart;

2. Type: Provide Standard type unless Special Purpose type is indicated.
3. Colors and Patterns: As indicated by manufacturer's designations.

B. Plywood: Exterior softwood plywood complying with DOC PS 1, Grade C-C Plugged, touch sanded.

2.2 COUNTERTOP FABRICATION

A. Fabricate countertops according to solid surface material manufacturer's written instructions and to the AWI/AWMAC/WI's "Architectural Woodwork Standards."

1. Grade: Premium.

B. Configuration:

1. Front: Straight, slightly eased at top, with 1-inch nosing.
2. Backsplash: Straight, slightly eased at corner.
3. End Splash: Matching backsplash.

C. Countertops: 3/4-inch-thick, solid surface material with front edge built up with same material.

D. Backsplashes: 1/2-inch-thick, 4-inch-high solid surface material.

E. Fabricate tops with shop-applied edges unless otherwise indicated. Comply with solid surface material manufacturer's written instructions for adhesives, sealers, fabrication, and finishing.

1. Fabricate with loose backsplashes for field assembly.

F. Joints: Fabricate straight countertops eight feet or less in length without joints. Where size and configuration of countertops exceed dimensions of solid surface slab, fabricate countertops in sections for joining in field, with joints at locations indicated on approved Shop Drawings.

G. Cutouts and Holes:

1. Counter-Mounted Plumbing Fixtures: Prepare countertops in shop for field cutting openings for counter-mounted fixtures. Mark tops for cutouts and drill holes at corners of cutout locations. Make corner holes of largest radius practical.
2. Fittings: Drill countertops in shop for plumbing fittings, undercounter soap dispensers, and similar items.

2.3 WINDOWSILL FABRICATION

A. Fabricate windowsills according to solid surface material manufacturer's written instructions and to the AWI/AWMAC/WI's "Architectural Woodwork Standards."

1. Grade: Premium.

B. Sills: Not less than 1/2-inch-thick, solid surface material, and as indicated on Drawings.

C. Configuration: As indicated on Drawings.

D. Joints: Fabricate windowsills without joints, except where width of opening exceeds length of available materials.

E. Subsills: Plywood, exterior grade, 3/4-inch thickness, unless otherwise indicated on Drawings.

2.4 COUNTERTOP SUPPORT BRACKETS.

A. Rakks Model EH Inside Wall mount.

1. Size: Depending on the size of the countertops they are supporting.
2. Finish: As selected by Architect from Manufactures full range.
3. Color: As selected by Architect from Manufactures full range.

2.5 INSTALLATION MATERIALS

A. Adhesive: Product recommended by solid surface material manufacturer.

1. Adhesives shall have a VOC content of 70 g/L or less.

B. Sealant for Windowsills: Comply with applicable requirements in Section 079200 "Joint Sealants."

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates to receive solid surface material windowsills and conditions under which windowsills will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of windowsills.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Fasten plywood sub-tops to cabinets by screwing through sub-tops into corner blocks of base cabinets. Shim as needed to align subtops in a level plane.

B. Secure countertops to subtops with adhesive according to solid surface material manufacturer's written instructions. Align adjacent surfaces and, using adhesive in color to match countertop, form seams to comply with manufacturer's written instructions. Carefully dress joints smooth, remove surface scratches, and clean entire surface.

C. Install subsills as indicated on Drawings.

D. Secure windowsills to subsills with adhesive according to solid surface material manufacturer's written instructions. Align adjacent surfaces and, using adhesive in color to match windowsill, form seams to comply with manufacturer's written instructions. Carefully dress joints smooth, remove surface scratches, and clean entire surface.

1. Install windowsills level to a tolerance of 1/8 inch in 8 feet, 1/4 inch maximum. Do not exceed 1/64-inch difference between planes of adjacent units.

E. Bond joints with adhesive and draw tight as windowsills are set. Mask areas of windowsills adjacent to joints to prevent adhesive smears.

1. Install metal splines in kerfs in windowsill edges at joints. Fill kerfs with adhesive before inserting splines and remove excess immediately after adjoining units are drawn into position.

F. Apply sealant to gaps at walls; comply with Section 079200 "Joint Sealants."

END OF SECTION

SECTION 12484 - FLOOR MATS AND FRAMES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Recessed frames and floor grids at main entrance door.

1.2 ACTION SUBMITTALS

A. Product Data: Product data for each type of floor grid and frame specified, including manufacturer's specifications and installation instructions

B. Shop Drawings:

   1. Items penetrating floor mats and frames, including door control device.
   2. Divisions between mat sections.
   3. Detail showing layout of grid and frame specified indicating construction relative to materials, direction of traffic, spline locations, profiles, anchors and accessories.

C. Samples: Submit as assembled section of floor grid and frame members with selected tread insert showing each type of color for exposed floor grid, frame and accessories required.

1.3 PERMORMANCE REQUIREMENTS

A. Slip Resistance in accordance with ASTM D-2047-96, coefficient of Friction, minimum 0.60 for accessible routes. Provide certification from manufacturer meeting minimum coefficient of friction when tested in wet conditions

B. Standard Rolling load performance is 500lb/wheel (load applied to a solid 5" x 2" wide polyurethane wheel, 1000 passes without damage).

1.4 QUALITY ASSURANCE

A. Single Source Responsibility: Obtain floor grids and frames from one source of a single manufacturer.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance data in the form of manufacturer's printed instructions for cleaning and maintaining floor grids.

PART 2 - PRODUCTS

2.1 ENTRANCE FLOOR MATS AND FRAMES, GENERAL

A. Regulatory Requirements: Comply with applicable provisions in [**the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines for Buildings and Facilities**] [**and**] [**ICC A117.1**] <**Insert regulation**>.

2.2 STAINLESS STEEL GRIDS

A. Basis-of-Design Product: Subject to compliance with requirements, provide construction specialities gridline G6 or a comparable product by one of the following:
1. American Mat & Rubber Company.
2. Babcock-Davis
3. Balco, Inc.
4. Pawling Corporation; Architectural Products Division.

B. Materials: Stainless Steel – Type 304 Stainless Steel for surface wires and support bars..

C. Floor Grids: 5/8” maximum depths, wire to be .090 x .150” electronically welded and spaced .145 apart.

2.3 FRAMES

A. Recessed Frames: ASTM B 221 (ASTM B 221M). Manufacturer's standard extrusion.

1. Color: As selected by Architect from full range of industry colors and color densities.

2. Stainless Steel angle frame with drain pan shall be Type 304 stainless steel with 1/8” exposed surface at grid perimeter. Support structure to be comprised of adjustable height – aluminum support feet and legs no more than 24” o.c. Maximum overall depth of grid and framing system to be no more than 7” deep.

2.4 FABRICATION

A. Floor Mats: Shop fabricate units to greatest extent possible in sizes indicated. Unless otherwise indicated, provide single unit for each mat installation; do not exceed manufacturer's recommended maximum sizes for units that are removed for maintenance and cleaning. Where joints in mats are necessary, space symmetrically and away from normal traffic lanes. Miter corner joints in framing elements with hairline joints or provide prefabricated corner units without joints.

B. Field Measurements: Check actual openings for grids by accurate field measurements before fabrication. Record actual measurements on final shop drawings. Coordinate fabrication schedule with construction progress to avoid delay in work.

C. Coordinate frame installation with concrete construction to ensure recess and frame anchorage are accurate and that the base is level and flat. Defer frame installation until building enclosure is complete and related interior finish work is in progress.

D. Coat concealed surfaces of aluminum frames that contact cementitious material with manufacturer's standard protective coating.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install recessed mat frames to comply with manufacturer's written instructions. Set mat tops at height recommended by manufacturer for most effective cleaning action; coordinate tops of mat surfaces with bottoms of doors that swing across mats to provide clearance between door and mat.

B. Install surface-type units to comply with manufacturer's written instructions at locations indicated; coordinate with entrance locations and traffic patterns.

3.2 PROTECTION

A. After completing frame installation and concrete work, provide temporary filler of plywood or fiberboard in recesses and cover frames with plywood protective flooring. Maintain protection until construction traffic has ended and Project is near Substantial Completion.

END OF SECTION 12484

SECTION 12931 - BIKE RACKS

PART I - GENERAL

1.1 Summary

A. This section includes:

1. Bicycle Rack

1.2 Quality Assurance

A. Installer Qualifications: An experienced installer who has completed installation of bicycle racks similar in material, design, and extent to that indicated for this project and whose work has resulted in construction with a record of successful in-service performance.
B. Manufacturer Qualifications: A firm experienced in manufacturing bicycle racks similar to those required for this project and with a record of successful in-service performance.
C. Source Limitations: Obtain each color, finish, shape and type of bicycle rack from a single source with resources to provide components of consistent quality in appearance and physical properties.
D. Product Options: Drawings indicate size, shape and dimensional requirements of bicycle racks and are based on the specific system indicated.

1.3 Submittals

A. Product Data: Include physical characteristics such as shape, dimensions, bicycle parking capacity and finish for each bicycle rack.
B. Shop Drawings: Show installation details for each bicycle rack.
C. Samples: Submit manufacturer's samples of materials, finishes, and colors.
D. Maintenance Data: For each bicycle rack.
E. Warranty: Manufacturer's standard warranty.

1.4 Delivery, Storage and Handling

A. Upon delivery, before signing for shipment, inspect for any damages and notate on the B.O.L.
B. Store bicycle racks in original undamaged packages and containers until ready for installation
C. Handle bicycle racks with sufficient care to prevent any scratches or damage to the finish.

PART 2 - PRODUCTS

2.1 Manufacturers

A. Acceptable Manufacturers: Bike Hitch by DERO BIKE RACK CO, 42 Northern Stacks Drive, Minneapolis, MN 55421, 1-888-337-6729. Fax: 612-331-2731. Website: www.dero.com
B. Acceptable Manufacturers: Ring Bike Rack by LandscapeForms, 7800 E Michigan Ave, Kalamazoo, MI 49048, 800-430-6209. Website: www.landscapeforms.com
C. Or approved equal.

2.2 Materials

A. 1.5" OD 11 gauge tube.
B. Fabrication: Shop assembled bicycle rack.

2.3 Finishes

A. A 304 grade stainless steel finish, high luster electropolish finish.

2.4 Bike Rack

A. Setbacks

1. Parallel Wall Setback: A minimum of 30" should be left between the wall and the rack. 36" is the recommended setback.
2. Distance Between Racks: 24" is the minimum distance between racks. 36" is recommended.
3. Street Setback: 24" is the minimum distance between the street and the rack. 36" is recommended.
4. 3/8" anchors.
5. Capacity: 2 bicycles.

PART 3 - EXECUTION

3.1 Installation

A. Installation Method: In-ground mount is embedded into concrete base.
B. Install in accordance with manufacturer's instructions at locations indicated on the Drawings.
C. Install level.
D. Anchor securely in place.
E. It is the responsibility of the installer to ensure that all base materials into which the rack will be installed can support the rack and will not be damaged by any required installation procedures.

3.2 Cleaning

A. Clean rack promptly after installation in accordance with manufacturer's instructions.
B. Do not use harsh cleaning materials or methods that could damage finish.

3.3 Protection

A. Protect installed racks to ensure that, except for normal weathering, racks will be without damage or deterioration at time of Substantial Completion.

END OF SECTION 12931

DIVISION 13

SECTION 13085 – SOUND ISOLATION

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Sound isolation clips installed with drywall furring channels for support of gypsum board for noise control (de-coupling) in walls and ceilings.

1.2 RELATED SECTIONS

A. Section 05400 – Cold-Formed Metal Framing

B. Section 07210 – Building Insulation

C. Section 07920 – Joint Sealants

D. Section 09111 – Non-Load-Bearing Wall Framing

E. Section 09250 – Gypsum Board

F. Section 09260 – Gypsum Board Assemblies

1.3 REFERENCES

A. AISI Specifications for Design of Cold-Formed Steel Structural Members

B. ASTM B 633 – Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel

C. ASTM C 645 – Standard Specification for Nonstructural Steel Framing Members

D. ASTM C 754 – Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products

E. ASTM C 840 – Standard Specification for Application and Finishing of Gypsum Board

F. ASTM C 1002 – Standard Specification for Steel-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs

G. ASTM D 412 – Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers – Tension

H. ASTM D 573 – Standard Test Method for Rubber-Deterioration in an Air Oven

I. ASTM D 2000 – Standard Classification System for Rubber Products in Automotive Applications

J. ASTM D 2240 – Standard Test Method for Rubber Property – Durometer Hardness

K. UL Fire Resistance Directory

1.4 DESIGN REQUIREMENTS

A. Dead or Shear Load: Maximum design load of 36 pounds per each resilient sound isolation clip

B. Conform to UL Fire Resistance Directory design assemblies, where required

1.5 SUBMITTALS

A. Comply with Section 01330 – Submittal Procedures

B. Product Data: Submit manufacturer's product data and installation instructions
   1. Sound isolation clips
   2. Drywall furring channels

C. Samples: Submit manufacturer's samples
   1. Sound isolation clips
   2. Drywall furring channels

D. Warranty: Submit manufacturer's standard warranty for resilient sound isolation clips

1.6 DELIVERY, STORAGE AND HANDLING

A. Delivery: Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly identifying product name and manufacturer

B. Storage: Store materials in clean, dry area indoors in accordance with manufacturer's instructions

C. Handling: Protect materials during handling and installation to prevent damage

PART 2 - PRODUCTS

2.1 SOUND ISOLATION

A. Sound Isolation Clips Basis of Design: Sound Isolation Clip (ARSIC-1)
   1. Acoustical Solutions, Inc
   2. Rubber Isolator:
      a. Natural organic rubber compound, blended with fire-inhibiting compounds
      b. Molded to isolate ferrule from clip
      c. Minimum of 12 micro-vibration controlling pedestals at point of contact with framing member
      d. Manufactured to ASTM D 2000, M2 AA 510 A13, which includes:
         1) Hardness, ASTM D 2240, Shore A: 47
         2) Modulus 300 Percent, ASTM D 412, Die C: 5.3 MPa
         3) Tensile Strength, ASTM D 412, Die C : 11.2 MPa
         4) Elongation at Break, ASTM D 573: 454 percent
   3. Clip: Galvanized or aluminum-zinc coated steel, 16 gauge
   4. Ferrule: Zinc-electroplated steel

5. Projection: 1-5/8 inches from supporting structure, when 7/8-inch drywall furring channels are used

B. Drywall Furring Channels (Hat Track):
   1. Material: Cold-formed galvanized steel
   2. Conformance:
      a. AISI Specifications for Design of Cold-Formed Steel Structural Members
      b. ASTM C 645
      c. ASTM C 754
   3. Designation: Steel Stud Manufacturers Association (SSMA) Code 087F125-18 (22 gauge)
      a. Size: 0.0179 inch (0.53mm) thick, 7/8 inch (22.2 mm) height, 2-11/16 inches (68 mm) width
      b. Hemmed edge detail
   4. Designation: Steel Stud Manufacturers Association (SSMA) Code 087F125-27 (22 gauge)
      a. Size: 0.0269 inch (0.68 mm) thick, 7/8 inch (22.2 mm) height, 2-11/16 inches (68 mm) width
      b. Hemmed edge detail

C. Mechanical Fasteners:
   1. Type: Self-drilling, self-tapping screws. Steel, ASTM C 1002. Galvanized coating, plated, or oil-phosphate coated, ASTM B 633, as needed for required corrosion resistance
   2. Sound Isolation Clip Connections:
      a. To Wood Framing Members: Screws 2-1/2 inches (63mm) minimum length, #8 minimum shank, Type W (course thread), bugle-or hex-head screws of equal or greater size.
         1) Minimum Pullout and Shear: 108 pounds
      b. To Steel Framing Members (Less than Gauge): Screws 1-1/2 inches (38 mm) minimum length; #8 minimum shank; Type S (fine thread); bugle-, wafer-, or hex head screws of equal or greater size
         1) Minimum Pullout and Shear: 108 pounds
      c. To Steel Framing Members (20 Gauge through 12 Gauge): Screws 1-1/2 inches (38 mm) minimum length; #8 minimum shank; Type S (fine thread); self-drilling tip; bugle-, wafer-, or hex-head screws or equal or greater size
         1) Minimum Pullout and Shear: 108 pounds
      d. To Concrete: Anchors 1-3/4 inches (44mm) minimum length, 3/16-inch to ¼-inch diameter. Mushroom head or screw-in type anchor in accordance with fastener manufacturer's instructions. Powers Fasteners or approved equal
         1) Minimum Pullout and Shear: 108 pounds
      e. To Concrete Masonry Units: Anchors 2-1/4 inches (57 mm) minimum length, ¼ inch diameter. Designed for use in concrete masonry units in accordance with fastener manufacturer's instructions. Power Fasteners or approved equal
         1) Minimum Pullout and Shear: 108 pounds
   3. Drywall Furring Channel Lap Joint Connection, Steel to Steel: Framing screws, button head, 7/16 inch (11 mm) minimum length, #6 minimum shank, needle point, Phillips drive or greater, or double-wire tie with 18 gauge tie wire.

D. Tie Wire: 18 gauge, annealed, galvanized steel

E. Acoustical Sealant: Sound Sealant a flexible, non-hardening caulk

F. Fire/Smoke Sealant: Flexible, non-hardening. Classified as an acoustical sealant. As specified in Section 07920

G. Putty Pad Sealant: Control noise transmission and fire resistance at electrical boxes and other penetrations

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas to receive materials. Notify Architect if areas are not acceptable. Do not begin installation until unacceptable conditions have been corrected.

3.2 INSTALLATION – GENERAL

A. Install sound isolation clips and drywall furring channels in accordance with manufacturer's instructions

B. Mechanically fasten resilient sound isolation clips to structure with screws, bolts, or expansion anchors, dependent upon structure

C. Fire-Resistive Design Assemblies:
1. Install as specified in UL Fire Resistance Directory, where required
2. Do not arbitrarily add resilient sound isolation clips to fire-rated assemblies

D. Space sound isolation clips at maximum of 24 inches (600 mm) by 48 inches (1,200 mm) or center for walls and ceilings

E. Do not exceed design load (pull and shear) of 36 pounds per isolation clip

F. Stagger isolation clip installation, so dead load is supported by all support members

G. Splicing Drywall Furring Channels:
1. Splice drywall-furring channels with minimum of 6-inch (150-mm) laps
2. Secure laps with 2 framing screws or 18-gauge tie wire double wrapped
3. Locate splices between resilient sound isolation clips
4. Do not locate splices on resilient sound isolation clips

H. Install sound isolation clips on 1 side of wall assembly, unless otherwise indicated on the drawings.

I. Flanking Noise:
1. Review installation details to prevent structure-borne flanking noise
2. Do not allow drywall furring channels or gypsum board to contact foreign materials, including floors, ceilings, or wall framing members

J. Ensure metal ferrule of resilient sound isolation clips is in firm contact with structural member

K. Gypsum Board:
1. Install gypsum board in vertical or horizontal position with 1/8-inch (3-mm) to ¼-inch (6-mm) gap around perimeter for acoustical sealant application
2. Install gypsum board in accordance with ASTM C 840 as specified in Section 09250

L. Acoustical Sealant:

1. Seal potential air leaks with Sound Sealant acoustical caulk to achieve best Field Sound Transmission Class (FSTC)
2. Seal electrical outlets and penetrations with Sound Sealant acoustical caulk
3. Apply fire-rated acoustical sealant at locations where fire-rated assembly is required

M. Putty Pad Sealant: Acoustically seal with putty pads, electrical boxes in walls and ceilings in which resilient sound isolation clips are used

3.3 INSTALLATION – WALLS

A. Install drywall-furring channels perpendicular to framing members

B. Space drywall furring channels maximum of 24 inches (600mm) on center

C. Locate first drywall furring channel parallel to floor and maximum of 3 inches (75 mm) above floor and 1 drywall furring channel maximum of 6 inches (150 mm) from ceiling

3.4 INSTALLATION – CEILINGS

A. Install drywall-furring channels perpendicular, parallel, or angular to framing members

B. Space drywall furring channels:
   1. Maximum of 24 inches (600mm) on center with:
      a. Single layer of 5/8-inch (16-mm) gypsum board
      b. Double layer of 5/8-inch (16-mm) gypsum board, weighing less than 2.25 pounds per square foot per layer
      c. Single layer of ½-inch (12-mm) high-strength gypsum board
      d. Double layer of ½-inch (12-mm) high-strength gypsum board
   2. Maximum of 16 inches (400 mm) on center with:
      a. Double layer of 5/8-inch (16 mm) gypsum board
      b. Single layer of ½-inch (12-mm) regular-strength gypsum board
      c. Double layer of ½-inch (12-mm) regular-strength gypsum board
   3. Reduce spacing of drywall furring channels to prevent potential for sagging of gypsum board or when additional loads are supported by sound isolation clips

C. Locate sound isolation clips maximum of 8 inches (200mm) from ends of drywall furring channels

D. Locate drywall furring channels maximum of 3 inches (75 mm) from parallel wall assemblies

END OF SECTION 13085

DIVISION 14

SECTION 14210 - ELECTRIC TRACTION ELEVATORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes electric traction passenger elevator located at 1st floor entrance and 2nd floor corridor.

1.3 DEFINITIONS

A. Definitions in ASME A17.1 apply to work of this Section.

B. Defective Elevator Work: Operation or control system failure, including excessive malfunctions; performances below specified ratings; excessive wear; unusual deterioration or aging of materials or finishes; unsafe conditions; need for excessive maintenance; abnormal noise or vibration; and similar unusual, unexpected, and unsatisfactory conditions.

1.4 ACTION SUBMITTALS

A. Product Data: Include capacities, sizes, performances, operations, safety features, finishes, and similar information. Include product data for the following:

1. Car enclosures and hoistway entrances.

2. Operation, control, and signal systems.

B. Shop Drawings: Show plans, elevations, sections, and large-scale details indicating service at each landing, machine room layout, coordination with building structure, relationships with other construction, and locations of equipment and signals. Include large-scale layout of car control station and standby power operation control panel. Indicate variations from specified requirements,maximum dynamic and static loads imposed on building structure at points of support, and maximum and average power demands.

1.5 INFORMATIONAL SUBMITTALS

A. Manufacturer Certificates: Signed by elevator manufacturer certifying that hoistway, pit, and machine room layout and dimensions, as shown on Drawings, and electrical service, as shown aAnd specified, are adequate for elevator system being provided.

B. Coordination Drawings: For traction elevators.

1. Indicate modifications to structural and architectural drawings necessitated by use of manufacturer model other than basis of design model specified.

2. Indicate locations of elevator equipment and connections to utilities and building structure.

3. Include plans and elevations; clearance requirements for equipment access and maintenance; details of equipment supports; and utility service characteristics.

4. Show location of elevator pit components, including pit lights, ladders, power locations, sump pumps, sump and grate.

5. Show location of shaft components, including elevator-related miscellaneous steel components, sprinkler heads, smoke and heat detectors, and fastening to other construction.

6. Show location of elevator machine room components, including elevator equipment, smoke and heat detectors, sprinkler heads, lights, power locations, clearances, door and door swing, louvers, and HVAC diffusers.

C. Qualification Data: For Installer.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For elevators to include in emergency, operation, and maintenance manuals.

1. In addition to items specified in Division 01 Section "Operation and Maintenance Data," include diagnostic and repair information available to manufacturer's and Installer's maintenance personnel.

B. Inspection and Acceptance Certificates and Operating Permits: As required by authorities having jurisdiction for normal, unrestricted elevator use.

1.7 QUALITY ASSURANCE

A. Installer Qualifications: Elevator manufacturer or manufacturer's authorized representative who is trained and approved for installation of units required for this Project.

B. Source Limitations: Obtain elevators through one source from a single manufacturer.

1. Provide major elevator components, including pump-and-tank units, plunger-cylinder assemblies, controllers, signal fixtures, door operators, car frames, cabs, and entrances, manufactured by single manufacturer responsible for providing warranty.

C. Regulatory Requirements: Comply with ASME A17.1 and elevator design requirements for earthquake loads in ASCE 7.

D. Accessibility Requirements: Comply with Section 4.10 in the U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA), Accessibility Guidelines for Buildings and Facilities (ADAAG)," and NCSBC.

E. Fire-Rated Hoistway Entrance Assemblies: Door and frame assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated, based on testing at as close to neutral pressure as possible according to UL 10B.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle materials, components and equipment in manufacturer's protective packaging.

B. Store materials, components, and equipment off of ground, under cover, and in a dry location. Handle according to manufacturer's written recommendations to prevent damage, deterioration, or soiling.

C. If the construction site is not prepared to receive the elevator equipment at the agreed ship date, the General Contractor shall be responsible to provide a safe, dry, and easily accessible storage area on or off the premises. Additional labor costs for double handling will be the responsibility of the general contractor.

1.9 COORDINATION

A. Coordinate installation of sleeves, block outs, and items that are embedded in concrete or masonry for elevator equipment. Furnish templates and installation instructions and deliver to Project site in time for installation.

B. Coordinate sequence of elevator installation with other work to avoid delaying the Work.

C. Coordinate locations and dimensions of other work relating to hydraulic elevators including pit ladders, sumps, and floor drains in pits; entrance subsills; and electrical service, electrical outlets, lights, and switches in pits and machine rooms.

1.10 MAINTENANCE SERVICE

A. Initial Maintenance Service: Beginning at Substantial Completion, provide one year's full maintenance service by skilled employees of elevator Installer. Include monthly preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper elevator operation at rated speed and capacity. Provide parts and supplies same as those used in the manufacture and installation of original equipment.

1. Perform maintenance, including emergency callback service, during normal working hours.

1.11 WARRANTY

A. Manufacturer's Special Warranty: Manufacturer agrees to repair, restore, or replace elevator work that fails in materials or workmanship within specified warranty period.

1. Warranty Period: One year from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide KONE MonoSpace 300 gearless traction elevator 3500 lbs./150 fpm speed, stretcher accommodation, elevator, sized as indicated, or a comparable product of one of the following:

1. Otis.

2. Thyssen Krup.

3. Schindler.

B. Project design is based upon basis of design unit. Modifications to design required by use of other than basis of design shall be prepared by Contractor and submitted to Architect for review.

2.02 EQUIPMENT: CONTROL COMPONENTS AND CONTROL SPACE

A. Controller: Provide microcomputer based control system to perform all of the functions.
1. All high voltage (110V or above) contact points inside the controller cabinet shall be protected from accidental contact in a situation where the controller doors are open.
2. Controller shall be separated into two distinct halves; Motor Drive side and Control side. High voltage motor power conductors shall be routed and physically segregated from the rest of the controller.
3. Provide a serial cardrack and main CPU board containing a non-erasable EPROM and operating system firmware.
4. Variable field parameters and adjustments shall be contained in a non-volatile memory module.

B. Drive: Provide Variable Voltage Variable Frequency AC drive system to develop high starting torque with low starting current.

C. Controller Location: Locate controller{s} in remote closet to the entrance frame at the top landing of the elevator.

2.03 EQUIPMENT: HOISTWAY COMPONENTS

A. Machine: AC gearless machine, with permanent magnet synchronous motor, direct current electro-mechanical disc brakes and integral traction drive sheave, mounted to the car guide rail at the top of the hoistway.

B. Governor: Friction type over-speed governor rated for the duty of the elevator specified.

C. Buffers, Car and Counterweight: Polyurethane buffer.

D. Hoistway Operating Devices:
1. Emergency stop switch in the pit
2. Terminal stopping switches.
3. Emergency stop switch on the machine

E. Positioning System: System consisting of magnets and proximity switches.

F. Guide Rails and Attachments: Steel rails with brackets and fasteners.

2.04 EQUIPMENT: HOISTWAY ENTRANCES

A. Hoistway Entrances
1. Sills: extruded.
2. Doors: Hollow metal construction with vertical internal channel reinforcements.
3. Fire Rating: Entrance and doors shall be UL fire-rated for 1-1/2 hour.
4. Entrance Finish: Brushed Stainless Steel.
5. Entrance Markings Jamb Plates: Provide standard entrance jamb tactile markings on both jambs, at all floors. Plate Mounting: Refer to manufacturer drawings.

2.05 EQUIPMENT: CAR COMPONENTS

A. Car Frame: Provide car frame with adequate bracing to support the platform and car enclosure.

B. Platform: Platform shall be all steel construction.

C. Car Guides: Provide guide-shoes mounted to top and bottom of both car and counterweight frame. Each guide-shoe assembly shall be arranged to maintain constant contact on the rail surfaces. Provide retainers in areas with Seismic design requirements.

D. Steel Cab
   1. Car Wall Finish: Brushed stainless steel.
   2. Car Front Finish: Brushed stainless steel.
   3. Car Door Finish: Brushed stainless steel.
   4. Ceiling:
      a. Rectangular, LED Spot Lights (CL94) Brushed Stainless Steel and Brushed Aluminum frame.
   5. Handrail:
      a. Round, Straight ends tube brushed aluminum - 1.5 in.. Rails to be located on Back Wall of car enclosure.

   6. Flooring: By others. (Not to exceed 2sqft & 1/2" finished depth.)
   7. Threshold: Aluminum

E. Emergency Car Signals
   1. Emergency Siren: Siren mounted on top of cab that is activated when the alarm button in the car operating panel is engaged. Siren shall have rated sound pressure level of 80 dB(A) at a distance of three feet from device. Siren shall respond with a delay of not more than one second after activation of alarm button.
   2. Emergency Car Lighting: Provide emergency power unit employing a 12-volt sealed rechargeable battery and totally static circuits shall illuminate the elevator car and provide current to the alarm bell in the event of building power failure.
   3. Emergency Exit Contact: An electrical contact shall be provided on the car-top exit.

F. Ventilation: No fan.

2.06 EQUIPMENT: SIGNAL DEVICES AND FIXTURES

A. Car Operating Panel: Provide car operating panel with all push buttons, key switches, and message indicators for elevator operation.
   1. Full height car operating panel shall contain a bank of round, mechanical, illuminated buttons marked to correspond to landings served, emergency call button, door open button, door close button, and key switches for lights, inspection, and exhaust fan. Buttons have amber illumination (halo). All buttons to have raised text and Braille marking on left hand side. The car operating display panel shall be amber 7 Segment. All texts, when illuminated, shall be amber. The full height car operating panel shall have a polycarbonate face plate that is shatterproof and impact resistant in a color and pattern per manufacturers standard selection.
   2. Additional features of car operating panel shall include:
      a. Car Position Indicator within operating panel (amber).
      b. Elevator Data Plate marked with elevator capacity and car number on car top.
      c. Help buttons with raised markings.
      d. In car stop switch per local code.
      e. Firefighter's hat.

f. Firefighter's Phase II Key-switch.
g. Call Cancel Button.
h. Pre-programmed integrated ADA phone (complete description of krms features included as standard)
i. Help Button/Communicator. Activation of help button will initiate two-way communication between car and a location inside the building, switching over to alternate location if call is unanswered, where personnel are available to take the appropriate action. Visual indicators are provided for call initiation and call acknowledgement.
j. Firefighter's Phase II emergency in-car operating instructions.

B. Hall Fixtures: Wall mounted hall fixtures shall be provided with necessary push buttons and key switches for elevator operation. Wall mounted hall fixtures shall have a polycarbonate face plate that is shatterproof and impact resistant in a color per manufacturers standard selection.
1. Hall fixtures shall feature round, mechanical, illuminated buttons in raised fixture housings. Hall fixtures shall correspond to options available from that landing. Buttons shall be flat flush in vertically mounted fixture. Hall fixtures should not be jamb-mounted. Hall lanterns shall feature amber illumination.

C. Car Lantern and Chime: A directional lantern visible from the corridor shall be provided in the car entrance. When the car stops and the doors are opening, the lantern shall indicate the direction in which the car is to travel and a chime will sound. The chime will sound once for up and twice for down.

2.07 EQUIPMENT: ELEVATOR OPERATION AND CONTROLLER

A. Elevator Operation
1. Simplex Collective Operation: Using a microprocessor-based controller, operation shall be automatic by means of the car and hall buttons. If all calls in the system have been answered, the car shall park at the last landing served.
2. Zoned Car Parking.
3. Relative System Response Dispatching.

B. Standard Operating Features to include:
1. Full Collective Operation
2. Fan and Light Control.
3. Load Weighing Bypass.
4. Ascending Car Uncontrolled Movement Protection
5. Top of Car Inspection Station.

C. Additional Operating Features to include:

D. Elevator Control System for Inspections and Emergency
1. Provide devices within controller to run the elevator in inspection operation.
2. Provide devices on car top to run the elevator in inspection operation.
3. Provide within controller an emergency stop switch to disconnect power from the brake and prevents motor from running.
4. Provide the means from the controller to mechanically lift and control the elevator brake to safely bring car to nearest available landing when power is interrupted.
5. Provide the means from the controller to reset the governor over speed switch and also trip the governor.
6. Provide the means from the controller to reset the emergency brake when set because of an unintended car movement or ascending car over speed.
7. Provide the means for the control to reset elevator earthquake operation.

2.08 EQUIPMENT: DOOR OPERATOR AND CONTROL

A. Door Operator: A closed loop permanent magnet VVVF high-performance door operator shall be provided to open and close the car and hoistway doors simultaneously. Door movement shall be cushioned at both limits of travel. Electro-mechanical interlock shall be provided at each hoistway entrance to prevent operation of the elevator unless all doors are closed and locked. An electric contact shall be provided on the car at each car entrance to prevent the operation of the elevator unless the car door is closed.

B. The door operator shall be arranged so that, in case of interruption or failure of electric power, the doors can be readily opened by hand from within the car, in accordance with applicable code. Emergency devices and keys for opening doors from the landing shall be provided as required by local code.

C. Doors shall open automatically when the car has arrived at or is leveling at the respective landings. Doors shall close after a predetermined time interval or immediately upon pressing of a car button. A door open button shall be provided in the car. Momentary pressing of this button shall reopen the doors and reset the time interval.

D. Door hangers and tracks shall be provided for each car and hoistway door. Tracks shall be contoured to match the hanger sheaves. The hangers shall be designed for power operation with provisions for vertical and lateral adjustment. Hanger sheaves shall have polyurethane tires and pre-lubricated sealed-for-life bearings.

E. Electronic Door Safety Device. The elevator car shall be equipped with an electronic protective device extending the full height of the car. When activated, this sensor shall prevent the doors from closing or cause them to stop and reopen if they are in the process of closing. The doors shall remain open as long as the flow of traffic continues and shall close shortly after the last person passes through the door opening.

PART 3 EXECUTION

3.01 EXAMINATION

A. Field measure and examine substrates, supports, and other conditions under which elevator work is to be performed.

B. Do not proceed with work until unsatisfactory conditions are corrected.

C. Prior to start of Work, verify hoistway is in accordance with shop drawings. Dimensional tolerance of hoistway from shop drawings: -0 inches +2 inches. Do not begin work of this section until dimensions are within tolerances.

D. Prior to start of Work, verify projections greater then 2 inches (4 inches if ASME A17.1/CSA B44 2000 applies) must be beveled not less then 75 degrees from horizontal.

E. Prior to start of Work, verify landings have been prepared for entrance sill installation. Traditional sill angle or concrete sill support shall not be required.

F. Prior to start of Work, verify elevator pit has been constructed in accordance with requirements, is dry and reinforced to sustain vertical forces, as indicated in approved submittal. Verify that sumps or sump pumps located within pit will not interfere with installed elevator equipment.

G. Prior to start of Work, verify control space has been constructed in accordance with requirements, with access coordinated with elevator shop drawings, including Sleeves and penetrations.

H. Verify installation of GFCI protected 20-amp in pit and adjacent to each signal control cabinet in control space.

3.02 PREPARATION

A. Coordinate installation of anchors, bearing plates, brackets and other related accessories.

3.03 INSTALLATION

A. Install equipment, guides, controls, car and accessories in accordance with manufacturer installation methods and recommended practices.

B. Properly locate guide rails and related supports at locations in accordance with manufacturer's recommendations and approved shop drawings. Anchor to building structure using isolation system to minimize transmission of vibration to structure.

C. All hoistway frames shall be securely fastened to fixing angles mounted in the hoistway. Coordinate installation of sills and frames with other trades.

D. Lubricate operating system components in accordance with manufacturer recommendations.

E. Perform final adjustments, and necessary service prior to substantial completion.

3.04 CONSTRUCTION

A. Interface with Other Work:
   1. Guide rail brackets attached to steel shall be installed prior to application of fireproofing.
   2. Coordinate construction of entrance walls with installation of door frames and sills. Maintain front wall opening until elevator equipment has been installed.
      a. Ensure adequate support for entrance attachment points at all landings.
      b. Coordinate wall openings for hall push buttons, signal fixtures and sleeves. Each elevator requires sleeves within the hoistway wall.
      c. Coordinate emergency power transfer switch and power change pending signals as required for termination at the primary elevator signal control cabinet in each group.
      d. Coordinate interface of elevators and fire alarm system.
      e. Coordinate interface of dedicated telephone line.

3.05 TESTING AND INSPECTIONS

A. Perform recommended and required testing in accordance with authority having jurisdiction.

B. Obtain required permits and provide originals to Owner's Representative.

3.06 DEMONSTRATION

A. Prior to substantial completion, instruct Owner's Representative on the proper function and required daily maintenance of elevators. Instruct personnel on emergency procedures.

END OF SECTION

DIVISION 15

SECTION 15000 - GENERAL MECHANICAL REQUIREMENTS

PART 1 - GENERAL

1.1 SCOPE

A. This section as well as the Drawing and General Provisions of the Contract, including General and Supplementary Conditions and Division 1 – General Sections included in Division 15 Specifications are for mechanical and related work particular to Young Women's Christian Association (YWCA) Facility at 601-605 South Jefferson Davis Parkway New Orleans, Louisiana. Coordinate with plans and other specifications sections.

1.2 RELATED DOCUMENTS

A. SECTION 15000 - MECHANICAL GENERAL REQUIREMENTS
SECTION 15050 – MECHANICAL BASIC MATERIALS AND METHODS
SECTION 15055 – MOTORS
SECTION 15057 – ENCLOSED CONTROLLERS
SECTION 15060 - HANGERS AND SUPPORTS FOR MECHANICAL EQUIPMENT AND PIPING
SECTION 15071 - MECHANICAL VIBRATIONS AND SEISMIC CONTROLS
SECTION 15075 – MECHANICAL IDENTIFICATION
SECTION 15083 – MECHANICAL PIPE INSULATION
SECTION 15091 – SLEEVES AND SLEEVE SEALS FOR HVAC PIPING
SECTION 15122 – METERS AND GAUGES FOR HVAC PIPING
SECTION 15183 - REFRIGERANT PIPING
SECTION 15732 – ROOFTOP AIR CONDITIONERS
SECTION 15738 - SPLIT SYSTEM AIR CONDITIONING UNITS
SECTION 15740 – 100% OUTSIDE AIR PACKAGED ROOFTOP UNITS
SECTION 15800 – HVAC FUNCTIONAL CHECK OUT
SECTION 15815 - METAL DUCT
SECTION 15829 - DUCT ACCESSORIES
SECTION 15830- DUCT INSULATION
SECTION 15855 - DIFFUSERS, REGISTERS AND GRILLES
SECTION 15870 – COMMERCIAL KITCHEN HOODS
SECTION 15923 – DIRECT DIGITAL CONTROLS
SECTION 15990 – TESTING, ADJUSTING AND BALANCING

1.3 WORK INCLUDED

A. The work covered by this Division of the Specifications consists of furnishing all plant, labor, equipment, supervision, appliances, and materials, and in performing all operations in connection with the plumbing, fire protection, air conditioning, heating and ventilating systems complete and in strict accordance with this Division of the Specifications and the applicable drawings.

1.4 COORDINATION OF WORK

A. General: Refer to the Division 1 sections for general coordination requirements applicable to the entire work. It is recognized that the contract documents are diagrammatic in showing certain physical relationships which must be established within the mechanical work, and in its interface with other work, including electrical work, and that such establishment is the exclusive responsibility of the Contractor.

B. Advise other trades of openings required in their work for the subsequent move-in of large equipment.

C. Submit coordination drawings prior to purchase-fabrication-installation of any of the elements involved in the coordination.

D. Verify final locations for rough-ins with field measurements and with the requirements of the actual equipment to be connected.

E. Verify all dimensions by field measurements.

F. Arrange for chases, slots, and openings in other building components to allow for installation.

G. Coordinate the installation of required supporting devices and sleeves to be set in poured-in-place concrete and other structural components, as they are constructed.

H. Sequence, coordinate, and integrate installations of materials and equipment for efficient flow of the work. Give particular attention to large equipment requiring positioning prior to closing-in the installation areas.

I. Coordinate the cutting and patching of building components to accommodate the installation of equipment and materials. Comply with Division I.

J. Install equipment to facilitate maintenance and repair or replacement of equipment components. As much as practical, connect equipment for ease of disconnecting, with minimum of interference with other installations.

K. Coordinate the installation of materials and equipment above ceilings with suspension system, mechanical equipment and systems, and structural components.

L. Contractor shall visit the site before bidding to familiarize himself with conditions under which he will have to perform his Contract.

1.5 EXISTING CONDITIONS

A. The utilities and information shown on the drawings are based on information provided to the designers by the architect or utility company. Contractor shall field verify existing conditions and notify architect in writing of any discrepancies prior to commencing with new work.

B. All existing piping and materials not to be reused and becoming surplus or abandoned shall be removed from the premises and shall be property of the Contractor, unless otherwise noted

1.6 INTERRUPTION OF SERVICES

A. All work shall be accomplished at a time most convenient to the owner and so that the interruption of service (water, gas, heating, and air conditioning) shall be minimum and only for changeover.

B. No service shall be interrupted or changeover begun until the time and duration of service interruption have been agreed to, in writing, signed by the Owner's Representative, the Architect, and the Contractor.

C. Temporary connections, or temporary rerouting to serve existing facilities will be required as the work progresses. Make due allowances in bid.

D. The contractor is responsible for re-connecting all existing mechanical and plumbing systems or items to remain such that they are in the same operable condition as prior to construction. It is the contractor's sole responsibility to trace the existing systems prior to demolition to ensure that all existing systems to remain will remain operable. At no additional cost to the owner, the contractor shall extend existing or new systems to serve those components should any portion of those systems be removed.

1.7 CODES AND STANDARDS

A. Workmanship, material and equipment shall be in accordance with Specifications and Drawings, and in some instances the requirements exceed those required by codes and standards. Where not exceeded, the codes and standards shall be considered as absolute minimum requirements.

1.8 ELECTRICAL WORK

A. Refer to Division 16 for all electrical work as it pertains to work specified in this section.

1.9 WORKMANSHIP

A. Install all materials and components of the work in accordance with instructions of manufacturer following the best modern construction practices and conforming with the Contract Documents. Workmanship shall be first class, in both function and appearance, whether finally concealed or exposed and shall be performed by experienced workmen skilled in the type of work. As practicable, the lines of all exposed components of the system shall be perpendicular or parallel to the lines of the building.

1.10 DRAWINGS

A. Contract Drawings and details are shown to limit and explain structural conditions, requirements, and manner of erecting work. Drawings are intended to convey the scope of work and indicate general arrangements of equipment, ducts and piping and approximate sizes and locations of equipment and outlets. Trades shall follow these drawings in laying out their work, check general construction drawings to familiarize themselves with all conditions affecting their work, and shall verify spaces in which their work will be installed.

B. It may be necessary to shift pipes and/or ducts and this is permissible, and may be required under the general contract, but all such changes must be referred to the Architect for approval. Where rearrangement of piping or equipment is required, contractor shall prepare and submit approval drawings of the proposed arrangement.

C. Where the Contractor is not certain about the method of installation, he shall ask for details. Lack of details, not requested, will not be an excuse for improper installation, and any such work must be corrected.

1.11 SHOP DRAWINGS AND DATA TO BE SUBMITTED

A. Submit adequate engineering data on each piece of equipment to allow a careful check of compliance with the technical requirements of the Contract documents. Clearly indicate on submitted data the manufacturer's name, piece number, equipment capacity, and other applicable technical data. Refer to individual sections for specific requirements.

B. Corrections or comments made on shop drawings during the review do not relieve the Contractor from compliance with requirements of the Contract Documents, Plans and Specifications. Shop Drawings will be checked for general conformance with the design concept of the project and general compliance with information given in the contract documents. Review of Shop Drawings shall not relieve the Contractor from responsibility for confirming and correlating all quantities and dimensions, coordinating work with that of all other trades, and performing work in a safe and satisfactory manner. Review of shop drawings shall not permit any deviation from Plans and Specifications. Shop Drawings must be accompanied by signed statement from contractor, stating that he has reviewed the submittal and checked it for compliance.

C. Shop Drawings: Submit 1/4 inch minimum scale coordinated shop drawings relating to the duct systems, showing clearances and relationship to structural members, piping, lights and ceilings. Shop drawings for all ductwork must be submitted and reviewed before any ductwork is constructed or installed.

D. Submit a 1/4" scale layout of each mechanical room showing the location, arrangement, etc. of all such equipment to be installed in this room.

E. Contractor shall provide products as specified if submittals for review of materials are not received within thirty (30) days after award of the Contract.

F. Any item not specified herein but submitted as a substitute for the specified item shall be accompanied by manufacturer’s documentation starting/illustrating the following

applicable information in addition to the specific information requested in other sections.

1. Dimensions/weight.
2. Electrical ratings-voltage, amperage, short circuit capability, etc.
3. Construction - gauge of steel/aluminum, paint finish/application method, color, NEMA type, etc.
4. Warranty.

1.12 INSTRUCTIONS

A. Contractor shall provide formal training sessions for all mechanical systems. Training shall be provided by competent instructors who will give full instruction to designated personnel in the adjustment, operation, and maintenance, including pertinent safety requirements of the equipment or system specified. Instruction shall be given during the first regular work week after the equipment or system has been accepted and turned over to the Owner for regular operation. The length of training session(s) shall be as long as required to review the mechanical systems to the owner's satisfaction with the exception of systems with specified training requirements. There is no limit to the number of attendees on behalf of the owner.

B. Training sessions shall be coordinated to provide the owner with sequential training of all mechanical systems and equipment. Impromptu training without proper documentation is not acceptable as formal training.

C. The contractor is solely responsible for initiating, coordinating, and documenting owner training sessions. The contractor shall:
   1. Schedule the training session with the owner's representative in writing, allowing sufficient time for the owner to notify the necessary attendees.
   2. Provide a written agenda outlining the systems to be addressed in a given session.
   3. Provide a sign in sheet and minutes of the training session.
   4. Distribute the above documentation to the owner and architect as proof of completing formal training.

1.13 OPERATING AND MAINTENANCE MANUALS

A. Bind in loose-leaf binders with the words, "Operating and Maintenance Manual" and the project identification imprinted on the cover. Prepare three complete sets of records for the Owner, with table of contents, index, and tabbed section dividers.

B. During the construction period, accumulate the following for inclusion in the Operating and Maintenance Manuals:

C. Copies of warranties and guarantees on each piece of equipment installed.
   1. Wiring and control diagrams.
   2. Shop Drawings.
   3. Operating instructions for:
      a. HVAC Systems
      b. Recommended maintenance procedures.

D. Submit the manuals for approval at approximately 75 percent job completion. Each manual shall consist of:
   1. Complete description of each item of equipment and apparatus furnished and installed - including ratings, capacities, and characteristics.
   2. Fully detailed parts list, including all numbered parts of each item of equipment and apparatus furnished and installed.
   3. Manufacturer's printed instructions describing operation, servicing, maintenance and repair of each item of equipment and apparatus.
   4. Provide serial and model numbers for all equipment.

1.14 DELIVERY, STORAGE AND HANDLING

A. Deliver products to project properly identified with names, model numbers, types, grades, compliance labels, and similar information needed for distinct identifications, adequately packaged and protected to prevent damage during shipment, storage, and handling.

B. Store equipment and materials at the site, unless off-site storage is authorized in writing. Protect stored equipment and materials from damage.

C. Coordinate deliveries of materials and equipment to minimize construction site congestion.

1.15 GUARANTEES

A. Contractor shall guarantee all materials, workmanship, and equipment furnished under Division 15 for a period of one (1) year after the date of final acceptance or beneficial use by the Owner, whichever date is the earliest.

PART 2 - PRODUCTS

2.1 AVAILABLE MANUFACTURERS

A. Manufacturer's names and catalog numbers are scheduled or specified for the purpose of establishing standard of design, quality, appearance, performance and serviceability, and not to limit competition. Scheduled products (as may be modified by detailed Specifications) are those selected as the basis for system design with respect to physical size and space arrangements, required capacity and performance characteristics, and the product quality intended.

B. The Drawings indicate specified products physically arranged in the spaces, as catalogued by Specific manufacturers, generally as listed in the equipment schedules.

C. Listed "Acceptable Manufacturers" are those considered capable of manufacturing products conforming to detailed Specifications, and as such, are invited to compete on an equal basis provided the offering is comparable in every respect to scheduled or specified products and actually conforms to the detailed Specifications and schedule

requirements. Listing herein as "acceptable manufacturers" does not imply "accepted," "approved," "prior approval," or any other such connotation.

2.2 DUCT MOUNTED SMOKE DETECTORS

A. Duct detectors shall be provided and installed as required by NFPA 90A and Standard Mechanical Code and in other locations indicated on the plans.

B. Smoke detectors shall be the ionization type provided, installed and commissioned by Division 15 unless specified under Division 15 “Fire Alarm”, in which case the duct detector shall be provided by Division 16 and mounted by Division 15.

C. General: Include the following features:
   1. Operating Voltage: 24-V dc, nominal. Provide transformer if required.
   2. Self-Restoring: Detectors do not require resetting or readjustment after actuation to restore them to normal operation.
   3. Plug-in Arrangement: Detector and associated electronic components are mounted in a module that connects in a tamper-resistant manner to a fixed base with a twist-locking plug connection. Terminals in the fixed base accept building wiring.
   4. Integral Visual-Indicating Light: LED type. Indicates detector has operated.
   5. Sensitivity: Can be tested and adjusted in-place after installation. Relay Fan Shutdown: Rated to interrupt fan motor-control circuit.

2.3 FLAME-SPREAD AND SMOKE DEVELOPED PROPERTIES OF MATERIALS

A. Materials and adhesives used throughout the mechanical and electrical systems for insulation, acoustical lining, filters, ducts, flexible connections, and jackets or coverings regardless of kind, or for piping or conduit system components, shall have a flame-spread rating not over 25 without evidence of continued combustion and with a smoke developed rating not higher than 50. If such materials are to be applied with adhesives, they shall be tested as applied with such adhesives, or the adhesives used shall have a flame-spread rating not over 25 and a smoke developed rating not higher than 50.

B. "Flame-Spread Rating" and "Smoke Developed Rating" shall be as determined by the "Method of Test of Surface Burning Characteristics of Building Materials, NFPA No. 225, ASTM E84, Underwriter's Laboratories, Inc., Standard." Such materials are listed in the Underwriter's Laboratories, Inc. "Building Materials List" under the heading "Hazard Classification (Fire)."

2.4 AUXILIARY STRUCTURAL SUPPORTS

A. Provide auxiliary structural supports as necessary to support mechanical systems from the building structure. Supporting members shall be metal strut framing or standard structural shapes, designed to support imposed loads with a working stress no greater than 25 percent of ultimate stress values of the members, and articulation with the

building structure without exceeding structural limitations at the point of attachment to the building structure.

2.5 SPECIAL TOOLS

A. Furnish a set of special tools and devices required for the proper maintenance of the major pieces of equipment and install on adequate tool board. This shall include only tools which cannot normally be purchased "over-the-counter" at hardware stores.

2.6 EQUIPMENT GUARDS

A. Provide equipment with exposed moving parts with belt guards, coupling guards, fan guards or other enclosures as necessary for personnel safety.

2.7 ACCESS DOORS

A. Furnish, for installation under appropriate section of the work, access doors at each point required to provide access to concealed valves, dampers, damper operators, and other devices requiring operation, adjustment, or maintenance.

B. Shall be 16 gauge steel, with mounting straps, concealed hangers, and screwdriver locks, designed for the doors to open 180 degrees, minimum.

C. Access doors installed in fire walls or partitions shall be U.L. labeled to maintain the fire rating of the wall or partition.

D. Provide prime coat finish for installation in ceilings or painted or unfinished surfaces.

E. Provide polished chrome plate finish for installation in unpainted finished walls.

F. Milcor Style M for masonry and surfaces not specified otherwise.

G. Milcor Style K for plastered surfaces.

H. Milcor Style DW for drywall surfaces.

I. Milcor Style AT-FRSC "Special" for drywall ceilings. (Designated "fire resistive suspended ceiling door" by manufacturer).

J. Milcor Style AT for acoustical tile ceilings.

K. Milcor Style AP for acoustical plaster ceilings.

L. Acceptable Manufacturers: Baldwin, Hannon, Josam, Miami, Carey, Milcor, Titus, Wade, Walsh, Zurn.

PART 3 - EXECUTION

3.1 HAZARDOUS LOCATIONS

A. Air-Moving equipment installed within, or handling air from hazardous locations shall be provided with non-ferrous fan wheels, non-sparking inlet rings, and with explosion proof motors and electrical devices.

B. "Hazardous Locations" shall be as defined in the National Electrical Code.

3.2 PROTECTION OF EQUIPMENT AND MATERIALS

A. Protect equipment and materials from physical damage, water damage and deterioration after it is delivered to the project, and during the installation.

B. The equipment shall be kept clean. Motors and electrical devices shall be covered with suitable materials to prevent dirt or dust accumulation within equipment. Machinery and devices shall be properly oiled and maintained to prevent rusting and deterioration.

C. Repair scratches, mars, or paint deterioration.

3.3 MATERIAL DAMAGE

A. The contractor shall immediately report in writing to the owner and design professional any incident involving equipment or material damage including rain water damage, pipe leaks, physical damage, etc.

B. At a minimum the report shall include the areas and extent of damage and proposed resolution.

C. Water damaged materials shall be replaced with new materials without exception.

3.4 EXCAVATION AND BACKFILL

A. Perform excavation and backfill required for the installation of underground pipe, ducts, equipment, and devices in accordance with other divisions of this Specification relating to such work. Carefully check for existing underground services before using power equipment for excavation.

B. Trenches shall be wide enough for proper installation of the pipe. Grade the ditch bottom for proper slope and provide bell holes to allow the full bearing of the pipe barrel. Comply with all health and safety regulations relating to ditching.

C. De-water to extent necessary to keep trenches dry and to provide proper compaction under all pipes. Continue de-watering operation until system has been tested, approved, backfilled and compacted.

D. Excavate 6" below the pipe and fill with sand to pipe grade.

E. No excavation shall be under or near footings without approval of the Architect.

F. Backfill trenches with clean dirt or sand. Take care not to disturb the pipe grade or alignment. Compact around and under the pipe carefully. The fill shall be compacted in 6" layers with a power tamper to achieve 95% compaction. Clean up around the ditch area to remove trash and any excess dirt.

3.5 EQUIPMENT AND PIPE SPACE

A. The Drawings indicate specified products physically arranged in the spaces, as catalogued by specific manufacturers, generally as listed in the equipment schedules.

B. Drawings show pipe and ductwork diagrammatically.

C. Adhere to Drawings as closely as possible in layout of work.

D. Vary run of piping, run and shape of ductwork and make offsets during progress of work as required to meet structural and other interferences per reviewed shop drawings.

E. Install piping and ductwork in furred spaces wherever possible. Run exposed piping and ductwork parallel to or at right angles to building walls.

F. Keep horizontal lines as high as practicable.

G. Conform to ceiling heights established on the Drawings with adequate clearance for light fixtures.

3.6 PAINTING AND FINISHING AND CLEANING

A. Finish painting (other than factory applied) of mechanical and electrical equipment, and its associated piping, ductwork, and devices is specified in other sections. Provide touch-up painting of pre-finished mechanical products.

B. Surfaces shall be left clean, debris shall be removed, and equipment shall be furnished in prime coat finish unless otherwise specified.

C. Piping, ductwork and equipment: Clean exterior of piping, ductwork and equipment, removing rust, plaster and dirt by wire brushing. Remove grease, oil, and similar materials by wiping with clean rags and suitable solvents.

D. Supports and anchors: Exterior supports and anchors shall be hot dipped galvanized steel with cold galvanized welds.

E. Motors, pumps and other items with factory finish. Remove grease and oil and leave surfaces clean and polished.

F. Plumbing Fixtures: Clean and polish fixtures immediately prior to final inspection.

G. Cleaning operations are supplemented by detailed instructions for specific systems.

END OF SECTION 15000

SECTION 15001 – PLUMBING GENERAL REQUIREMENTS

PART 1 - GENERAL

1.1 SCOPE

A. This section, as well as the Drawings and General Provisions of the Contract, including General and Supplementary Conditions and Division 1 - General Sections included in Division 15 Specifications are for mechanical and related work particular to Young Women's Christian Association (YWCA) Facility at 601-605 South Jefferson Davis Parkway New Orleans, Louisiana. Coordinate with plans and other specifications sections.

1.2 RELATED DOCUMENTS

SECTION 15001 - PLUMBING GENERAL REQUIREMENTS
SECTION 15051 – PLUMBING BASIC MATERIALS AND METHODS
SECTION 15061 - HANGERS AND SUPPORTS FOR PLUMBING PIPING AND EQUIPMENT
SECTION 15072 - VIBRATION AND SEISMIC CONTROLS FOR PLUMBING PIPING AND EQUIPMENT
SECTION 15076 - IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT
SECTION 15084 - PLUMBING PIPING INSULATION
SECTION 15092 - SLEEVES AND SLEEVE SEALS FOR PLUMBING PIPING
SECTION 15110 - VALVES FOR PLUMBING PIPING
SECTION 15123 - METERS AND GAUGES FOR PLUMBING PIPING
SECTION 15140 - DOMESTIC WATER PIPING
SECTION 15150 - SANITARY WASTE AND VENT PIPING
SECTION 15160 - STORM DRAINAGE PIPING
SECTION 15194 – FUEL GAS PIPING
SECTION 15410 - PLUMBING FIXTURES
SECTION 15430 - PLUMBING SPECIALTIES
SECTION 15485 – ELECTRIC DOMESTIC WATER HEATERS
SECTION 15486 - GAS-FIRED DOMESTIC WATER HEATERS
SECTION 15489 - SUMP PUMPS

1.3 WORK INCLUDED

A. The work covered by this Division of the Specifications consists of furnishing all plant, labor, equipment, supervision, appliances, and materials, and in performing all operations in connection with the plumbing and fire protection systems complete and in strict accordance with this Division of the Specifications and the applicable drawings.

1.4 COORDINATION OF WORK

A. General: Refer to the Division 1 sections for general coordination requirements applicable to the entire work. It is recognized that the contract documents are diagrammatic in showing certain physical relationships which must be established within the mechanical work, and in its interface with other work, including electrical work, and that such establishment is the exclusive responsibility of the Contractor.

B. Advise other trades of openings required in their work for the subsequent move-in of large equipment.

C. Submit coordination drawings prior to purchase-fabrication-installation of any of the elements involved in the coordination.

D. Verify final locations for rough-ins with field measurements and with the requirements of the actual equipment to be connected.

E. Verify all dimensions by field measurements.

F. Arrange for chases, slots, and openings in other building components to allow for installation.

G. Coordinate the installation of required supporting devices and sleeves to be set in poured-in-place concrete and other structural components, as they are constructed.

H. Sequence, coordinate, and integrate installations of materials and equipment for efficient flow of the work. Give particular attention to large equipment requiring positioning prior to closing-in the installation areas.

I. Coordinate the cutting and patching of building components to accommodate the installation of equipment and materials. Comply with Division 1.

J. Install equipment to facilitate maintenance and repair or replacement of equipment components. As much as practical, connect equipment for ease of disconnecting, with minimum of interference with other installations.

K. Coordinate the installation of materials and equipment above ceilings with suspension system, mechanical equipment and systems, and structural components.

L. Contractor shall visit the site before bidding to familiarize himself with conditions under which he will have to perform his Contract.

1.5 CODES AND STANDARDS

A. Workmanship, material and equipment shall be in accordance with Specifications and Drawings, and in some instances the requirements exceed those required by codes and standards. Where not exceeded, the codes and standards shall be considered as absolute minimum requirements.

1.6 ELECTRICAL WORK

A. Refer to Division 16 for all electrical work as it pertains to work specified in this section.

1.7 WORKMANSHIP

A. Install all materials and components of the work in accordance with instructions of manufacturer, following the best modern construction practices and conforming with the Contract Documents. Workmanship shall be first class, in both function and appearance, whether finally concealed or exposed and shall be performed by experienced workmen skilled in the type of work. As practicable, the lines of all exposed components of the system shall be perpendicular or parallel to the lines of the building.

1.8 DRAWINGS

A. Contract Drawings and details are shown to limit and explain structural conditions, requirements, and manner of erecting work. Drawings are intended to convey the scope of work and indicate general arrangements of equipment and piping and approximate sizes and locations of equipment and outlets. Trades shall follow these drawings in laying out their work, check general construction drawings to familiarize themselves with all conditions affecting their work, and shall verify spaces in which their work will be installed.

B. It may be necessary to shift pipes or equipment and this is permissible, and may be required under the general contract, but all such changes must be referred to the Architect for approval. Where rearrangement of piping or equipment is required, Contractor shall prepare and submit approval drawings of the proposed arrangement. Revised routing and required offsets shall be provided at no additional expense to the owner.

C. Where the Contractor is not certain about the method of installation, he shall ask for details. Lack of details, not requested, will not be an excuse for improper installation, and any such work must be corrected.

1.9 SHOP DRAWINGS AND DATA TO BE SUBMITTED

A. Submit adequate engineering data on each piece of equipment to allow a careful check of compliance with the technical requirements of the Contract documents. Clearly indicate on submitted data the manufacturer's name, piece number, equipment capacity, and other applicable technical data. Refer to individual sections for specific requirements.

B. Corrections or comments made on shop drawings during the review do not relieve the Contractor from compliance with requirements of the Contract Documents, Plans and Specifications. Shop Drawings will be checked for general conformance with the design concept of the project and general compliance with information given in the contract documents. Review of Shop Drawings shall not relieve the Contractor from responsibility for confirming and correlating all

quantities and dimensions, coordinating work with that of all other trades, and performing work in a safe and satisfactory manner. Review of shop drawings shall not permit any deviation from Plans and Specifications. Shop Drawings must be accompanied by signed statement from contractor, stating that he has reviewed the submittal and checked it for compliance.

C. Any item not specified herein but submitted as a substitute for the specified item shall be accompanied by manufacturer's documentation starting/illustrating the following applicable information in addition to the specific information requested in other sections.

1. Dimensions/weight.
2. Electrical ratings-voltage, amperage, short circuit capability, etc.
3. Construction - gauge of steel/aluminum, paint finish/application method, color, NEMA type, etc.
4. Warranty.

D. Submit manufacturer's documentation on the following:

1. Valves
2. Pipe Insulation.
3. Hangers and Supports.
4. Plumbing Fixtures.
5. Plumbing Specialties.
6. Water Heaters

1.10 INSTRUCTIONS

A. Contractor shall provide formal training sessions for all mechanical systems. Training shall be provided by competent instructors who will give full instruction to designated personnel in the adjustment, operation, and maintenance, including pertinent safety requirements of the equipment or system specified. Instruction shall be given during the first regular work week after the equipment or system has been accepted and turned over to the Owner for regular operation. The length of training session(s) shall be as long as required to review the mechanical systems to the Owner's satisfaction with the exception of systems with specified training requirements. There is no limit to the number of attendees on behalf of the owner.

B. Training sessions shall be coordinated to provide the owner with sequential training of all mechanical systems and equipment. Impromptu training without proper documentation is not acceptable as formal training.

C. The contractor is solely responsible for initiating, coordinating, and documenting owner training sessions. The contractor shall:
1. Schedule the training session with the owner's representative in writing, allowing sufficient time for the owner to notify the necessary attendees.
2. Provide a written agenda outlining the systems to be addressed in a given session.
3. Provide a sign in sheet and minutes of the training session.
4. Distribute the above documentation to the owner and architect as proof of completing formal training.

1.11 OPERATING AND MAINTENANCE MANUALS

A. Bind in loose-leaf binders with the words, "Operating and Maintenance Manual" and the project identification imprinted on the cover. Prepare three complete sets of records for the Owner, with table of contents, index, and tabbed section dividers.

B. During the construction period, accumulate the following for inclusion in the Operating and Maintenance Manuals:

C. Copies of warranties and guarantees on each piece of equipment installed.

1. Plumbing.
2. Wiring and control diagrams.
3. Shop Drawings.
4. Operating instructions for:
   a.Fire Protection Systems.
   b.Plumbing Systems.

5. Recommended maintenance procedures.

D. Submit the manuals for approval at approximately 75 percent job completion. Each manual shall consist of:

1. Complete description of each item of equipment and apparatus furnished and installed - including ratings, capacities, and characteristics.
2. Fully detailed parts list, including all numbered parts of each item of equipment and apparatus furnished and installed.
3. Manufacturer's printed instructions describing operation, servicing, maintenance and repair of each item of equipment and apparatus.

1.12 COMMISSIONING

A. The contractor shall provide commissioning support as outlined in SECTION 018000 “Commissioning Process” and referenced sections therein.

1.13 DELIVERY, STORAGE AND HANDLING

A. Deliver products to project properly identified with names, model numbers, types, grades, compliance labels, and similar information needed for distinct identifications, adequately packaged and protected to prevent damage during shipment, storage, and handling.

B. Store equipment and materials at the site, unless off-site storage is authorized in writing. Protect stored equipment and materials from damage.

C. Coordinate deliveries of materials and equipment to minimize construction site congestion.

1.14 GUARANTEES

A. Contractor shall guarantee all materials, workmanship, and equipment furnished under Division 22 for a period of five (5) year after the date of final acceptance or beneficial use by the Owner, whichever date is the earliest. This warranty shall supersede other warranties defined elsewhere in the project manual and shall remain in effect.

PART 2 - PRODUCTS

2.1 AVAILABLE MANUFACTURERS

A. Manufacturer's names and catalog numbers are scheduled or specified for the purpose of establishing standard of design, quality, appearance, performance and serviceability, and not to limit competition. Scheduled products (as may be modified by detailed Specifications) are those selected as the basis for system design with respect to physical size and space arrangements, required capacity and performance characteristics, and the product quality intended.

B. The Drawings indicate specified products physically arranged in the spaces, as catalogued by Specific manufacturers, generally as listed in the equipment schedules.

C. Listed "Acceptable Manufacturers" are those considered capable of manufacturing products conforming to detailed Specifications, and as such, are invited to compete on an equal basis provided the offering is comparable in every respect to scheduled or specified products and actually conforms to the detailed Specifications and schedule requirements. Listing herein as "acceptable manufacturers" does not imply "accepted," "approved," "prior approval," or any other such connotation.

2.2 FLAME-SPREAD AND SMOKE DEVELOPED PROPERTIES OF MATERIALS

A. Materials and adhesives used throughout the mechanical and electrical systems for insulation, acoustical lining, filters, ducts, flexible connections, and jackets or coverings regardless of kind, or for piping or conduit system components, shall have a flame-spread rating not over 25 without evidence of continued combustion and with a smoke developed rating not higher than 50. If such materials are to be applied with adhesives, they shall be tested as applied with such adhesives, or the adhesives used shall have a flame-spread rating not over 25 and a smoke developed rating not higher than 50.

B. "Flame-Spread Rating" and "Smoke Developed Rating" shall be as determined by the "Method of Test of Surface Burning Characteristics of Building Materials, NFPA No. 225, ASTM E84, Underwriter's Laboratories, Inc., Standard." Such materials are listed in the Underwriter's Laboratories, Inc. "Building Materials List" under the heading "Hazard Classification (Fire)."

2.3 AUXILIARY STRUCTURAL SUPPORTS

A. Provide auxiliary structural supports as necessary to support mechanical systems from the building structure. Supporting members shall be metal strut framing or standard structural shapes, designed to support imposed loads with a working stress no greater than 25 percent of ultimate stress values of the members, and articulation with the building structure without exceeding structural limitations at the point of attachment to the building structure.

2.4 SPECIAL TOOLS

A. Furnish a set of special tools and devices required for the proper maintenance of the major pieces of equipment and install on adequate tool board. This shall include only tools which cannot normally be purchased "over-the-counter" at hardware stores.

2.5 EQUIPMENT GUARDS

A. Provide equipment with exposed moving parts with belt guards, coupling guards, fan guards or other enclosures as necessary for personnel safety.

2.6 ACCESS DOORS

A. Furnish, for installation under appropriate section of the work, access doors at each point required to provide access to concealed valves, dampers, damper operators, and other devices requiring operation, adjustment, or maintenance. Access doors shall be located in inconspicuous locations and in unoccupied areas wherever possible. Access door locations shall be shown on shop drawings for architect approval.

B. Shall be 16 gauge steel, with mounting straps, concealed hangers, and screwdriver locks, designed for the doors to open 180 degrees, minimum.

C. Access doors installed in fire walls or partitions shall be U.L. labeled to maintain the fire rating of the wall or partition.

D. Provide prime coat finish for installation in ceilings or painted or unfinished surfaces.

E. Provide primed finish for installation in unpainted finished walls.

F. Milcor Style M for masonry and surfaces not specified otherwise.

G. Milcor Style DW for drywall surfaces.

H. Milcor Style AT-FRSC "Special" for drywall ceilings. (Designated "fire resistive suspended ceiling door" by manufacturer).

I. Milcor Style AP for acoustical plaster ceilings.

J. Acceptable Manufacturers: Josam, Miami, Milcor, Wade and Zurn.

PART 3 - EXECUTION

3.1 PROTECTION OF EQUIPMENT AND MATERIALS

A. Protect equipment and materials from physical damage, water damage and deterioration after it is delivered to the project, and during the installation.

B. The equipment shall be kept clean. Motors and electrical devices shall be covered with suitable materials to prevent dirt or dust accumulation within equipment. Machinery and devices shall be properly oiled and maintained to prevent rusting and deterioration.

C. Repair scratches, mars, or paint deterioration.

3.2 MATERIAL DAMAGE

A. The Contractor shall immediately report in writing to the Owner and design professional any incident involving equipment or material damage including rain water damage, pipe leaks, physical damage, etc.

B. At a minimum the report shall include the areas and extent of damage and proposed resolution.

C. Water damaged materials shall be replaced with new materials without exception.

3.3 EXCAVATION AND BACKFILL

A. Perform excavation and backfill required for the installation of underground pipe, equipment, and devices in accordance with other divisions of this Specification relating to such work. Carefully check for existing underground services before using power equipment for excavation.

B. Trenches shall be wide enough for proper installation of the pipe. Grade the ditch bottom for proper slope and provide bell holes to allow the full bearing of the pipe barrel. Comply with all health and safety regulations relating to ditching.

C. De-water to extent necessary to keep trenches dry and to provide proper compaction under all pipes. Continue de-watering operation until system has been tested, approved, backfilled and compacted.

D. Excavate 6" below the pipe and fill with sand to pipe grade.

E. No excavation shall be under or near footings without approval of the Architect.

F. Backfill trenches with clean dirt or sand. Take care not to disturb the pipe grade or alignment. Compact around and under the pipe carefully. The fill shall be compacted in 6" layers with a power tamper to achieve 95% compaction. Clean up around the ditch area to remove trash and any excess dirt.

3.4 EQUIPMENT AND PIPE SPACE

A. The Drawings indicate specified products physically arranged in the spaces, as cataloged by specific manufacturers, generally as listed in the equipment schedules.

B. Drawings show pipe diagrammatically.

C. Adhere to Drawings as closely as possible in layout of work.

D. Vary run of piping and make offsets during progress of work as required to meet structural and other interferences per reviewed shop drawings.

E. Install piping in furred spaces and above ceilings wherever possible. Run exposed piping parallel to or at right angles to building walls.

F. Keep horizontal lines as high as practicable.

G. Conform to ceiling heights established on the Drawings with adequate clearance for light fixtures and to allow for ceiling tile removal/installation.

3.5 PAINTING AND CLEANING

A. Finish painting (other than factory applied) of mechanical equipment, and its associated piping, and devices is specified in other sections. Provide touch-up painting of pre-finished mechanical products.

B. Surfaces shall be left clean, debris shall be removed, and equipment shall be furnished in prime coat finish unless otherwise specified.

C. Paint all piping that is exposed to public view. Clean exterior of piping, removing rust, plaster and dirt by wire brushing. Remove grease, oil, and similar materials by wiping with clean rags and suitable solvents. Refer to Division 9 for painting requirements.

D. Exterior supports and anchors shall be hot dipped galvanized steel with cold galvanized welds.

E. Motors, pumps and other items with factory finish: Remove grease and oil and leave surfaces clean and polished.

F. Plumbing Fixtures: Clean and polish fixtures immediately prior to final inspection.

G. Cleaning operations are supplemented by detailed instructions for specific systems.

END OF SECTION 15001

SECTION 15051 – PLUMBING BASIC MECHANICAL MATERIALS AND METHODS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Piping materials and installation instructions common to plumbing and fire protection piping systems.
2. Dielectric fittings.
3. Sleeves.
4. Escutcheons.
5. Grout.
6. Equipment installation requirements.
7. Concrete bases.

1.2 SUBMITTALS

A. Product Data: For the following

1. Escutcheons
2. Dielectric fittings

B. Welding certificates.

1.3 QUALITY ASSURANCE

A. Steel Support Welding: Qualify processes and operators according to AWS D1.1, "Structural Welding Code--Steel."

B. Steel Pipe Welding: Qualify processes and operators according to ASME Boiler and Pressure Vessel Code: Section IX, "Welding and Brazing Qualifications."

1. Comply with provisions in ASME B31 Series, "Code for Pressure Piping."
2. Certify that each welder has passed AWS qualification tests for welding processes involved and that certification is current.

C. Electrical Characteristics for Mechanical Equipment: Equipment of higher electrical characteristics may be furnished provided such proposed equipment is approved in writing and connecting electrical services, circuit breakers, and conduit sizes are appropriately modified. If minimum energy ratings or efficiencies are specified, equipment shall comply with requirements.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Deliver pipes and tubes with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe end damage and to prevent entrance of dirt, debris, and moisture.

B. Protect steel pipe from weather during storage to prevent corrosion and scale build-up.

C. Store plastic pipes such that they are protected from direct sunlight. Support to prevent sagging and bending.

1.5 COORDINATION

A. Arrange for pipe spaces, chases, slots, core drilling and openings in building structure during progress of construction, to allow for mechanical installations. Contractor is responsible for providing required penetrations in structure to accommodate piping.

B. Coordinate installation of required supporting devices and set sleeves in poured-in-place concrete and other structural components as they are constructed.

PART 2 - PRODUCTS

2.1 PIPE, TUBE, AND FITTINGS

A. Refer to individual Division 15 piping Sections for pipe, tube, and fitting materials and joining methods.

B. Pipe Threads: ASME B1.20.1 for factory-threaded pipe and pipe fittings.

2.2 JOINING MATERIALS

A. Refer to individual Division 22 piping Sections for special joining materials not listed below.

B. Pipe-Flange Gasket Materials: ASME B16.21, nonmetallic, flat, asbestos-free, 1/8-inch maximum thickness unless thickness or specific material is indicated. Full-Face type for flat-face, Class 125, flanges and narrow-face type for raised face, Class 250, flanges.

C. Solder Filler Metals: ASTM B 32, lead-free alloys. Include water-flushable flux according to ASTM B 813.

D. Brazing Filler Metals: AWS A5.8, BCuP Series or BAg1, unless otherwise indicated.

E. Welding Filler Metals: Comply with AWS D10.12.

F. Solvent Cements for Joining Plastic Piping:

1. PVC Piping: ASTM D 2564. Include primer according to ASTM F 656.
2. PVC to ABS Piping Transition: ASTM D 3138.

2.3 TRANSITION FITTINGS

A. AWWA Transition Couplings: Same size as, and with pressure rating at least equal to and with ends compatible with, piping to be joined.

2.4 DIELECTRIC FITTINGS

A. Description: Combination fitting of copper alloy and ferrous materials with threaded, solder-joint, plain, or weld-neck end connections that match piping system materials.

B. Insulating Material: Suitable for system fluid, pressure, and temperature.

C. Dielectric Unions: Factory-fabricated, union assembly, for 250-psig minimum working pressure at 180 degrees F.

D. Dielectric Flanges: Factory-fabricated, companion-flange assembly, for 150- or 300-psig minimum working pressure as required to suit system pressures.

E. Dielectric Couplings: Galvanized-steel coupling with inert and noncorrosive, thermoplastic lining; threaded ends; and 300-psig minimum working pressure at 225 degrees F.

F. Dielectric Nipples: Electroplated steel nipple with inert and noncorrosive, thermoplastic lining; plain, threaded, or grooved ends; and 300-psig minimum working pressure at 225 degrees F.

2.5 SLEEVES

A. Steel Pipe: ASTM A 53, Type E, Grade B, Schedule 40, galvanized, plain ends.

2.6 ESCUTCHEONS

A. Description: Manufactured wall and ceiling escutcheons and floor plates, with an ID to closely fit around pipe, tube, and insulation of insulated piping and an OD that completely covers opening.

B. One-Piece, Cast-Brass Type: With set screw.

1. Finish: Polished chrome-plated.

2.7 GROUT

A. Description: ASTM C 1107, Grade B, non-shrink and nonmetallic, dry hydraulic-cement grout.

1. Characteristics: Post-hardening, volume-adjusting, non-staining, noncorrosive, nongaseous, and recommended for interior and exterior applications.
2. Design Mix: 3000-psi, 28-day compressive strength.
3. Packaging: Premixed and factory packaged.

PART 3 - EXECUTION

3.1 PIPING SYSTEMS - COMMON REQUIREMENTS

A. Install piping according to the following requirements and Division 15 Sections specifying piping systems.

B. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.

C. Install piping in concealed locations, unless otherwise indicated and except in equipment rooms and service areas.

D. Install at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

E. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.

F. Install piping to permit valve servicing.

G. Install piping at required slopes.

H. Install piping free of sags and bends.

I. Install fittings for changes in direction and branch connections.

J. Install piping to allow application of insulation.

K. Select system components with pressure rating equal to or greater than system operating pressure.

L. Install escutcheons for penetrations of walls, ceilings, and floors in exposed areas.

M. Install sleeves for pipes passing through concrete and masonry walls. Cut sleeves to length for mounting flush with both surfaces.

N. Aboveground, Exterior-Wall Pipe Penetrations: Seal penetrations using non-shrink grout between the wall and the sleeve. Seal the annular space between the pipe and the sleeve using non-shrink grout or flexible silicon sealants. Select sleeve size to allow for 1-inch annular clear space between pipe and sleeve for installing grout or silicone sealant.

1. Install steel pipe for sleeves smaller than 10 inches in diameter.

O. Fire-Barrier Penetrations: Seal all piping penetrations to maintain indicated fire rating of walls, partitions, ceilings, and floors at mechanical penetrations. Refer to architectural fire proofing requirements.

P. Verify final equipment locations prior to roughing-in.

Q. Refer to equipment specifications in other Sections of these Specifications for roughing-in requirements.

R. Expansion and Contraction of Piping:

1. Allowance shall be made throughout for expansion and contraction of pipe. Horizontal runs of pipe with expansion loops or joints shall be anchored to the wall or the supporting construction to force expansion toward the expansion joints or loops. Horizontal runs of piping without expansion joints or loops, over 50 feet in length, shall be anchored in the middle of the run to force the expansion evenly toward the ends.

2. All piping shall be so installed that it may contract or expand freely without damage to any other work or injury to itself. Any swing joints, expansion joints, or bends necessary shall be installed whether shown or not.

3.2 PIPING JOINT CONSTRUCTION

A. Join pipe and fittings according to the following requirements and Division 22 Sections specifying piping systems.

B. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.

C. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.

D. Soldered Joints: Apply ASTM B 813, water-flushable flux, unless otherwise indicated, to tube end. Construct joints according to ASTM B 828 or CDA's "Copper Tube Handbook," using lead-free solder alloy complying with ASTM B 32.

E. Brazed Joints: Construct joints according to AWS's "Brazing Handbook," "Pipe and Tube" Chapter, using copper-phosphorus brazing filler metal complying with AWS A5.8.

F. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:

1. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.
2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.

G. Welded Joints: Construct joints according to AWS D10.12, using qualified processes and welding operators according to Part 1 "Quality Assurance" Article.

H. Flanged Joints: Select appropriate gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Use suitable lubricants on bolt threads.

I. Plastic Piping Solvent-Cement Joints: Clean and dry joining surfaces. Join pipe and fittings according to the following:

1. Comply with ASTM F 402, for safe-handling practice of cleaners, primers, and solvent cements.
2. PVC Non-pressure Piping: Join according to ASTM D 2855.
3. PVC to ABS Non-pressure Transition Fittings: Join according to ASTM D 3138 Appendix.

3.3 PIPING CONNECTIONS

A. Make connections according to the following, unless otherwise indicated:

1. Install unions, in piping NPS 2 and smaller, adjacent to each valve and at final connection to each piece of equipment.
2. Install flanges, in piping NPS 2-1/2 and larger, adjacent to flanged valves and at final connection to each piece of equipment.
3. Dry Piping Systems: Install dielectric unions and flanges to connect piping materials of dissimilar metals.
4. Wet Piping Systems: Install dielectric coupling and nipple fittings to connect piping materials of dissimilar metals.

3.4 EQUIPMENT INSTALLATION - COMMON REQUIREMENTS

A. Install equipment to allow maximum possible headroom unless specific mounting heights are indicated.

B. Install equipment level and plumb, parallel and perpendicular to other building systems and components in exposed interior spaces, unless otherwise indicated.

C. Install mechanical equipment to facilitate service, maintenance, and repair or replacement of components. Connect equipment for ease of disconnecting, with minimum interference to other installations. Extend grease fittings to accessible locations.

D. Install equipment to allow right of way for piping installed at required slope.

3.5 PAINTING

A. Painting of mechanical systems, equipment, and components is specified in Division 9 Section.

B. Damage and Touchup: Repair marred and damaged factory-painted finishes with materials and procedures to match original factory finish.

C. Paint all pining that is exposed to public view. Clean exterior of piping, removing rust, plaster and dirt by wire brushing. Remove grease, oil, and similar materials by wiping with clean rags and suitable solvents. Refer to Division 9 for painting requirements.

3.6 CONCRETE BASES

A. Concrete Bases: Anchor equipment to concrete base according to equipment manufacturer's written instructions.

1. Construct concrete bases of dimensions indicated, but not less than 4 inches larger in both directions than supported unit.
2. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch centers around the full perimeter of the base.
3. Install epoxy-coated anchor bolts for supported equipment that extend through concrete base, and anchor into structural concrete floor.
4. Place and secure anchorage devices. Use supported equipment manufacturer's setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
5. Install anchor bolts to elevations required for proper attachment to supported equipment.
6. Install anchor bolts according to anchor-bolt manufacturer's written instructions.
7. Use 3,000 psi concrete and reinforcement.

3.7 GROUTING

A. Mix and install grout for mechanical equipment base bearing surfaces, pump and other equipment base plates, and anchors.

B. Clean surfaces that will come into contact with grout.

C. Provide forms as required for placement of grout.

D. Avoid air entrapment during placement of grout.

E. Place grout, completely filling equipment bases.

F. Place grout on concrete bases and provide smooth bearing surface for equipment.

G. Place grout around anchors.

H. Cure placed grout.

END OF SECTION 15051

SECTION 15055 - MOTORS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes basic requirements for motors.

B. See individual Sections for application of motors and reference to specific motor requirements for motor-driven equipment.

C. See Division 15 Section "Mechanical Vibration and Seismic Controls" for mounting motors and vibration isolation and seismic-control devices.

1.2 DEFINITIONS

A. Factory-Installed Motor: A motor installed by motorized-equipment manufacturer as a component of equipment.

B. Field-Installed Motor: A motor installed at Project site and not factory installed as an integral component of motorized equipment.

1.3 SUBMITTALS

A. Product Data for Field-Installed Motors: For each type and size of motor indicated, provide nameplate data and ratings; mounting arrangements; size, type, and location of winding terminations; conduit entry and ground lug locations; and information on coatings or finishes.

B. Shop Drawings for Field-Installed Motors: Dimensioned plans, elevations, sections, and details, including required clearances and service space around equipment. Include the following:
   1. Each installed unit's type and details.
   2. Nameplate legends.
   3. Diagrams of power and control wiring. Provide schematic wiring diagram for each type of motor and for each control scheme.

C. Qualification Data: For testing agency.

D. Field quality-control test reports.

E. Operation and maintenance data.

1.4 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

B. Comply with NFPA 70.

1.5 COORDINATION

A. Coordinate features of motors, installed units, and accessory devices. Provide motors that are:
   1. Compatible with the following:
      a. Magnetic controllers.
      b. Multispeed controllers.
      c. Reduced-voltage controllers.
   2. Designed and labeled for use with variable frequency drives, and suitable for use throughout speed range without overheating.
   3. Matched to torque and horsepower requirements of the load.
   4. Matched to ratings and characteristics of supply circuit and required control sequence.

B. Coordinate motor support with requirements for driven load; access for maintenance and motor replacement; installation of accessories, belts, belt guards; and adjustment of sliding rails for belt tensioning.

C. Coordinate size and location of concrete bases. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified in Division 3 Section.

PART 2 - PRODUCTS

2.1 MOTOR REQUIREMENTS

A. Motor requirements apply to factory-installed and field-installed motors, except as follows:
   1. Different ratings, performance, or characteristics for a motor are specified in another Section.
   2. Manufacturer for a factory-installed motor requires ratings, performance, or characteristics, other than those specified in this Section, to meet performance specified.

2.2 MOTOR CHARACTERISTICS

A. Motors 3/4 HP and Larger: Three phase, unless noted otherwise.

B. Motors Smaller than 3/4 HP: Single phase, unless noted otherwise.

C. Frequency Rating: 60 Hz.

D. Voltage Rating: NEMA standard voltage selected to operate on nominal circuit voltage to which motor is connected.

E. Service Factor: 1.15

F. Duty: Continuous duty at ambient temperature of 105 deg F (40 deg C) and at altitude of 3300 ft (1005 m) above sea level.

G. Capacity and Torque Characteristics: Sufficient to start, accelerate, and operate connected loads at designated speeds, at installed altitude and environment, with indicated operating sequence, and without exceeding nameplate ratings or considering service factor.

H. Enclosure: Provide Open Drip Proof motors for motors located indoors in dry locations, and Totally Enclosed Fan Cooled motors in wet locations or outdoors.

I. Speed: Unless noted otherwise motors shall operate at 1750 RPM or less.

2.3 POLYPHASE MOTORS

A. Description: NEMA MG 1, Design B, medium induction motor.

B. Efficiency: Minimum efficiencies shall be as follows:

Motor HP	Minimum Efficiency
1-3	81%
5-15	86%
20-50	90%
60 and above	93%

C. Stator: Copper windings, unless otherwise indicated.
1. Multispeed motors shall have separate winding for each speed.

D. Rotor: Squirrel cage, unless otherwise indicated.

E. Bearings: Double-shielded, prelubricated ball bearings suitable for radial and thrust loading.

F. Temperature Rise: Match insulation rating, unless otherwise indicated.

G. Insulation: Class F evaluated in accordance with IEEE 117 classification tests, unless otherwise indicated.

H. Code Letter Designation:
1. Motors 15HP and Larger: NEMA starting Code F or G.
2. Motors smaller than 15HP: Manufacturer's standard starting characteristic.

I. Enclosure: Cast iron for motors 7.5 hp and larger; rolled steel for motors smaller than 7.5 hp. All motors installed in wet locations or outdoors shall be cast iron.
1. Finish: Gray enamel.

2.4 POLYPHASE MOTORS WITH ADDITIONAL REQUIREMENTS

A. Motors Used with Variable Frequency Controllers: Ratings, characteristics, and features coordinated with and approved by controller manufacturer.
   1. Designed with critical vibration frequencies outside operating range of controller output.
   2. Temperature Rise: Matched to rating for Class B insulation.
   3. Insulation: Class H.
   4. Thermal Protection: Comply with NEMA MG 1, Part 31 requirements for thermally protected motors.

B. Rugged-Duty Motors: Totally enclosed, with 1.25 minimum service factor, greased bearings, integral condensate drains, and capped relief vents. Windings insulated with nonhygroscopic material.
   1. Finish: Chemical-resistant paint over corrosion-resistant primer.

C. Source Quality Control: Perform the following tests on each motor according to NEMA MG 1:
   1. Measure winding resistance.
   2. Read no-load current and speed at rated voltage and frequency.
   3. Measure locked rotor current at rated frequency.
   4. Perform high-potential test.

2.5 SINGLE-PHASE MOTORS

A. Type: One of the following, to suit starting torque and requirements of specific motor application:
   1. Split-phase start, capacitor run.
   2. Capacitor start, capacitor run.
   3. Permanent-split capacitor.

B. Shaded-Pole Motors: For motors 1/20 hp and smaller only.

C. Thermal Protection: Internal protection to automatically open power supply circuit to motor when winding temperature exceeds a safe value calibrated to temperature rating of motor insulation. Thermal-protection device shall automatically reset when motor temperature returns to normal range.

D. Bearings: Ball type for belt-connected motors and other motors with high radial forces on motor shaft; sealed, prelubricated-sleeve type for other single-phase motors.

E. Source Quality Control: Perform the following tests on each motor according to NEMA MG 1:
   1. Measure winding resistance.
   2. Read no-load current and speed at rated voltage and frequency.
   3. Measure locked rotor current at rated frequency.
   4. Perform high-potential test.

PART 3 - EXECUTION

3.1 MOTOR INSTALLATION

A. Anchor each motor assembly to base, adjustable rails, or other support, arranged and sized according to manufacturer's written instructions. Attach by bolting. Level and align with load transfer link.

B. Install motors on concrete bases complying with Division 3.

C. Comply with mounting and anchoring requirements specified in Division 15 Section "Mechanical Vibration and Seismic Controls."

3.2 FIELD QUALITY CONTROL

A. Prepare for acceptance tests as follows:
   1. Run each motor with its controller. Demonstrate correct rotation, alignment, and speed at motor design load.
   2. Test interlocks and control features for proper operation.
   3. Verify that current in each phase is within nameplate rating.

B. Testing: Perform the following field quality-control testing:
   1. Perform each electrical test and visual and mechanical inspection stated in NETA ATS, Section 7.15.1.
      a. Certify compliance with test parameters.
   2. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.

3.3 ADJUSTING

A. Align motors, bases, shafts, pulleys and belts. Tension belts according to manufacturer's written instructions.

END OF SECTION 15055

SECTION 15057 - ENCLOSED CONTROLLERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes ac general-purpose controllers rated 600 V and less that are supplied as enclosed units.

B. All magnetic starters will be furnished in this Division for installation in Division-26, except starters furnished as part of a motor control center.

1.3 SUBMITTALS

A. Product Data: For each type of enclosed controller. Include dimensions and manufacturer's technical data on features, performance, electrical characteristics, ratings, and finishes.

B. Shop Drawings: For each enclosed controller.
   1. Dimensioned plans, elevations, sections, and details, including required clearances and service space around equipment. Show tabulations of installed devices, equipment features, and ratings. Include the following:
      a. Enclosure types and details.
      b. Nameplate legends.
      c. Short-circuit current rating of integrated unit.
      d. UL listing for series rating of overcurrent protective devices in combination controllers.
      e. Features, characteristics, ratings, and factory settings of individual overcurrent protective devices in combination controllers.
   2. Wiring Diagrams: Power, signal, and control wiring. Differentiate between manufacturer-installed and field-installed wiring.

C. Maintenance Data: For enclosed controllers and components to include in maintenance manuals specified in Division 1. In addition to requirements specified in Division 1 Section "Closeout Procedures," include the following:
   1. Routine maintenance requirements for enclosed controllers and all installed components.
   2. Manufacturer's written instructions for testing and adjusting overcurrent protective devices.

D. Load-Current and Overload-Relay Heater List: Compile after motors have been installed and arrange to demonstrate that selection of heaters suits actual motor nameplate full-load currents.

1.4 QUALITY ASSURANCE

A. Manufacturer Qualifications: Maintain, within 100 miles of Project site, a service center capable of providing training, parts, and emergency maintenance and repairs.

B. Source Limitations: Obtain enclosed controllers of a single type through one source from a single manufacturer.

C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

D. Comply with NFPA 70.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Store enclosed controllers indoors in clean, dry space with uniform temperature to prevent condensation. Protect enclosed controllers from exposure to dirt, fumes, water, corrosive substances, and physical damage.

1.6 COORDINATION

A. Coordinate layout and installation of enclosed controllers with other construction including conduit, piping, equipment, and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.

B. Coordinate features of enclosed controllers and accessory devices with pilot devices and control circuits to which they connect.

C. Coordinate features, accessories, and functions of each enclosed controller with ratings and characteristics of supply circuit, motor, required control sequence, and duty cycle of motor and load.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Manual and Magnetic Enclosed Controllers:
      a. Danfoss
      b. Eaton Corp.; Cutler-Hammer Products.
      c. General Electrical Distribution & Control.
      d. Rockwell Automation Allen-Bradley Co.; Industrial Control Group.
      e. Square D Co.

2.2 MANUAL ENCLOSED CONTROLLERS

A. Fractional Horsepower Single Phase Manual Starters: Fractional horsepower manual starters shall consist of a manually operated toggle switch equipped with meting alloy type thermal overload relay. Thermal unit shall be of one-piece construction and interchangeable. Starter shall be inoperative if thermal unit is removed. Contacts shall be double break, silver alloy, visible from both sides of starter.

B. Manual Starters Three Phase: Manual starters shall be constructed and tested in accordance with the latest published NEMA Standards. The manual starters shall consist of a manually operated switch equipped with melting alloy type thermal overload relays. The overload relays shall be trip-free, and the starter shall be inoperative if any thermal units are removed. Thermal units must be of one-piece construction. The starters will be furnished in a NEMA 1 general purpose enclosure unless otherwise indicated on the plans.

2.3 MAGNETIC ENCLOSED CONTROLLERS

A. Description: NEMA ICS 2, Class A, full voltage, nonreversing, across the line, unless otherwise indicated. Across-the-line magnetic starters through NEMA. size seven shall be equipped with double break silver alloy contacts. All contacts shall be replaceable without removing power wiring or removing starter from panel.

B. Control Circuit: Control voltage at 120 V shall be obtained from integral control power transformer of sufficient capacity to operate connected pilot, indicating and control devices, plus 100 percent spare capacity.

C. Overload Relay: Ambient-compensated type with inverse-time-current characteristic and NEMA ICS 2, Class 10 tripping characteristic. Provide with heaters or sensors in each phase matched to nameplate full-load current of specific motor to which they connect and with appropriate adjustment for duty cycle.

2.4 ENCLOSURES

A. Description: Flush- or surface-mounted cabinets as indicated. NEMA 250, Type 1, unless otherwise indicated to comply with environmental conditions at installed location.
   1. Outdoor Locations: NEMA 250, Type 3R.
   2. Kitchen Areas: NEMA 250, Type 4X, stainless steel.

3. Other Wet or Damp Indoor Locations: NEMA 250, Type 4.

2.5 ACCESSORIES

A. Devices shall be factory installed in controller enclosure, unless otherwise indicated.

B. Provide HOA Switch, and Auxiliary contacts as required by the control sequence (coordinate with the control sequence specifications): NEMA ICS 2, heavy-duty type.

2.6 FACTORY FINISHES

A. Manufacturer's standard prime-coat finish ready for field painting.

B. Finish: Manufacturer's standard paint applied to factory-assembled and -tested enclosed controllers before shipping.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas to receive enclosed controllers for compliance with requirements, installation tolerances, and other conditions affecting performance.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 APPLICATIONS

A. Select features of each enclosed controller to coordinate with ratings and characteristics of supply circuit and motor; required control sequence; duty cycle of motor, drive, and load; and configuration of pilot device and control circuit affecting controller functions.

B. Select horsepower rating of controllers to suit motor controlled.

3.3 INSTALLATION

A. See Division 16 Section "Basic Electrical Materials and Methods" for general installation requirements.

B. For control equipment at walls, bolt units to wall or mount on lightweight structural-steel channels bolted to wall. For controllers not at walls, provide freestanding racks.

C. Install freestanding equipment on concrete bases complying with Division 3 Section "Cast-in-Place Concrete."

D. Enclosed Controller Fuses: Install fuses in each fusible switch. Comply with requirements in Division 16 Section "Fuses."

3.4 IDENTIFICATION

A. Identify enclosed controller components and control wiring according to Division 26.

3.5 CONTROL WIRING INSTALLATION

A. Install wiring between enclosed controllers according to Division 16 Section "Conductors and Cables."

B. Bundle, train, and support wiring in enclosures.

C. Connect hand-off-automatic switch and other automatic-control devices where applicable.
   1. Connect selector switches to bypass only manual- and automatic-control devices that have no safety functions when switch is in hand position.

3.6 CONNECTIONS

A. Conduit installation requirements are specified in other Division 26 Sections. Drawings indicate general arrangement of conduit, fittings, and specialties.

B. Ground equipment.

C. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

3.7 ADJUSTING

A. Set field-adjustable switches and circuit-breaker trip ranges.

3.8 CLEANING

A. Clean enclosed controllers internally, on completion of installation, according to manufacturer's written instructions. Vacuum dirt and debris; do not use compressed air to assist in cleaning.

3.9 STARTUP SERVICE

A. Engage a factory-authorized service representative to perform startup service.

B. Verify that enclosed controllers are installed and connected according to the Contract Documents.

C. Verify that electrical wiring installation complies with manufacturer's submittal and installation requirements in Division 16 Sections.

D. Complete installation and startup checks according to manufacturer's written instructions.

3.10 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain enclosed controllers.
   1. Train Owner's maintenance personnel on procedures and schedules for starting and stopping, troubleshooting, servicing, and maintaining equipment and schedules.
   2. Review data in maintenance manuals. Refer to Division 1 Section "Closeout Procedures."
   3. Review data in maintenance manuals. Refer to Division 1 Section "Operation and Maintenance Data."
   4. Schedule training with Owner, through Architect, with at least seven days' advance notice.

END OF SECTION 15057

SECTION 15060 - HANGERS AND SUPPORTS FOR MECHANICAL EQUIPMENT AND PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes hangers and supports for mechanical system piping and equipment.

B. See Division 15 Section "Mechanical Vibration and Seismic Controls" for vibration isolation supports and hangers

C. Design heavy-duty steel trapezes for piping to support multiple pipes capable of supporting combined weight of supported systems, system contents, and test water.

1.2 SUBMITTALS

A. Product Data: For each type of pipe hanger, channel support system component, and thermal-hanger shield insert indicated.

1.3 QUALITY ASSURANCE

A. Welding: Qualify procedures and personnel according to AWS D1.1, "Structural Welding Code--Steel."

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where subparagraph titles below introduce lists, the following requirements apply for product selection:
   1. Manufacturers: Subject to compliance with requirements, provide products by the manufacturers specified.

2.2 MANUFACTURED UNITS

A. Pipe Hangers, Supports, and Components: MSS SP-58, factory-fabricated components.
   1. Manufacturers:
      a. B-Line Systems, Inc.
      b. Grinnell Corp.
      c. Michigan Hanger Co., Inc.

2. Galvanized, Metallic Coatings: For piping and equipment that will not have field-applied finish.
3. Nonmetallic Coatings: On attachments for electrolytic protection where attachments are in direct contact with copper tubing.

B. Channel Support Systems: MFMA-2, factory-fabricated components for field assembly.
1. Manufacturers:
   a. B-Line Systems, Inc.
   b. Grinnell Corp.
   c. Michigan Hanger Co., Inc.
   d. Unistrut Corp.
2. Coatings: Manufacturer's standard galvanized finish
3. Nonmetallic Coatings: On attachments for electrolytic protection where attachments are in direct contact with copper tubing.

C. Thermal-Hanger Shield Inserts: 100-psi (690-kPa) minimum compressive-strength insulation, encased in sheet metal shield.
1. Material for insulated Piping: ASTM C 552, Type I cellular glass water-repellent-treated, ASTM C 533, Type I calcium silicate with vapor barrier.
2. For Trapeze or Clamped System: Insert and shield cover entire circumference of pipe.
3. For Clevis or Band Hanger: Insert and shield cover lower 180 degrees of pipe.
4. Insert Length: Extend 2 inches (50 mm) beyond sheet metal shield for piping operating below ambient air temperature.

2.3 MISCELLANEOUS MATERIALS

A. Mechanical-Anchor Fasteners: Insert-type attachments with pull-out and shear capacities appropriate for supported loads and building materials where used.

B. Structural Steel: ASTM A 36/A 36M, steel plates, shapes, and bars, black and galvanized.

C. Grout: ASTM C 1107, Grade B, factory-mixed and -packaged, nonshrink and nonmetallic, dry, hydraulic-cement grout.
1. Characteristics: Post hardening and volume adjusting; recommended for both interior and exterior applications.
2. Properties: Nonstaining, noncorrosive, and nongaseous.
3. Design Mix: 5000-psi (34.5-MPa), 28-day compressive strength.

PART 3 - EXECUTION

3.1 APPLICATIONS

A. Specific hanger requirements are specified in Sections specifying equipment and systems.

B. Comply with MSS SP-69 for pipe hanger selections and applications that are not specified in piping system Specification Sections.

C. Horizontal-Piping Hangers and Supports: Unless otherwise indicated and except as specified in piping system Specification Sections, install the following types:
   1. Adjustable Steel Clevis Hangers (MSS Type 1): For suspension of noninsulated or insulated stationary pipes, NPS 1/2 to NPS 30 (DN 15 to DN 750).
   2. Pipe Saddle Supports (MSS Type 36): For support of pipes, NPS 4 to NPS 36 (DN 100 to DN 900), with steel pipe base stanchion support and cast-iron floor flange.
   3. Single Pipe Rolls (MSS Type 41): For suspension of pipes, NPS 1 to NPS 30 (DN 25 to DN 750), from 2 rods if longitudinal movement caused by expansion and contraction might occur.
   4. Complete Pipe Rolls (MSS Type 44): For support of pipes, NPS 2 to NPS 42 (DN 50 to DN 1050), if longitudinal movement caused by expansion and contraction might occur but vertical adjustment is not necessary.

D. Vertical-Piping Clamps: Unless otherwise indicated and except as specified in piping system Specification Sections, install the following types:
   1. Extension Pipe or Riser Clamps (MSS Type 8): For support of pipe risers, NPS 3/4 to NPS 20 (DN 20 to DN 500).
   2. Carbon- or Alloy-Steel Riser Clamps (MSS Type 42): For support of pipe risers, NPS 3/4 to NPS 20 (DN 20 to DN 500), if longer ends are required for riser clamps.

E. Hanger-Rod Attachments: Unless otherwise indicated and except as specified in piping system Specification Sections, install the following types:
   1. Steel Turnbuckles (MSS Type 13): For adjustment up to 6 inches (150 mm) for heavy loads.
   2. Steel Clevises (MSS Type 14): For 120 to 450 deg F (49 to 232 deg C) piping installations.

F. Building Attachments: Unless otherwise indicated and except as specified in piping system Specification Sections, install the following types:
   1. Steel or Malleable Concrete Inserts (MSS Type 18): For upper attachment to suspend pipe hangers from concrete ceiling.
   2. Top-Beam C-Clamps (MSS Type 19): For use under roof installations with bar-joist construction to attach to top flange of structural shape.
   3. Side-Beam or Channel Clamps (MSS Type 20): For attaching to bottom flange of beams, channels, or angles.
   4. Center-Beam Clamps (MSS Type 21): For attaching to center of bottom flange of beams.
   5. C-Clamps (MSS Type 23): For structural shapes.
   6. Welded-Steel Brackets: For support of pipes from below or for suspending from above by using clip and rod. Use one of the following for indicated loads:
      a. Light (MSS Type 31): 750 lb (340 kg).
      b. Medium (MSS Type 32): 1500 lb (675 kg).
      c. Heavy (MSS Type 33): 3000 lb (1350 kg).

G. Saddles and Shields: Unless otherwise indicated and except as specified in piping system Specification Sections, install the following types:

1. Protection Shields (MSS Type 40): Of length recommended by manufacturer to prevent crushing insulation.
2. Steel Pipe-Covering Protection Saddles (MSS Type 39): To fill interior voids with insulation that matches adjoining insulation.
3. Thermal-Hanger Shield Inserts: For supporting insulated pipe, 360-deg ree insert of high-density, 100-psi (690-kPa) minimum compressive-strength, water-repellent-treated calcium silicate or cellular-glass pipe insulation, same thickness as adjoining insulation with vapor barrier and encased in 360-deg ree sheet metal shield.

H. Spring Hangers and Supports: Unless otherwise indicated and except as specified in piping system Specification Sections, install the following types:
1. Spring Cushions (MSS Type 48): For light loads if vertical movement does not exceed 1-1/4 inches (32 mm).
2. Spring-Cushion Roll Hangers (MSS Type 49): For equipping Type 41 roll hanger with springs.
3. Variable-Spring Base Supports (MSS Type 52): Preset to indicated load and limit variability factor to 25 percent to absorb expansion and contraction of piping system from base support.

3.2 INSTALLATION

A. Pipe Hanger and Support Installation: Comply with MSS SP-69 and MSS SP-89. Install hangers, supports, clamps, and attachments as required to properly support piping from building structure.

B. Channel Support System Installation: Arrange for grouping of parallel runs of piping and support together on field-assembled channel systems. Field assemble and install according to manufacturer's written instructions.

C. Heavy-Duty Steel Trapeze Installation: Arrange for grouping of parallel runs of horizontal piping and support together on field-fabricated, heavy-duty trapezes. Support pipes of various sizes together and space trapezes for smallest pipe size or install intermediate supports for smaller diameter pipes as specified above for individual pipe hangers. Field fabricate from ASTM A 36/A 36M, steel shapes selected for loads being supported. Weld steel according to AWS D1.1.

D. Install building attachments within concrete slabs or attach to structural steel. Space attachments within maximum piping span length indicated in MSS SP-69. Install additional attachments at concentrated loads, including valves, flanges, guides, strainers, and expansion joints, and at changes in direction of piping. Install concrete inserts before concrete is placed; fasten inserts to forms and install reinforcing bars through openings at top of inserts.

E. Install mechanical-anchor fasteners in concrete after concrete is placed and completely cured. Install fasteners according to manufacturer's written instructions.

F. Install hangers and supports complete with necessary inserts, bolts, rods, nuts, washers, and other accessories.

G. Install hangers and supports to allow controlled thermal movement of piping systems, to permit freedom of movement between pipe anchors, and to facilitate action of expansion joints, expansion loops, expansion bends, and similar units.

H. Load Distribution: Install hangers and supports so that piping live and dead loads and stresses from movement will not be transmitted to connected equipment.

I. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes and so maximum pipe deflections allowed by ASME B31.9, "Building Services Piping," is not exceeded.

J. Insulated Piping: Comply with the following:
   1. Attach clamps and spacers to piping.
      a. Insulated Piping: Use thermal-hanger shield insert with clamp sized to match OD of insert.
      b. Do not exceed pipe stress limits according to ASME B31.9.
   2. Install MSS SP-58, Type 40 protective shields on cold piping with vapor barrier. Shields shall span arc of 180 deg rees.
   3. Shield Dimensions for Pipe: Not less than the following:
      a. NPS 1/4 to NPS 3-1/2 (DN 8 to DN 90): 12 inches (305 mm) long and 0.048 inch (1.22 mm) thick.
      b. NPS 4 (DN 100): 12 inches (305 mm) long and 0.06 inch (1.52 mm) thick.
      c. NPS 5 and NPS 6 (DN 125 and DN 150): 18 inches (457 mm) long and 0.06 inch (1.52 mm) thick.
      d. NPS 8 to NPS 14 (DN 200 to DN 350): 24 inches (610 mm) long and 0.075 inch (1.91 mm) thick.
      e. NPS 16 to NPS 24 (DN 400 to DN 600): 24 inches (610 mm) long and 0.105 inch (2.67 mm) thick.
   4. Pipes NPS 6 (DN 200) and Larger: Include treated wood inserts.
   5. Insert Material: Length at least as long as protective shield.
   6. Thermal-Hanger Shields: Install with insulation same thickness as piping insulation.

3.3 EQUIPMENT SUPPORTS

A. Fabricate structural-steel stands to suspend equipment from structure above or to support equipment above floor. Place grout under supports for equipment and make smooth bearing surface.

3.4 METAL FABRICATION

A. Cut, drill, and fit miscellaneous metal fabrications for heavy-duty steel trapezes and equipment supports. Fit exposed connections together to form hairline joints. Field-weld connections that cannot be shop-welded because of shipping size limitations. Comply with AWS D1.1 procedures for shielded metal arc welding, appearance and quality of welds, and methods used in correcting welding work, and with the following:
   1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
   2. Obtain fusion without undercut or overlap.

3. Remove welding flux immediately.
4. Finish welds at exposed connections so no roughness shows after finishing and contours of welded surfaces match adjacent contours.

3.5 ADJUSTING

A. Hanger Adjustment: Adjust hangers to distribute loads equally on attachments and to achieve indicated slope of pipe.

3.6 PAINTING

A. Touching Up: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces. Apply paint by brush or spray to provide a minimum dry film thickness of 2.0 mils. See Division 9 Section "Painting" for paint materials and application requirements.

B. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

END OF SECTION 15060

SECTION 15061 - HANGERS AND SUPPORTS FOR PLUMBING AND EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes hangers and supports for fire-suppression and plumbing system piping and equipment.

B. See Division 15 Sections on fire-suppression piping for additional fire-suppression piping hangers and supports requirements.

C. Design heavy-duty steel trapezes for piping to support multiple pipes capable of supporting combined weight of supported systems, system contents, and test water.

1.2 SUBMITTALS

A. Product Data: For each type of pipe hanger, channel support system component, and thermal-hanger shield insert indicated.

1.3 QUALITY ASSURANCE

A. Welding: Qualify procedures and personnel according to AWS D1.1, "Structural Welding Code--Steel."

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where subparagraph titles below introduce lists, the following requirements apply for product selection:
   1. Manufacturers: Subject to compliance with requirements, provide products by the manufacturers specified.

2.2 MANUFACTURED UNITS

A. Pipe Hangers, Supports, and Components: MSS SP-58, factory-fabricated components.
   1. Manufacturers:
      a. B-Line Systems, Inc.
      b. Grinnell Corp.
      c. Michigan Hanger Co., Inc.
   2. Galvanized, Metallic Coatings: For piping and equipment that will not have field-applied finish.

3. Nonmetallic Coatings: On attachments for electrolytic protection where attachments are in direct contact with copper tubing.

B. Channel Support Systems: MFMA-2, factory-fabricated components for field assembly.
1. Manufacturers:
   a. B-Line Systems, Inc.
   b. Grinnell Corp.
   c. Michigan Hanger Co., Inc.
   d. Unistrut Corp.
2. Coatings: Manufacturer's standard galvanized finish.
3. Nonmetallic Coatings: On attachments for electrolytic protection where attachments are in direct contact with copper tubing.

2.3 MISCELLANEOUS MATERIALS

A. Mechanical-Anchor Fasteners: Insert-type attachments with pull-out and shear capacities appropriate for supported loads and building materials where used.

B. Structural Steel: ASTM A 36/A 36M, steel plates, shapes, and bars, black and galvanized.

PART 3 - EXECUTION

3.1 APPLICATIONS

A. Specific hanger requirements are specified in Sections specifying equipment and systems.

B. Comply with MSS SP-69 for pipe hanger selections and applications that are not specified in piping system Specification Sections.

C. Horizontal-Piping Hangers and Supports: Unless otherwise indicated and except as specified in piping system Specification Sections, install the following types:
1. Adjustable Steel Clevis Hangers (MSS Type 1): For suspension of non-insulated or insulated stationary pipes, NPS 1/2 to NPS 10.

D. Vertical-Piping Clamps: Unless otherwise indicated and except as specified in piping system Specification Sections, install the following types:
1. Extension Pipe or Riser Clamps (MSS Type 8 or Type 42): For support of pipe risers, NPS 3/4 to NPS 20.

E. Building Attachments: Unless otherwise indicated and except as specified in piping system Specification Sections, install the following types:
1. Steel or Malleable Concrete Inserts (MSS Type 18): For upper attachment to
2. suspend pipe hangers from concrete ceiling.
3. Top-Beam C-Clamps (MSS Type 19): For use under roof installations with bar-joist construction to attach to top flange of structural shape.

4. Side-Beam or Channel Clamps (MSS Type 20): For attaching to bottom flange of beams, channels, or angles.
5. Center-Beam Clamps (MSS Type 21): For attaching to center of bottom flange of beams.
6. C-Clamps (MSS Type 23): For structural shapes.

F. Saddles and Shields: Unless otherwise indicated and except as specified in piping system Specification Sections, install the following types:
1. Protection Shields (MSS Type 40): Of length recommended by manufacturer to prevent crushing insulation.

G. Refer to drawings for hangers to be used in the crawl space below the Lite-Deck system.

3.2 INSTALLATION

A. Pipe Hanger and Support Installation: Comply with MSS SP-69 and MSS SP-89. Install hangers, supports, clamps, and attachments as required to properly support piping from building structure.

B. Channel Support System Installation: Arrange for grouping of parallel runs of piping and support together on field-assembled channel systems. Field assemble and install according to manufacturer's written instructions.

C. Heavy-Duty Steel Trapeze Installation: Arrange for grouping of parallel runs of horizontal piping and support together on field-fabricated, heavy-duty trapezes. Support pipes of various sizes together and space trapezes for smallest pipe size or install intermediate supports for smaller diameter pipes as specified above for individual pipe hangers. Field fabricate from ASTM A 36/A 36M, steel shapes selected for loads being supported. Weld steel according to AWS D1.1.

D. Install building attachments within concrete slabs or attach to structural steel. Space attachments within maximum piping span length indicated in MSS SP-69. Install additional attachments at concentrated loads, including valves, flanges, guides, strainers, and expansion joints, and at changes in direction of piping. Install concrete inserts before concrete is placed; fasten inserts to forms and install reinforcing bars through openings at top of inserts.

E. Install mechanical-anchor fasteners in concrete after concrete is placed and completely cured. Install fasteners according to manufacturer's written instructions.

F. Install hangers and supports complete with necessary inserts, bolts, rods, nuts, washers, and other accessories.

G. Refer to drawing details of pipe hangers for first floor “Lite Deck” framing system.

H. Install hangers and supports to allow controlled thermal movement of piping systems, to permit freedom of movement between pipe anchors, and to facilitate action of expansion joints, expansion loops, expansion bends, and similar units.

I. Load Distribution: Install hangers and supports so that piping live and dead loads and stresses from movement will not be transmitted to connected equipment.

J. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes and so maximum pipe deflections allowed by ASME B31.9, "Building Services Piping," is not exceeded.

K. Insulated Piping: Comply with the following:
   1. Install MSS SP-58, Type 40 protective shields on cold piping with vapor barrier. Shields shall span arc of 180 degrees.
   2. Shield Dimensions for Pipe: Not less than the following:
      a. NPS 1/4 to NPS 3: 12 inches long and 0.048 inch thick.
      b. NPS 4 to NPS 8: 18 inches long and 0.06 inch thick.

3.3 EQUIPMENT SUPPORTS

A. Fabricate structural-steel stands to suspend equipment from structure above or to support equipment above floor. Place grout under supports for equipment and make smooth bearing surface.

3.4 METAL FABRICATION

A. Cut, drill, and fit miscellaneous metal fabrications for heavy-duty steel trapezes and equipment supports. Fit exposed connections together to form hairline joints. Field-weld connections that cannot be shop-welded because of shipping size limitations. Comply with AWS D1.1 procedures for shielded metal arc welding, appearance and quality of welds, and methods used in correcting welding work, and with the following:
   1. Use materials and methods that minimize distortion and develop strength and
   2. corrosion resistance of base metals.
   3. Obtain fusion without undercut or overlap.
   4. Remove welding flux immediately.
   5. Finish welds at exposed connections so no roughness shows after finishing and contours of welded surfaces match adjacent contours.

3.5 ADJUSTING

A. Hanger Adjustment: Adjust hangers to distribute loads equally on attachments and to achieve indicated slope of pipe.

3.6 PAINTING

A. Touching Up: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces. Apply paint by brush or spray to provide a minimum dry film thickness of 2.0 mils. See Division 09 Section "Painting" for paint materials and application requirements.

B. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A780.

END OF SECTION 15061

SECTION 15071 – MECHANCIAL VIBRATIONS AND SEISMIC CONTROLS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following
   1. Elastomeric isolation pads and mounts.
   2. Restrained elastomeric isolation mounts.
   3. Freestanding and restrained spring isolators.
   4. Housed spring mounts.
   5. Elastomeric hangers.
   6. Spring hangers.
   7. Spring hangers with vertical-limit stops.
   8. Thrust limits.
   9. Pipe riser resilient supports.

1.2 SUBMITTALS

A. Product Data: Include load deflection curves for each vibration isolation device indicated.

1.3 QUALITY ASSURANCE

A. Welding: Qualify procedures and personnel according to AWS D1.1, "Structural Welding Code--Steel."

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where subparagraph titles below introduce lists, the following requirements apply for product selection:
   1. Manufacturers: Subject to compliance with requirements, provide products by the manufacturers specified.

2.2 VIBRATION ISOLATORS

A. Elastomeric Isolator Pads: Oil and water-resistant elastomer or natural rubber, arranged in single or multiple layers, molded with a nonslip pattern and galvanized steel base plates of sufficient stiffness for uniform loading over pad area, and factory cut to sizes that match requirements of supported equipment.
   1. Material: Standard neoprene.

B. Elastomeric Mounts: Double-deflection type, with molded, oil-resistant rubber or neoprene isolator elements with factory-drilled, encapsulated top plate for bolting to equipment and with base plate for bolting to structure. Color-code or otherwise identify to indicate capacity range.

C. Spring Isolators: Freestanding, laterally stable, open-spring isolators.
   1. Outside Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.
   2. Minimum Additional Travel: 50 percent of the required deflection at rated load.
   3. Lateral Stiffness: More than 80 percent of the rated vertical stiffness.
   4. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.
   5. Base plates: Factory drilled for bolting to structure and bonded to 1/4-inch- (6-mm-) thick, rubber isolator pad attached to base plate underside. Base plates shall limit floor load to 100 psig.
   6. Top Plate and Adjustment Bolt: Threaded top plate with adjustment bolt and cap screw to fasten and level equipment.

D. Restrained Spring Isolators: Freestanding, steel, open-spring isolators with seismic restraint.
   1. Housing: Steel with resilient vertical-limit stops to prevent spring extension due to wind loads or if weight is removed; factory-drilled base plate bonded to 1/4-inch- (6-mm-) thick, elastomeric isolator pad attached to base plate underside; and adjustable equipment mounting and leveling bolt that acts as blocking during installation.
   2. Outside Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.
   3. Minimum Additional Travel: 50 percent of the required deflection at rated load.
   4. Lateral Stiffness: More than 80 percent of the rated vertical stiffness.
   5. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.

E. Elastomeric Hangers: Double-deflection type, with molded, oil-resistant rubber or neoprene isolator elements bonded to steel housings with threaded connections for hanger rods. Color-code or otherwise identify to indicate capacity range.

F. Spring Hangers: Combination coil-spring and elastomeric-insert hanger with spring and insert in compression.
   1. Frame: Steel, fabricated for connection to threaded hanger rods and to allow for a maximum of 30 degrees of angular hanger-rod misalignment without binding or reducing isolation efficiency.
   2. Outside Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.
   3. Minimum Additional Travel: 50 percent of the required deflection at rated load.
   4. Lateral Stiffness: More than 80 percent of the rated vertical stiffness.
   5. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.
   6. Elastomeric Element: Molded, oil-resistant rubber or neoprene. Steel-washer-reinforced cup to support spring and bushing projecting through bottom of frame.

G. Spring Hangers with Vertical-Limit Stop: Combination coil-spring and elastomeric-insert hanger with spring and insert in compression and with a vertical-limit stop.
   1. Frame: Steel, fabricated for connection to threaded hanger rods and to allow for a maximum of 30 degrees of angular hanger-rod misalignment without binding or reducing isolation efficiency.
   2. Outside Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.
   3. Minimum Additional Travel: 50 percent of the required deflection at rated load.
   4. Lateral Stiffness: More than 80 percent of the rated vertical stiffness.
   5. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.
   6. Elastomeric Element: Molded, oil-resistant rubber or neoprene.
   7. Adjustable Vertical Stop: Steel washer with neoprene washer "up-stop" on lower threaded rod.

H. Pipe Riser Resilient Support: All-directional, acoustical pipe anchor consisting of 2 steel tubes separated by a minimum of 1/2-inch thick, 60-durometer neoprene. Include steel and neoprene vertical-limit stops arranged to prevent vertical travel in both directions. Design support for a maximum load on the isolation material of 500 psig and for equal resistance in all directions.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install roof curbs, equipment supports, and roof penetrations as specified in "Roof Accessories."

B. Install thrust limits at centerline of thrust, symmetrical on either side of equipment.

3.2 FIELD QUALITY CONTROL

A. Tests and Inspections:
   1. Test isolator deflection.
   2. Inspect minimum snubber clearances.

3.3 ADJUSTING

A. Adjust isolators after piping systems have been filled and equipment is at operating weight.

B. Adjust limit stops on restrained spring isolators to mount equipment at normal operating height. After equipment installation is complete, adjust limit stops so they are out of contact during normal operation.

C. Attach thrust limits at centerline of thrust and adjust to a maximum of 1/4-inch (6-mm) movement during start and stop.

D. Adjust active height of spring isolators.

E. Adjust snubbers according to manufacturer's written recommendations.

END OF SECTION 15071

SECTION 15072 - VIBRATION AND SEISMIC CONTROLS FOR PLUMBING PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Isolation pads.
   2. Isolation mounts.
   3. Restrained elastomeric isolation mounts.
   4. Freestanding and restrained spring isolators.
   5. Housed spring mounts.
   6. Elastomeric hangers.
   7. Spring hangers.
   8. Spring hangers with vertical-limit stops.
   9. Pipe riser resilient supports.
   10. Resilient pipe guides.
   11. Restraining braces and cables.

1.2 SUBMITTALS

A. Product Data: For each product indicated.

B. Delegated-Design Submittal: For vibration isolation and seismic-restraint calculations and details indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

C. Welding certificates.

D. Qualification Data: For professional engineer.

E. Field quality-control test reports.

1.3 QUALITY ASSURANCE

A. Comply with seismic-restraint requirements in the IBC unless requirements in this Section are more stringent.

B. Welding: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

C. Seismic-restraint devices shall have horizontal and vertical load testing and analysis and shall bear anchorage preapproval OPA number from OSHPD, preapproved by ICC-ES, or preapproved by another agency acceptable to authorities having jurisdiction, showing

maximum seismic-restraint ratings. Ratings based on independent testing are preferred to ratings based on calculations. If preapproved ratings are not available, submittals based on independent testing are preferred. Calculations (including combining shear and tensile loads) to support seismic-restraint designs must be signed and sealed by a qualified professional engineer.

PART 2 - PRODUCTS

2.1 VIBRATION ISOLATORS

A. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:
   1. Ace Mountings Co., Inc.
   2. Amber/Booth Company, Inc.
   3. California Dynamics Corporation.
   4. Isolation Technology, Inc.
   5. Kinetics Noise Control.
   6. Mason Industries.
   7. Vibration Eliminator Co., Inc.
   8. Vibration Isolation.
   9. Vibration Mountings & Controls, Inc.
   10. Other prior approved equal.

B. Pads: Arranged in single or multiple layers of sufficient stiffness for uniform loading over pad area, molded with a nonslip pattern and galvanized-steel baseplates, and factory cut to sizes that match requirements of supported equipment.
   1. Resilient Material: Oil- and water-resistant neoprene.

C. Mounts: Double-deflection type, with molded, oil-resistant rubber, hermetically sealed compressed fiberglass, or neoprene isolator elements with factory-drilled, encapsulated top plate for bolting to equipment and with baseplate for bolting to structure. Color-code or otherwise identify to indicate capacity range.
   1. Materials: Cast-ductile-iron or welded steel housing containing two separate and opposing, oil-resistant rubber or neoprene elements that prevent central threaded element and attachment hardware from contacting the housing during normal operation.
   2. Neoprene: Shock-absorbing materials compounded according to the standard for bridge-bearing neoprene as defined by AASHTO.

D. Restrained Mounts: All-directional mountings with seismic restraint.
   1. Materials: Cast-ductile-iron or welded steel housing containing two separate and opposing, oil-resistant rubber or neoprene elements that prevent central threaded element and attachment hardware from contacting the housing during normal operation.
   2. Neoprene: Shock-absorbing materials compounded according to the standard for bridge-bearing neoprene as defined by AASHTO.

E. Spring Isolators: Freestanding, laterally stable, open-spring isolators.

1. Outside Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.
2. Minimum Additional Travel: 50 percent of the required deflection at rated load.
3. Lateral Stiffness: More than 80 percent of rated vertical stiffness.
4. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.
5. Baseplates: Factory drilled for bolting to structure and bonded to **1/4-inch-**thick, rubber isolator pad attached to baseplate underside. Baseplates shall limit floor load to **500 psig**.
6. Top Plate and Adjustment Bolt: Threaded top plate with adjustment bolt and cap screw to fasten and level equipment.

F. Restrained Spring Isolators: Freestanding, steel, open-spring isolators with seismic or limit-stop restraint.
1. Housing: Steel with resilient vertical-limit stops to prevent spring extension due to weight being removed; factory-drilled baseplate bonded to **1/4-inch-**thick, neoprene or rubber isolator pad attached to baseplate underside; and adjustable equipment mounting and leveling bolt that acts as blocking during installation.
2. Restraint: Seismic or limit-stop as required for equipment and authorities having jurisdiction.
3. Outside Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.
4. Minimum Additional Travel: 50 percent of the required deflection at rated load.
5. Lateral Stiffness: More than 80 percent of rated vertical stiffness.
6. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.

G. Housed Spring Mounts: Housed spring isolator with integral seismic snubbers.
1. Housing: Ductile-iron or steel housing to provide all-directional seismic restraint.
2. Base: Factory drilled for bolting to structure.
3. Snubbers: Vertically adjustable to allow a maximum of **1/4-inch** travel up or down before contacting a resilient collar.

H. Elastomeric Hangers: Single or double-deflection type, fitted with molded, oil-resistant elastomeric isolator elements bonded to steel housings with threaded connections for hanger rods. Color-code or otherwise identify to indicate capacity range.

I. Spring Hangers: Combination coil-spring and elastomeric-insert hanger with spring and insert in compression.
1. Frame: Steel, fabricated for connection to threaded hanger rods and to allow for a maximum of 30 degrees of angular hanger-rod misalignment without binding or reducing isolation efficiency.
2. Outside Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.
3. Minimum Additional Travel: 50 percent of the required deflection at rated load.
4. Lateral Stiffness: More than 80 percent of rated vertical stiffness.
5. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.
6. Elastomeric Element: Molded, oil-resistant rubber or neoprene. Steel-washer-reinforced cup to support spring and bushing projecting through bottom of frame.

7. Self-centering hanger rod cap to ensure concentricity between hanger rod and support spring coil.

J. Spring Hangers with Vertical-Limit Stop: Combination coil-spring and elastomeric-insert hanger with spring and insert in compression and with a vertical-limit stop.
   1. Frame: Steel, fabricated for connection to threaded hanger rods and to allow for a maximum of 30 degrees of angular hanger-rod misalignment without binding or reducing isolation efficiency.
   2. Outside Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.
   3. Minimum Additional Travel: 50 percent of the required deflection at rated load.
   4. Lateral Stiffness: More than 80 percent of rated vertical stiffness.
   5. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.
   6. Elastomeric Element: Molded, oil-resistant rubber or neoprene.
   7. Adjustable Vertical Stop: Steel washer with neoprene washer "up-stop" on lower threaded rod.
   8. Self-centering hanger rod cap to ensure concentricity between hanger rod and support spring coil.

K. Pipe Riser Resilient Support: All-directional, acoustical pipe anchor consisting of 2 steel tubes separated by a minimum of **1/2-inch-**thick neoprene. Include steel and neoprene vertical-limit stops arranged to prevent vertical travel in both directions. Design support for a maximum load on the isolation material of **500 psig** and for equal resistance in all directions.

L. Resilient Pipe Guides: Telescopic arrangement of 2 steel tubes or post and sleeve arrangement separated by a minimum of **1/2-inch-**thick neoprene. Where clearances are not readily visible, a factory-set guide height with a shear pin to allow vertical motion due to pipe expansion and contraction shall be fitted. Shear pin shall be removable and re-insertable to allow for selection of pipe movement. Guides shall be capable of motion to meet location requirements.

2.2 SEISMIC-RESTRAINT DEVICES

A. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:
   1. Amber/Booth Company, Inc.
   2. California Dynamics Corporation.
   3. Cooper B-Line, Inc.; a division of Cooper Industries.
   4. Hilti, Inc.
   5. Kinetics Noise Control.
   6. Loos & Co.; Cableware Division.
   7. Mason Industries.
   8. TOLCO Incorporated; a brand of NIBCO INC.
   9. Unistrut; Tyco International, Ltd.
   10. Other prior approved equal

B. General Requirements for Restraint Components: Rated strengths, features, and applications shall be as defined in reports by an evaluation service member of ICC-ES, OSHPD, or an agency acceptable to authorities having jurisdiction.
   1. Structural Safety Factor: Allowable strength in tension, shear, and pullout force of components shall be at least four times the maximum seismic forces to which they will be subjected.

C. Channel Support System: MFMA-3, shop- or field-fabricated support assembly made of slotted steel channels with accessories for attachment to braced component at one end and to building structure at the other end and other matching components and with corrosion-resistant coating; and rated in tension, compression, and torsion forces.

D. Restraint Cables: ASTM A 603 galvanized-steel cables with end connections made of steel assemblies with thimbles, brackets, swivel, and bolts designed for restraining cable service; and with a minimum of two clamping bolts for cable engagement.

E. Hanger Rod Stiffener: Steel tube or steel slotted-support-system sleeve with internally bolted connections to hanger rod.

F. Bushings for Floor-Mounted Equipment Anchor Bolts: Neoprene bushings designed for rigid equipment mountings, and matched to type and size of anchor bolts and studs.

G. Resilient Isolation Washers and Bushings: One-piece, molded, oil- and water-resistant neoprene, with a flat washer face.

H. Mechanical Anchor Bolts: Drilled-in and stud-wedge or female-wedge type in zinc-coated steel for interior applications and stainless steel for exterior applications. Select anchor bolts with strength required for anchor and as tested according to ASTM E 488. Minimum length of eight times diameter.

PART 3 - EXECUTION

3.1 APPLICATIONS

A. Multiple Pipe Supports: Secure pipes to trapeze member with clamps approved for application by an evaluation service member of ICC-ES, OSHPD, or an agency acceptable to authorities having jurisdiction.

B. Hanger Rod Stiffeners: Install hanger rod stiffeners where indicated or scheduled on Drawings to receive them and where required to prevent buckling of hanger rods due to seismic forces.

C. Strength of Support and Seismic-Restraint Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static and seismic loads within specified loading limits.

3.2 VIBRATION-CONTROL AND SEISMIC-RESTRAINT DEVICE INSTALLATION

A. Equipment Restraints:
   1. Install resilient bolt isolation washers on equipment anchor bolts where clearance between anchor and adjacent surface exceeds **0.125 inches**.
   2. Install seismic-restraint devices using methods approved by an evaluation service member of ICC-ES, OSHPD, or an agency acceptable to authorities having jurisdiction providing required submittals for component.

B. Piping Restraints:
   1. Comply with requirements in MSS SP-127.
   2. Space lateral supports a maximum of **40 feet** o.c., and longitudinal supports a maximum of **80 feet** o.c.
   3. Brace a change of direction longer than **12 feet**.

C. Install cables so they do not bend across edges of adjacent equipment or building structure.

D. Install seismic-restraint devices using methods approved by an evaluation service member of ICC-ES, OSHPD, or an agency acceptable to authorities having jurisdiction providing required submittals for component.

E. Install bushing assemblies for anchor bolts for floor-mounted equipment, arranged to provide resilient media between anchor bolt and mounting hole in concrete base.

F. Attachment to Structure: If specific attachment is not indicated, anchor bracing to structure at flanges of beams, at upper truss chords of bar joists, or at concrete members.

G. Drilled-in Anchors:
   1. Identify position of reinforcing steel and other embedded items prior to drilling holes for anchors. Do not damage existing reinforcing or embedded items during coring or drilling. Notify the structural engineer if reinforcing steel or other embedded items are encountered during drilling. Locate and avoid pre-stressed tendons, electrical and telecommunications conduit, and gas lines.
   2. Do not drill holes in concrete or masonry until concrete, mortar, or grout has achieved full design strength.
   3. Wedge Anchors: Protect threads from damage during anchor installation. Heavy-duty sleeve anchors shall be installed with sleeve fully engaged in the structural element to which anchor is to be fastened.
   4. Set anchors to manufacturer's recommended torque, using a torque wrench.
   5. Install zinc-coated steel anchors for interior and stainless steel anchors for exterior applications.

3.3 ACCOMMODATION OF DIFFERENTIAL SEISMIC MOTION

A. Install flexible connections in piping where they cross seismic joints, where adjacent sections or branches are supported by different structural elements, and where the connections terminate with connection to equipment that is anchored to a different structural element from the one supporting the connections as they approach equipment.

Comply with requirements in Division 15 Section "Domestic Water Piping" for piping flexible connections.

3.4 FIELD QUALITY CONTROL

A. Perform tests and inspections.

B. Tests and Inspections:
   1. Provide evidence of recent calibration of test equipment by a testing agency acceptable to authorities having jurisdiction.
   2. Schedule test with Owner, through Architect, before connecting anchorage device to restrained component (unless post-connection testing has been approved), and with at least seven days' advance notice.
   3. Obtain Architect's approval before transmitting test loads to structure. Provide temporary load-spreading members.
   4. Test at least four of each type and size of installed anchors and fasteners selected by Architect.
   5. Test to 90 percent of rated proof load of device.
   6. Measure isolator restraint clearance.
   7. Measure isolator deflection.
   8. If a device fails test, modify all installations of same type and retest until satisfactory results are achieved.

C. Remove and replace malfunctioning units and retest as specified above.

D. Prepare test and inspection reports.

3.5 ADJUSTING

A. Adjust isolators after piping system is at operating weight.

B. Adjust limit stops on restrained spring isolators to mount equipment at normal operating height. After equipment installation is complete, adjust limit stops so they are out of contact during normal operation.

C. Adjust active height of spring isolators.

D. Adjust restraints to permit free movement of equipment within normal mode of operation.

END OF SECTION 15072

SECTION 15075 - MECHANICAL IDENTIFICATION

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following mechanical identification materials and their installation:
   1. Equipment nameplates.
   2. Equipment markers.
   3. Equipment signs.
   4. Access panel and door markers.
   5. Pipe markers.
   6. Duct markers.
   7. Valve tags.

1.2 SUBMITTALS

A. Product Data: For each type of product indicated.

1.3 QUALITY ASSURANCE

A. ASME Compliance: Comply with ASME A13.1, "Scheme for the Identification of Piping Systems," for letter size, length of color field, colors, and viewing angles of identification devices for piping.

PART 2 - PRODUCTS

2.1 EQUIPMENT IDENTIFICATION DEVICES

A. Equipment Nameplates: Metal, with data engraved or stamped, for permanent attachment on equipment.

   1. Data:

      a. Manufacturer, product name, model number, and serial number.
      b. Capacity, operating and power characteristics, and essential data.
      c. Labels of tested compliances.

   2. Location: Accessible and visible.
   3. Fasteners: As required to mount on equipment.

B. Equipment Markers: Engraved, color-coded laminated plastic. Include contact-type, permanent adhesive or affix with stainless steel screws.

   1. Terminology: Match schedules as closely as possible.

2. Data:

    a. Name and plan number.
    b. Equipment service.
    c. Design capacity.
    d. Other design parameters such as pressure drop, entering and leaving conditions, and speed.

3. Size: 2-1/2 by 4 inches for control devices, dampers, and valves; 4-1/2 by 6 inches for equipment.

C. Equipment Signs: ASTM D 709, Type I, phenolic-resin-laminate engraving stock; Grade ES-2, black surface, black phenolic core, with white melamine subcore, unless otherwise indicated. Fabricate in sizes required for message. Provide holes for mechanical fastening.

1. Engraving: Manufacturer's standard letter style, of sizes and with terms to match equipment identification.
2. Thickness: 1/16 inch, unless otherwise indicated.
3. Fasteners: Self-tapping, stainless-steel screws or contact-type, permanent adhesive.

2.2 PIPING IDENTIFICATION DEVICES

A. Manufactured Pipe Markers, General: Preprinted, color-coded, with lettering indicating service, and showing direction of flow.

1. Colors: Comply with ASME A13.1, unless otherwise indicated.
2. Lettering: Use piping system terms indicated and abbreviate only as necessary for each application length.
3. Pipes with OD, Including Insulation, Less Than 6 Inches: Full-band pipe markers extending 360 degrees around pipe at each location.
4. Pipes with OD, Including Insulation, 6 Inches and Larger: Either full-band or strip-type pipe markers at least three times letter height and of length required for label.
5. Arrows: Integral with piping system service lettering to accommodate both directions; or as separate unit on each pipe marker to indicate direction of flow.

B. Pretensioned Pipe Markers: Precoiled semirigid plastic formed to cover full circumference of pipe and to attach to pipe without adhesive.

C. Shaped Pipe Markers: Preformed semirigid plastic formed to partially cover circumference of pipe and to attach to pipe with mechanical fasteners that do not penetrate insulation vapor barrier.

D. Self-Adhesive Pipe Markers: Plastic with pressure-sensitive, permanent-type, self-adhesive back.

2.3 VALVE TAGS

A. Valve Tags: Stamped or engraved with 1/4-inch (6.4-mm) letters for piping system abbreviation and 1/2-inch (13-mm) numbers, with numbering scheme. Provide 5/32-inch (4-mm) hole for fastener.
   1. Material: 0.032-inch- (0.8-mm-) thick brass .
   2. Valve-Tag Fasteners: Brass wire-link or beaded chain; or S-hook.

PART 3 - EXECUTION

3.1 APPLICATIONS, GENERAL

A. Products specified are for applications referenced in other Division 15 Sections. If more than single-type material, device, or label is specified for listed applications, selection is Installer's option.

3.2 EQUIPMENT IDENTIFICATION

A. Install and permanently fasten equipment nameplates on each major item of mechanical equipment that does not have nameplate or has nameplate that is damaged or located where not easily visible. Locate nameplates where accessible and visible. Include nameplates for the following general categories of equipment:
   1. Pumps, compressors, chillers, condensers, and similar motor-driven units.
   2. Heat exchangers, coils, evaporators, cooling towers, heat recovery units, and similar equipment.
   3. Fans, blowers, primary balancing dampers, and mixing boxes.
   4. Packaged HVAC central-station and zone-type units.

B. Install equipment markers with permanent adhesive or stainless steel screws on or near each major item of mechanical equipment. Data required for markers may be included on signs, and markers may be omitted if both are indicated.

   1. Letter Size: Minimum 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.
   2. Data: Distinguish among multiple units, indicate operational requirements, indicate safety and emergency precautions, warn of hazards and improper operations, and identify units.
   3. Locate markers where accessible and visible. Include markers for the following general categories of equipment:

      a. Meters, gages, thermometers, and similar units.
      b. Pumps, compressors, chillers, condensers, and similar motor-driven units.
      c. Heat exchangers, coils, evaporators, cooling towers, heat recovery units, and similar equipment.
      d. Fans, blowers, primary balancing dampers, and mixing boxes.
      e. Packaged HVAC central-station and zone-type units.

C. Install equipment signs with stainless steel screws or permanent adhesive on or near each major item of mechanical equipment. Locate signs where accessible and visible.

1. Identify mechanical equipment with equipment markers in the following color codes:

   a. Green: For cooling equipment and components.
   b. Yellow: For heating equipment and components.
   c. Green and Yellow: For combination cooling and heating equipment and components.
   d. Brown: For energy-reclamation equipment and components.

2. Letter Size: Minimum 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.
3. Data: Distinguish among multiple units, indicate operational requirements, indicate safety and emergency precautions, warn of hazards and improper operations, and identify units.
4. Include signs for the following general categories of equipment:
   a. Main control and operating valves, including safety devices and hazardous units such as gas outlets.
   b. Fuel-burning units, including boilers, furnaces, heaters, stills, and absorption units.
   c. Pumps, compressors, chillers, condensers, and similar motor-driven units.
   d. Heat exchangers, coils, evaporators, cooling towers, heat recovery units, and similar equipment.
   e. Fans, blowers, primary balancing dampers, and mixing boxes.
   f. Packaged HVAC central-station and zone-type units.
   g. Tanks and pressure vessels.
   h. Strainers, filters, humidifiers, water-treatment systems, and similar equipment.

3.3 PIPING IDENTIFICATION

A. Install manufactured pipe markers indicating service on each piping system. Install with flow indication arrows showing direction of flow.
   1. Pipes with OD, Including Insulation, Less Than 6 Inches: Pretensioned pipe markers. Use size to ensure a tight fit.
   2. Pipes with OD, Including Insulation, Less Than 6 Inches: Self-adhesive pipe markers. Use color-coded, self-adhesive plastic tape, at least 1-1/2 inches wide, lapped at least 1-1/2 inches at both ends of pipe marker, and covering full circumference of pipe.

   3. Pipes with OD, Including Insulation, 6 Inches and Larger: Shaped pipe markers. Use size to match pipe and secure with fasteners.
   4. Pipes with OD, Including Insulation, 6 Inches and Larger: Self-adhesive pipe markers. Use color-coded, self-adhesive plastic tape, at least 1-1/2 inches wide, lapped at least 3 inches at both ends of pipe marker, and covering full circumference of pipe.
   5..

B. Locate pipe markers and color bands where piping is exposed in finished spaces; machine rooms; accessible maintenance spaces such as shafts, tunnels, and plenums; and exterior nonconcealed locations as follows:

1. Near each valve and control device.
2. Near each branch connection, excluding short takeoffs for fixtures and terminal units. Where flow pattern is not obvious, mark each pipe at branch.
3. Near penetrations through walls, floors, ceilings, and nonaccessible enclosures.
4. At access doors, manholes, and similar access points that permit view of concealed piping.
5. Near major equipment items and other points of origination and termination.
6. Spaced at maximum intervals of 50 feet along each run. Reduce intervals to 25 feet in areas of congested piping and equipment.
7. On piping above removable acoustical ceilings. Omit intermediately spaced markers.

3.4 VALVE-TAG INSTALLATION

A. Install tags on valves and control devices in piping systems, except check valves; valves within factory-fabricated equipment units; plumbing fixture supply stops; shutoff valves; faucets; convenience and lawn-watering hose connections; and HVAC terminal devices and similar roughing-in connections of end-use fixtures and units. List tagged valves in a valve schedule.

B. Valve-Tag Application Schedule: Tag valves according to size, shape, and color scheme and with captions similar to those indicated in the following:
1. Valve-Tag Size and Shape:

a. 1-1/2 inches (38 mm), round.

2. Valve-Tag Color:

a. Cold Water: Blue.
b. Hot Water: Red.
c. Gas: Yellow .
d. Steam: Red.
e. Condenser Water: Green

3. Letter Color:

a. All Piping: White.

3.5 ADJUSTING AND CLEANING

A. Relocate mechanical identification materials and devices that have become visually blocked by other work.

B. Clean faces of mechanical identification.

END OF SECTION 15075

SECTION 15076 – IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following mechanical identification materials and their installation:

1. Pipe markers.
2. Valve tags.

1.2 SUBMITTALS

A. Product Data: For each type of product indicated.

1.3 QUALITY ASSURANCE

A. ASME Compliance: Comply with ASME A13.1, "Scheme for the Identification of Piping Systems," for letter size, length of color field, colors, and viewing angles of identification devices for piping.

PART 2 - PRODUCTS

2.1 PIPING IDENTIFICATION DEVICES

A. Manufactured Pipe Markers, General: Preprinted, color-coded, with lettering indicating service, and showing direction of flow.

1. Colors: Comply with ASME A13.1, unless otherwise indicated.
2. Lettering: Use piping system terms indicated and abbreviate only as necessary for each application length.
3. Pipes with OD, Including Insulation, Less Than NPS 6: Full-band pipe markers extending 360 degrees around pipe at each location.
4. Pipes with OD, Including Insulation, NPS 6 and Larger: Either full-band or strip-type pipe markers at least three times letter height and of length required for label.
5. Arrows: Integral with piping system service lettering to accommodate both directions; or as separate unit on each pipe marker to indicate direction of flow.

B. Pre-tensioned Pipe Markers: Pre-coiled semi-rigid plastic formed to cover full circumference of pipe and to attach to pipe without adhesive.

C. Shaped Pipe Markers: Preformed semi-rigid plastic formed to partially cover circumference of pipe and to attach to pipe with mechanical fasteners that do not penetrate insulation vapor barrier.

D. Self-Adhesive Pipe Markers: Plastic with pressure-sensitive, permanent-type, self-adhesive back.

2.2 VALVE TAGS

A. Valve Tags: Stamped or engraved with 1/4-inch letters for piping system abbreviation and 1/2-inch numbers, with numbering scheme. Provide 5/32-inch hole for fastener.

1. Material: 0.032-inch- thick brass.
2. Valve-Tag Fasteners: Brass wire-link or beaded chain; or S-hook.

PART 3 - EXECUTION

3.1 APPLICATIONS, GENERAL

A. Products specified are for applications referenced in other Division 22 Sections. If more than single-type material, device, or label is specified for listed applications, selection is Installer's option.

3.2 PIPING IDENTIFICATION

A. Install manufactured pipe markers indicating service on each piping system. Install with flow indication arrows showing direction of flow.

1. Pipes with OD, Including Insulation, Less Than NPS 6: Pre-tensioned pipe markers. Use size to ensure a tight fit.
2. Pipes with OD, Including Insulation, Less Than NPS 6: Self-adhesive pipe markers. Use color-coded, self-adhesive plastic tape, at least 1-1/2 inches wide, lapped at least 1-1/2 inches at both ends of pipe marker, and covering full circumference of pipe.
3. Pipes with OD, Including Insulation, NPS 6 and Larger: Shaped pipe markers. Use size to match pipe and secure with fasteners.
4. Pipes with OD, Including Insulation, NPS 6 and Larger: Self-adhesive pipe markers. Use color-coded, self-adhesive plastic tape, at least 1-1/2 inches wide, lapped at least 3 inches at both ends of pipe marker, and covering full circumference of pipe.

B. Locate pipe markers and color bands where piping is exposed in finished spaces; machine rooms; accessible maintenance spaces such as shafts, tunnels, and plenums; and exterior non-concealed locations as follows:

1. Near each valve and control device.

2. Near each branch connection, excluding short takeoffs for fixtures. Where flow pattern is not obvious, mark each pipe at branch.
3. Near penetrations through walls, floors, ceilings, and non-accessible enclosures.
4. At access doors, manholes, and similar access points that permit view of concealed piping.
5. Near major equipment items and other points of origination and termination.
6. Spaced at maximum intervals of 15 feet along each run. Reduce intervals to 10 feet in areas of congested piping and equipment. Provide a minimum of one marker in each room.

3.3 VALVE-TAG INSTALLATION

A. Install tags on valves and control devices in piping systems, except check valves; valves within factory-fabricated equipment units; plumbing fixture supply stops and similar roughing-in connections of end-use fixtures. List tagged valves in a valve schedule.

B. Valve-Tag Application Schedule: Tag valves according to size, shape, and color scheme and with captions similar to those indicated in the following:

1. Valve-Tag Size and Shape:

    a. 1-1/2 inches, round.

2. Valve-Tag Color:

    a. Cold Water: Blue.
    b. Hot Water: Red.
    c. Gas: Yellow.
    d. Compressed Air: Green.

3. Letter Color:

    a. All Piping: White.

3.5 ADJUSTING AND CLEANING

A. Relocate identification materials and devices that have become visually blocked by other work.

B. Clean faces of mechanical identification.

END OF SECTION 15076

SECTION 15083 – MECHANICAL PIPE INSULATION

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes semirigid and flexible piping insulation, insulating cements, field-applied jackets, accessories and attachments, and sealing compounds.

1.2 SUBMITTALS

A. Product Data: Thermal conductivity, thickness, and jackets (both factory and field applied, if any), for each type of product indicated.

B. Shop Drawings: Shop fabrication and installation details for the following:
   1. Application of protective shields, saddles, and inserts at pipe hangers for each type of insulation and hanger.
   2. Insulation application at pipe expansion joints for each type of insulation.
   3. Insulation application at elbows, fittings, flanges, valves, and specialties for each type of insulation.
   4. Removable insulation at piping specialties and equipment connections.
   5. Application of field-applied jackets.

1.3 QUALITY ASSURANCE

A. Fire-Test-Response Characteristics: Provide products with flame-spread and smoke-developed indices of 25 and 50, respectively, according to ASTM E 84 by a testing agency acceptable to authorities having jurisdiction.

B. Insulation shall be installed by a firm whose principal business is the application and installation of thermal insulating material on piping and duct systems, with a minimum of five years experience in this principal business. Materials shall be installed by skilled mechanics in accordance with manufacturer’s standard published instructions except as otherwise specified.

C. ASBESTOS FREE INSTALLATION: All insulation and insulation materials shall be certified asbestos free. After the installation is complete, all insulation shall be labeled "ASBESTOS FREE INSULATION". The labels shall be positioned so that the labels will not be visible to a person standing on THE floor. The labels shall be fully adhered to the jacket or surface of the insulation so that the labels are not easily removed. The labels shall be located at least 10 foot on center and at each change of direction of the pipe or duct. All equipment that is insulated shall be labeled "ASBESTOS FREE INSULATION" as above. Labels shall be blue with 3/4" high white letters.

D. Provide 20 year manufacturer’s limited warranty on the insulation efficiency, moisture absorption, compressive strength, dimensional stability and combustible properties of

the installed system for indoor chilled water piping. If any of the above listed fails to meet the specified and/or installed value during the warranty period replacement insulation of equal or better quality shall be provided at no cost to the owner. The contractor shall bear the cost of all factory recommended installation procedures and factory inspections required to provide a factory approved installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Mineral-Fiber Insulation:
      a. CertainTeed Manson
      b. Knauf FiberGlass GmbH.
      c. Owens-Corning Fiberglass Corp.
      d. Schuller International, Inc.
   2. Flexible Elastomeric Thermal Insulation:
      a. Armstrong World Industries, Inc.
      b. Rubatex Corp.
   3. Foamglass insulation
      a. Pittsburgh Corning
      b. Cell-U-Foam

2.2 PIPE INSULATION MATERIALS

A. Mineral-Fiber Insulation: Glass fibers bonded with a thermosetting resin complying with the following:
   1. Preformed Pipe Insulation: Comply with ASTM C 547, Type 1, with factory-applied, all-purpose, vapor-retarder jacket.
   2. Blanket Insulation: Comply with ASTM C 553, Type II. 3/4 pcf density, type 75 insulation with ASJ. Secure joints with galvanized staples and 2-1/2" pressure sensitive foil tape.
   3. Preformed pipe insulation with wicking core: Comply with ASTM C 547, Type I, with factory applied jacket with factory cut evaporation holes. Wicking core shall be continuous along all lengths of pipe and across all fittings. Installed system shall be laboratory tested to maintain indefinite insulation dryness without dripping for the service listed under ambient conditions of 90 deg F, 90% relative humidity.
   4. Fire-Resistant Adhesive: Comply with MIL-A-3316C Class 1, Grade A for bonding glass cloth and tape to unfaced glass-fiber insulation, for sealing edges of glass-fiber insulation, and for bonding lagging cloth to unfaced glass-fiber insulation.
   5. Vapor-Retarder Mastics: Fire- and water-resistant, vapor-retarder mastic for indoor applications. Comply with MIL-C-19565C, Type II.
   6. Mineral-Fiber Insulating Cements: Comply with ASTM C 195.
   7. Expanded or Exfoliated Vermiculite Insulating Cements: Comply with ASTM C 196.

8. Mineral-Fiber, Hydraulic-Setting Insulating and Finishing Cement: Comply with ASTM C 449/C 449M.

B. Flexible Elastomeric Thermal Insulation: Closed-cell, sponge- or expanded-rubber materials. Comply with ASTM C 534, Type I for tubular materials and Type II for sheet materials.

C. Cellular Glass Insulation: Closed-cell, 100% rigid cellular glass. Comply with ASTM C 552, Type II, in 18" or 24" sections factory fitted for the vessel size.
1. Joint Sealant: Permanently resilient styrene-butadiene rubber sealant as recommended by manufacturer.

D. Field-Applied Jackets: ASTM C 921, Type 1, unless otherwise indicated.
1. Foil and Paper Jacket: Laminated, glass-fiber-reinforced, flame-retardant kraft paper and aluminum foil.
2. PVC Jacket: High-impact, ultraviolet-resistant PVC; 20 mils thick; roll stock ready for shop or field cutting and forming.
3. Standard PVC Fitting Covers: Factory-fabricated fitting covers manufactured from 20-mil- thick, high-impact, ultraviolet-resistant PVC.
4. Aluminum Jacket: Aluminum jacketing, .016" thickness with bands and seals of same material.

E. Accessories and Attachments:
1. Fiberglass insulation Glass Cloth and Tape: Comply with MIL-C-20079H, Type I for cloth and Type II for tape. Woven glass-fiber fabrics, plain weave, presized a minimum of 8 oz./sq. yd.
2. Bands: 3/4 inch wide, .016 inch thick, aluminum. Tie wire is not acceptable.

PART 3 - EXECUTION

3.1 GENERAL APPLICATION REQUIREMENTS

A. Surface Preparation: Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.

B. Site Preparation: The installation area shall be enclosed and weather proof during and after installation to prevent moisture intrusion. If insulation is water damaged, all affected insulation shall be removed and replaced with new materials. The contractor shall report in writing any incident of water damage to the design professional.

C. Apply insulation materials, accessories, and finishes according to the manufacturer's written instructions; with smooth, straight, and even surfaces; and free of voids throughout the length of pipes and fittings.

D. Use accessories compatible with insulation materials and suitable for the service indicated. Use accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.

E. Seal joints and seams with vapor-retarder mastic on insulation indicated to receive a vapor retarder. Do not use joint sealants to fill voids in excess of 1/8".

F. Apply insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by the insulation material manufacturer. Joint voids shall not exceed 1/8".

G. Apply insulation with the least number of joints practical.

H. Apply insulation over fittings and specialties, with continuous thermal and vapor-retarder integrity, unless otherwise indicated.

I. Hangers and Anchors: Where vapor retarder is indicated, seal penetrations in insulation at hangers, supports, anchors, and other projections with vapor-retarder mastic. Apply insulation continuously through hangers and around anchor attachments. Provide cellular glass blocking and saddles at support points.

J. Insulation Terminations: For insulation application where vapor retarders are indicated, seal ends with a compound recommended by the insulation material manufacturer to maintain vapor retarder.

K. Roof Penetrations: Apply insulation for interior applications to a point even with top of roof flashing.

L. Interior Wall and Partition Penetrations: Apply insulation continuously through walls and partitions except fire-rated walls and partitions. Foamglass insulation shall be continuous through rated walls with a UL listed fire stop assembly.

M. Floor Penetrations: Apply insulation continuously through floors, except rated floor assemblies. Foamglass insulation shall be continuous through rated floors with a UL listed fire stop assembly.

N. Grooved Piping: Insulation applied to grooved piping systems shall be of the material and thickness specified and factory formed to match the fittings. Field cut insulation is not acceptable.

3.2 PIPE INSULATION APPLICATION SCHEDULE

A. Service: Refrigerant suction and hot-gas piping.
   1. Operating Temperature: 35 to 50 deg F.
   2. Insulation Material: Flexible elastomeric.
   3. Insulation Thickness: 1"
   4. Field-Applied Jacket: Provide UV protective finish on all exterior insulation
   5. Vapor Retarder Required: No.

B. Service: Condensate drain piping.
   1. Operating Temperature: 35 to 50 deg F.
   2. Insulation Material: Flexible elastomeric.
   3. Insulation Thickness: 1/2"

END OF SECTION 15083

SECTION 15084 – PLUMBING PIPING INSULATION

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes semi-rigid piping insulation, insulating cements, field-applied jackets, accessories and attachments, and sealing compounds.

1.2 SUBMITTALS

A. Product Data: Thermal conductivity, thickness, and jackets (both factory and field applied, if any), for each type of product indicated.

B. Shop Drawings: Shop fabrication and installation details for the following:

1. Application of protective shields, saddles, and inserts at pipe hangers for each type of insulation and hanger.
2. Insulation application at pipe expansion joints for each type of insulation.
3. Insulation application at elbows, fittings, flanges, valves, and specialties for each type of insulation.
4. Removable insulation at piping specialties and equipment connections.
5. Application of field-applied jackets.

C. LEED Submittals:
1. Product Data for Credit IEQ 4.1: For adhesives and sealants, documentation including printed statement of VOC content and chemical components.
2. Laboratory Test Reports for Credit IEQ 4: For adhesives and sealants, documentation indicating that product complies with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

1.3 QUALITY ASSURANCE

A. Fire-Test-Response Characteristics: Provide products with flame-spread and smoke-developed indices of 25 and 50, respectively, according to ASTM E 84 by a testing agency acceptable to authorities having jurisdiction.

B. Insulation shall be installed by a firm whose principal business is the application and installation of thermal insulating material on piping and duct systems, with a minimum of five years experience in this principal business. Materials shall be installed by skilled mechanics in accordance with manufacturer’s standard published instructions except as otherwise specified.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Mineral-Fiber Insulation:

   a. Johns Manville
   b. Knauf
   c. Owens Corning

2. Flexible Elastomeric Thermal Insulation:

   a. Armstrong World Industries, Inc.
   b. Rubatex Corp.

2.2 PIPE INSULATION MATERIALS

A. Mineral-Fiber Insulation: Glass fibers bonded with a thermosetting resin complying with the following:

1. Preformed Pipe Insulation: Comply with ASTM C 547, Type 1, with factory-applied, all-purpose, vapor-retarder jacket.
2. Blanket Insulation: Comply with ASTM C 553, Type II. 3/4 PCF density, type 75 insulation with ASJ. Secure joints with galvanized staples and 2-1/2" pressure sensitive foil tape.
3. Fire-Resistant Adhesive: Comply with MIL-A-3316C Class 1, Grade A for bonding glass cloth and tape to un-faced glass-fiber insulation, for sealing edges of glass-fiber insulation, and for bonding lagging cloth to un-faced glass-fiber insulation.
4. Vapor-Retarder Mastics: Fire- and water-resistant, vapor-retarder mastic for indoor applications. Comply with MIL-C-19565C, Type II.
5. Mineral-Fiber Insulating Cements: Comply with ASTM C 195.

B. Flexible Elastomeric Thermal Insulation: Closed-cell, sponge- or expanded-rubber materials. Comply with ASTM C 534, Type I for tubular materials and Type II for sheet materials.

C. Field-Applied Jackets: ASTM C 921, Type 1, unless otherwise indicated.

1. Foil and Paper Jacket: Laminated, glass-fiber-reinforced, flame-retardant kraft paper and aluminum foil.
2. PVC Jacket: High-impact, ultraviolet-resistant PVC; 20 mils thick; roll stock ready for shop or field cutting and forming.
3. Standard PVC Fitting Covers: Factory-fabricated fitting covers manufactured from 20 mils thick, high-impact, ultraviolet-resistant PVC.

4. Aluminum Jacket: Aluminum jacketing, .016" thickness with bands and seals of same material.

D. Accessories and Attachments:

1. Fiberglass insulation Glass Cloth and Tape: Comply with MIL-C-20079H, Type I for cloth and Type II for tape. Woven glass-fiber fabrics, plain weave, pre-sized a minimum of 8 oz/sq yd.
2. Bands: 3/4 inch wide, 0.016 inch thick, aluminum. Tie wire is not acceptable.

PART 3 - EXECUTION

3.1 GENERAL APPLICATION REQUIREMENTS

A. Surface Preparation: Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.

B. Site Preparation: The installation area shall be enclosed and weather proof during and after installation to prevent moisture intrusion. If insulation is water damaged, all affected insulation shall be removed and replaced with new materials. The Contractor shall report in writing any incident of water damage to the design professional.

C. Apply insulation materials, accessories, and finishes according to the manufacturer's written instructions; with smooth, straight, and even surfaces; and free of voids throughout the length of pipes and fittings.

D. Use accessories compatible with insulation materials and suitable for the service indicated. Use accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.

E. Seal joints and seams with vapor-retarder mastic on insulation indicated to receive a vapor retarder. Do not use joint sealants to fill voids in excess of 1/8".

F. Apply insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by the insulation material manufacturer. Joint voids shall not exceed 1/8".

G. Apply insulation with the least number of joints practical.

H. Apply insulation over fittings and specialties, with continuous thermal and vapor-retarder integrity, unless otherwise indicated.

I. Hangers and Anchors: Where vapor retarder is indicated, seal penetrations in insulation at hangers, supports, anchors, and other projections with vapor-retarder mastic. Apply insulation continuously through hangers and around anchor attachments. Provide cellular glass blocking and saddles at support points.

J. Insulation Terminations: For insulation application where vapor retarders are indicated, seal ends with a compound recommended by the insulation material manufacturer to maintain vapor retarder.

K. Interior Wall and Partition Penetrations: Apply insulation continuously through walls and partitions, except fire-rated walls and partitions where insulation shall be continuous through rated walls with a UL listed fire stop assembly.

L. Floor Penetrations: Apply insulation continuously through floors, except rated floor assemblies, where insulation shall be continuous through rated floors with a UL listed fire stop assembly.

3.2 PIPE INSULATION APPLICATION SCHEDULE

A. Service: Domestic cold water. Insulate all domestic cold water except piping drops in walls and headers in walls serving fixtures.

1. Operating Temperature: 35 to 80 degrees F.
2. Insulation Material: Mineral-fiber preformed pipe.
3. Insulation Thickness: 1/2"
4. Jacket: All service jacket with self sealing laps on all pipe. Provide preformed PVC jackets for all fittings.
5. Field-Applied Jacket: Aluminum jacket where piping is exposed to view.

B. Service: Domestic hot water. Applies to all piping materials.

1. Operating Temperature: 60 to 140 degrees F.
2. Insulation Material: Mineral fiber.
3. Insulation Thickness: Size according to the following table:

Pipe Size	Insulation thickness
≤ 1-1/4"	1/2"
≥ 1-1/2"	1"

4. Jacket: All service jacket with self sealing laps on all pipe. Provide preformed PVC jackets for all fittings.
5. Field-Applied Jacket: Aluminum jacket where piping is exposed to view.

C. Service: Roof drain bodies, roof drain horizontal piping above ceilings, sanitary sewer horizontal piping carrying cold waste including but not limited to water coolers, ice makers and HVAC condensate, etc. above ceilings:

1. Operating Temperature: 32 to 100 degrees F.
2. Insulation Material: Mineral fiber Blanket.
3. Insulation Thickness: 1-1/2"
4. Jacket: Foil and paper.
5. Vapor Retarder Required: Yes.

END OF SECTION 15084

SECTION 15091 - SLEEVES AND SLEEVE SEALS FOR HVAC PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Sleeves.
2. Grout.

PART 2 - PRODUCTS

2.1 SLEEVES

A. Cast-Iron Wall Pipes: Cast or fabricated of cast or ductile iron and equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop unless otherwise indicated.

B. Galvanized-Steel Wall Pipes: ASTM A 53/A 53M, Schedule 40, with plain ends and welded steel collar; zinc coated.

C. Galvanized-Steel-Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, zinc coated, with plain ends.

D. PVC-Pipe Sleeves: ASTM D 1785, Schedule 40.

E. Galvanized-Steel-Sheet Sleeves: 0.0239-inch minimum thickness; round tube closed with welded longitudinal joint.

2.2 GROUT

A. Standard: ASTM C 1107/C 1107M, Grade B, post-hardening and volume-adjusting, dry, hydraulic-cement grout.

B. Characteristics: Nonshrink; recommended for interior and exterior applications.

C. Design Mix: 5000-psi, 28-day compressive strength.

D. Packaging: Premixed and factory packaged.

PART 3 - EXECUTION

3.1 SLEEVE INSTALLATION

A. Install sleeves for piping passing through penetrations in floors, partitions, roofs, and walls.

1. Sleeves are not required for core-drilled holes.

B. Install sleeves in concrete floors, concrete roof slabs, and concrete walls as new slabs and walls are constructed.

1. Cut sleeves to length for mounting flush with both surfaces.

a. Exception: Extend sleeves installed in floors of mechanical equipment areas or other wet areas 2 inches above finished floor level.

2. Using grout, seal the space outside of sleeves in slabs and walls.

C. Install sleeves for pipes passing through interior partitions.

1. Cut sleeves to length for mounting flush with both surfaces.
2. Install sleeves that are large enough to provide 1/4-inch annular clear space between sleeve and pipe or pipe insulation.
3. Seal annular space between sleeve and piping or piping insulation; use joint sealants appropriate for size, depth, and location of joint. Comply with requirements for sealants specified in Division 07 Section "Joint Sealants."

D. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestop materials. Comply with requirements for firestopping specified in Division 07 Section "Penetration Firestopping."

3.2 SLEEVE SCHEDULE

A. Use sleeves for the following piping-penetration applications:

1. Exterior Concrete Walls above/below Grade: Galvanized-steel wall sleeves.

2. Concrete Slabs above Grade: PVC-pipe sleeves.

a. Piping Smaller Than NPS 6: PVC-pipe sleeves.
b. Piping NPS 6 and Larger: PVC-pipe sleeves.

3. Interior Partitions:

a. Piping Smaller Than NPS 6: PVC-pipe sleeves.
b. Piping NPS 6 and Larger: Galvanized-steel-sheet sleeves.

END OF SECTION 15091

SECTION 15092 - SLEEVES AND SLEEVE SEALS FOR PLUMBING PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Sleeves.
2. Stack-sleeve fittings.
3. Sleeve-seal systems.
4. Sleeve-seal fittings.
5. Grout.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

PART 2 - PRODUCTS

2.1 SLEEVES

A. Cast-Iron Wall Pipes: Cast or fabricated of cast or ductile iron and equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop unless otherwise indicated.

B. Galvanized-Steel Wall Pipes: ASTM A 53/A 53M, Schedule 40, with plain ends and welded steel collar; zinc coated.

C. Galvanized-Steel-Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, zinc coated, with plain ends.

D. PVC-Pipe Sleeves: ASTM D 1785, Schedule 40.

E. Galvanized-Steel-Sheet Sleeves: 0.0239-inch minimum thickness; round tube closed with welded longitudinal joint.

F. Molded-PE or -PP Sleeves: Removable, tapered-cup shaped, and smooth outer surface with nailing flange for attaching to wooden forms.

G. Molded-PVC Sleeves: With nailing flange for attaching to wooden forms.

2.2 STACK-SLEEVE FITTINGS

A. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

1. Smith, Jay R. Mfg. Co.
2. Zurn Specification Drainage Operation; Zurn Plumbing Products Group.
3. Other prior approved equal.

B. Description: Manufactured, cast-iron sleeve with integral clamping flange. Include clamping ring, bolts, and nuts for membrane flashing.

1. Underdeck Clamp: Clamping ring with setscrews.

2.3 SLEEVE-SEAL SYSTEMS

A. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

1. Advance Products & Systems, Inc.
2. CALPICO, Inc.
3. Metraflex Company (The).
4. Pipeline Seal and Insulator, Inc.
5. Proco Products, Inc.
6. Other prior approved equal.

B. Description: Modular sealing-element unit, designed for field assembly, for filling annular space between piping and sleeve.

1. Sealing Elements: EPDM-rubber interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe.
2. Pressure Plates: Carbon steel.
3. Connecting Bolts and Nuts: Carbon steel, with corrosion-resistant coating, of length required to secure pressure plates to sealing elements.

2.4 SLEEVE-SEAL FITTINGS

A. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

1. Presealed Systems.
2. Other prior approved equal.

B. Description: Manufactured plastic, sleeve-type, waterstop assembly made for imbedding in concrete slab or wall. Unit has plastic or rubber waterstop collar with center opening to match piping OD.

2.5 GROUT

A. Standard: ASTM C 1107/C 1107M, Grade B, post-hardening and volume-adjusting, dry, hydraulic-cement grout.

B. Characteristics: Nonshrink; recommended for interior and exterior applications.

C. Design Mix: 5000-psi, 28-day compressive strength.

D. Packaging: Premixed and factory packaged.

PART 3 - EXECUTION

3.1 SLEEVE INSTALLATION

A. Install sleeves for piping passing through penetrations in floors, partitions, roofs, and walls.

B. For sleeves that will have sleeve-seal system installed, select sleeves of size large enough to provide 1-inch annular clear space between piping and concrete slabs and walls.

1. Sleeves are not required for core-drilled holes.

C. Install sleeves in concrete floors, concrete roof slabs, and concrete walls as new slabs and walls are constructed.

1. Permanent sleeves are not required for holes in slabs formed by molded-PE or -PP sleeves.
2. Cut sleeves to length for mounting flush with both surfaces.

a. Exception: Extend sleeves installed in floors of mechanical equipment areas or other wet areas 2 inches above finished floor level.

3. Using grout, seal the space outside of sleeves in slabs and walls without sleeve-seal system.

D. Install sleeves for pipes passing through interior partitions.

1. Cut sleeves to length for mounting flush with both surfaces.
2. Install sleeves that are large enough to provide 1/4-inch annular clear space between sleeve and pipe or pipe insulation.
3. Seal annular space between sleeve and piping or piping insulation; use joint sealants appropriate for size, depth, and location of joint. Comply with requirements for sealants specified in Division 07 Section "Joint Sealants."

E. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestop materials. Comply with requirements for firestopping specified in Division 07 Section "Penetration Firestopping."

3.2 STACK-SLEEVE-FITTING INSTALLATION

A. Install stack-sleeve fittings in new slabs as slabs are constructed.

1. Install fittings that are large enough to provide 1/4-inch annular clear space between sleeve and pipe or pipe insulation.
2. Secure flashing between clamping flanges for pipes penetrating floors with membrane waterproofing. Comply with requirements for flashing specified in Division 07 Section "Sheet Metal Flashing and Trim."
3. Install section of cast-iron soil pipe to extend sleeve to 2 inches above finished floor level.
4. Extend cast-iron sleeve fittings below floor slab as required to secure clamping ring if ring is specified.
5. Using grout, seal the space around outside of stack-sleeve fittings.

B. Fire-Barrier Penetrations: Maintain indicated fire rating of floors at pipe penetrations. Seal pipe penetrations with firestop materials. Comply with requirements for firestopping specified in Division 07 Section "Penetration Firestopping."

3.3 SLEEVE-SEAL-SYSTEM INSTALLATION

A. Install sleeve-seal systems in sleeves in exterior concrete walls and slabs-on-grade at service piping entries into building.

B. Select type, size, and number of sealing elements required for piping material and size and for sleeve ID or hole size. Position piping in center of sleeve. Center piping in penetration, assemble sleeve-seal system components, and install in annular space between piping and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make a watertight seal.

3.4 SLEEVE-SEAL-FITTING INSTALLATION

A. Install sleeve-seal fittings in new walls and slabs as they are constructed.

B. Assemble fitting components of length to be flush with both surfaces of concrete slabs and walls. Position waterstop flange to be centered in concrete slab or wall.

C. Secure nailing flanges to concrete forms.

D. Using grout, seal the space around outside of sleeve-seal fittings.

3.5 SLEEVE AND SLEEVE-SEAL SCHEDULE

A. Use sleeves and sleeve seals for the following piping-penetration applications:

1. Exterior Concrete Walls above Grade:

a. Piping Smaller Than NPS 6: Galvanized-steel wall sleeves or Galvanized-steel-pipe sleeves, Sleeve-seal fittings.
b. Piping NPS 6 and Larger: Galvanized-steel wall sleeves or Galvanized-steel-pipe sleeves.

2. Exterior Concrete Walls below Grade:

a. Piping Smaller Than NPS 6: Galvanized-steel wall sleeves with sleeve-seal system or Galvanized-steel-pipe sleeves with sleeve-seal system, Sleeve-seal fittings.
   1) Select sleeve size to allow for 1-inch annular clear space between piping and sleeve for installing sleeve-seal system.
b. Piping NPS 6 and Larger: Galvanized-steel wall sleeves with sleeve-seal system or Galvanized-steel-pipe sleeves with sleeve-seal system.
   1) Select sleeve size to allow for 1-inch annular clear space between piping and sleeve for installing sleeve-seal system.

3. Concrete Slabs-on-Grade:

a. Piping Smaller Than NPS 6: Galvanized-steel wall sleeves with sleeve-seal system or Galvanized-steel-pipe sleeves with sleeve-seal system, Sleeve-seal fittings.
   1) Select sleeve size to allow for 1-inch annular clear space between piping and sleeve for installing sleeve-seal system.

b. Piping NPS 6 and Larger: Galvanized-steel wall sleeves with sleeve-seal system or Galvanized-steel-pipe sleeves with sleeve-seal system.
   1) Select sleeve size to allow for 1-inch annular clear space between piping and sleeve for installing sleeve-seal system.

4. Concrete Slabs above Grade:

a. Piping Smaller Than NPS 6: Galvanized-steel-pipe sleeves or PVC-pipe sleeves, Stack-sleeve fittings.
b. Piping NPS 6 and Larger: Galvanized-steel-pipe sleeves or PVC-pipe sleeves, Stack-sleeve fittings.

5. Interior Partitions:

a. Piping Smaller Than NPS 6: Galvanized-steel-pipe sleeves or PVC-pipe sleeves.
b. Piping NPS 6 and Larger: Galvanized-steel-sheet sleeves.

END OF SECTION 15092

SECTION 15110 – VALVES FOR PLUMBING PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following general-duty valves:
   1. Copper-alloy ball valves.
   2. Ferrous-alloy butterfly valves.
   3. Bronze check valves.

B. See Division 15 Section "Fire Protection Piping, Valves and Accessories" for fire suppression valves.

C. See Division 15 Section “Plumbing Specialties” for specialty valves.

1.2 SUBMITTALS

A. Product Data: For each type of valve indicated. Include body, seating, and trim materials; valve design; pressure and temperature classifications; end connections; arrangement; dimensions; and required clearances. Include list indicating valve and its application. Include rated capacities; furnished specialties; and accessories.

1.3 QUALITY ASSURANCE

A. ASME Compliance: ASME B31.9 for building services piping valves.

B. ASME Compliance for Ferrous Valves: ASME B16.10 and ASME B16.34 for dimension and design criteria.

C. NSF Compliance: NSF 61 for valve materials for potable-water service.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers are listed below each valve type.

2.2 VALVES, GENERAL

A. Refer to Part 3 "Valve Applications" Article for applications of valves.

B. Bronze Valves: NPS 2 and Smaller: Threaded ends, unless otherwise indicated.

C. Ferrous Valves NPS 2-1/2 and Larger: Flanged ends, unless otherwise indicated.

D. Valve Pressure and Temperature Ratings: Not less than indicated and as required for system pressures and temperatures.

E. Valve Sizes: Same as upstream pipe, unless otherwise indicated.

F. Valve Actuators:

1. Lever Handle: For quarter-turn valves NPS 6 and smaller, except plug valves.

G. Extended Valve Stems: On insulated valves.

H. Valve Flanges: ASME B16.1 for cast-iron valves, ASME B16.5 for steel valves and ASME B16.24 for bronze valves.

I. Valve Grooved Ends: AWWA C606.

J. Solder Joint: With sockets according to ASME B16.18.

1. Caution: Use solder with melting point below 840 degrees F for check valves; below 421 degrees F for all ball valves.

K. Threaded: With threads according to ASME B1.20.1.

L. PEX Connections: Cold expansion type joint according to ASTM F 1960.

M. Valve Bypass and Drain Connections: MSS SP-45.

2.3 CHECK VALVES

A. Check valves, except non-slamming check valves, NPS 2 and smaller shall be Class 125 (125 PSI SWP / 200 PSI WOG) bronze body and trim, threaded ends, and conform to MSS SP-80.

B. Check valves shall be installed where shown on drawings and where required for satisfactory system operation.

2.4 NON-SLAMMING CHECK VALVES

A. Non-slamming or silent check valves shall be of the fully guided conical type, torsion spring actuated, or cone and diaphragm type. Bodies shall be constructed of cast iron, cast steel, stainless steel, or cast bronze in accordance with the following specifications:

Cast Iron: ASTM A-126 Class B or ASTM A-48 Class 35.

Cast Steel: ASTM A-216 Class WCB.

Cast Bronze: ASTM B-61 or ASTM B-584.

B. Seats and discs shall be constructed of bronze complying with ASTM B-62 or ASTM B-584 with torsion springs constructed of 300 series or 18-8 stainless steel. Seats may be of an elastomer suitable for 250 degrees F minimum continuous operating

temperature, or not less than 50 degrees F above the operating temperature of the system, whichever is higher. All mating surfaces of the closure faces shall be of bronze or Type 304, 316, or 17-4PH stainless steel, or elastomer, approved for the particular service, and materials must be compatible to prevent electrolytic action. Pressure loss through the valves, measured in feet of water, shall not exceed six tenths of the water velocity in feet per second.

C. Non-slamming check valves shall provide bubble-tight shutoff when handling water up to 250 degree F, and shall be designed to prevent rubbing of seat material when opening and closing. Poppet type valves shall have conical springs.

2.5 BALL VALVES:

A. All ball valves and their components shall be designed for a minimum working pressure of 600 PSI WOG and conform to MSS-SP-110. All non-metallic components and elastomers shall be suitable for 250 degrees F minimum continuous operating temperature, or not less than 50 degrees F above the operating temperature of the system, whichever is higher. All mating surfaces of closure faces shall be of bronze or Type 300 series or 17-4PH stainless steel, or elastomer, approved for the particular service, and materials must be compatible to prevent poisoning of contact surfaces of different materials (electrolytic action). Each valve shall be provided with a handle or wheel which shall be secured to the stem or chained to the valve body.

B. Ball valves shall be used on lines NPS 2-1/2 and smaller. Valves shall have bronze bodies with chrome-plated balls, threaded ends, and shall conform to MSS SP-110. Valves may be 2-piece or 3-piece bolt-through body. Valves used for balancing shall have balancing/memory stops included with valve. Use stem extensions on all insulated lines.

2.6 BUTTERFLY VALVES

A. Butterfly valves may be used on lines larger than NPS 2-1/2. Valves shall be structurally designed to provide closure against the system operating pressure. Valve shaft shall be of Type 316, 416 or 17-4PH stainless steel. Shaft seals shall be of the "O" ring type. Stems, discs and operators shall be designed for a water velocity of 16 feet per second through the nominal pipe area. Bodies shall be lugged or flanged type. Valves flanges shall be of the same class as required for the lines in which they are installed. Valves 8 inches and larger shall be provided with enclosed worm gear type operators permanently lubricated. Valves which serve to isolate system to permit removal of equipment shall have bodies with integral flanges, or full lugs drilled and tapped, to hold valve in place when piping or equipment is removed, and be capable of dead-end service to 150 PSI without use of the downstream flange. Valves installed with mechanical couplings shall be grooved or shouldered ends suitable for the approved couplings. Valves in insulated lines shall have extended necks to extend a minimum of 1" beyond the insulation and jacket.

2.7 ACCEPTABLE MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Apollo
2. Hammond
3. Milwaukee

PART 3 - EXECUTION

3.1 VALVE APPLICATIONS

A. Refer to piping Sections for specific valve applications. If valve applications are not indicated, use the following:

1. Shutoff Service: Ball or butterfly valves.
2. Throttling Service: Ball and butterfly valves.
3. Pump Discharge: Non-slamming check valves.

B. If valves with specified SWP classes or CWP ratings are not available, the same types of valves with higher SWP class or CWP ratings may be substituted.

C. Valves shall be Class 125 (125 PSI SWP/200 PSI WOG) or 150 percent of the system operating pressure, whichever is the greater.

3.2 VALVE INSTALLATION

A. Piping installation requirements are specified in other Division 15 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Install valves with unions or flanges at each piece of equipment arranged to allow service, maintenance, and equipment removal without system shutdown.

C. Locate valves for easy access.

D. Install valves in horizontal piping with stem at or above center of pipe.

E. Install valves in position to allow full stem movement.

F. Install check valves for proper direction of flow.

3.3 JOINT CONSTRUCTION

A. Refer to Division 15 Section "Basic Materials and Methods" for basic piping joint construction.

B. Grooved Joints: Assemble joints with keyed coupling housing, gasket, lubricant, and bolts according to coupling and fitting manufacturer's written instructions.

C. Soldered Joints: Use ASTM B 813, water-flushable, lead-free flux; ASTM B 32, lead-free-alloy solder; and ASTM B 828 procedure, unless otherwise indicated. Use silver soldered joints for all chilled and hot water piping applications.

3.4 ADJUSTING

A. Adjust or replace valve packing after piping systems have been tested and put into service but before final adjusting and balancing. Replace valves if persistent leaking occurs.

END OF SECTION 15110

SECTION 15122 - METERS AND GAUGES FOR HVAC PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Bimetallic-actuated thermometers.
2. Liquid-in-glass thermometers.
3. Thermowells.
4. Dial-type pressure gauges.
5. Gauge attachments.
6. Pitot-tube flowmeters.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Wiring Diagrams: For power, signal, and control wiring.

1.3 INFORMATIONAL SUBMITTALS

A. Product certificates.

1.4 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

PART 2 - PRODUCTS

2.1 BIMETALLIC-ACTUATED THERMOMETERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

B. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

1. Ashcroft Inc.
2. Ernst Flow Industries.
3. Marsh Bellofram.
4. Miljoco Corporation.
5. Nanmac Corporation.

6. Noshok.
7. Palmer Wahl Instrumentation Group.
8. REOTEMP Instrument Corporation.
9. Tel-Tru Manufacturing Company.
10. Trerice, H. O. Co.
11. Watts Regulator Co.; a div. of Watts Water Technologies, Inc.
12. Weiss Instruments, Inc.
13. WIKA Instrument Corporation - USA.
14. Winters Instruments - U.S.

C. Standard: ASME B40.200.

D. Case: Liquid-filled type(s); stainless steel with 3-inch nominal diameter.

E. Dial: Nonreflective aluminum with permanently etched scale markings and scales in deg F.

F. Connector Type(s): Union joint, adjustable angle, with unified-inch screw threads.

G. Connector Size: 1/2 inch, with ASME B1.1 screw threads.

H. Stem: 0.25 or 0.375 inch in diameter; stainless steel.

I. Window: Plain glass or plastic.

J. Ring: Stainless steel.

K. Element: Bimetal coil.

L. Pointer: Dark-colored metal.

M. Accuracy: Plus or minus 1 percent of scale range.

2.2 LIQUID-IN-GLASS THERMOMETERS

A. Metal-Case, Industrial-Style, Liquid-in-Glass Thermometers:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
2. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

    a. Flo Fab Inc.
    b. Miljoco Corporation.
    c. Palmer Wahl Instrumentation Group.
    d. Tel-Tru Manufacturing Company.
    e. Trerice, H. O. Co.
    f. Weiss Instruments, Inc.
    g. Winters Instruments - U.S.

3. Standard: ASME B40.200.
4. Case: Cast aluminum; 7-inch nominal size unless otherwise indicated.
5. Case Form: Adjustable angle unless otherwise indicated.
6. Tube: Glass with magnifying lens and blue or red organic liquid.
7. Tube Background: Nonreflective aluminum with permanently etched scale markings graduated in deg F.
8. Window: Glass or plastic.
9. Stem: Aluminum and of length to suit installation.

    a. Design for Air-Duct Installation: With ventilated shroud.
    b. Design for Thermowell Installation: Bare stem.

10. Connector: 1-1/4 inches, with ASME B1.1 screw threads.
11. Accuracy: Plus or minus 1 percent of scale range or one scale division, to a maximum of 1.5 percent of scale range.

2.3 DUCT-THERMOMETER MOUNTING BRACKETS

A. Description: Flanged bracket with screw holes, for attachment to air duct and made to hold thermometer stem.

2.4 THERMOWELLS

A. Thermowells:

1. Standard: ASME B40.200.
2. Description: Pressure-tight, socket-type fitting made for insertion into piping tee fitting.
3. Material for Use with Copper Tubing: CNR or CUNI.
4. Material for Use with Steel Piping: CRES.
5. Type: Stepped shank unless straight or tapered shank is indicated.
6. External Threads: NPS 1/2, NPS 3/4, or NPS 1, ASME B1.20.1 pipe threads.
7. Internal Threads: 1/2, 3/4, and 1 inch, with ASME B1.1 screw threads.
8. Bore: Diameter required to match thermometer bulb or stem.
9. Insertion Length: Length required to match thermometer bulb or stem.
10. Lagging Extension: Include on thermowells for insulated piping and tubing.
11. Bushings: For converting size of thermowell's internal screw thread to size of thermometer connection.

B. Heat-Transfer Medium: Mixture of graphite and glycerin.

2.5 PRESSURE GAUGES

A. Direct-Mounted, Metal-Case, Dial-Type Pressure Gauges:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

2. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

    a. AMETEK, Inc.; U.S. Gauge.
    b. Ashcroft Inc.
    c. Ernst Flow Industries.
    d. Flo Fab Inc.
    e. Marsh Bellofram.
    f. Miljoco Corporation.
    g. Noshok.
    h. Palmer Wahl Instrumentation Group.
    i. REOTEMP Instrument Corporation.
    j. Tel-Tru Manufacturing Company.
    k. Trerice, H. O. Co.
    l. Watts Regulator Co.; a div. of Watts Water Technologies, Inc.
    m. Weiss Instruments, Inc.
    n. WIKA Instrument Corporation - USA.
    o. Winters Instruments - U.S.

3. Standard: ASME B40.100.
4. Case: Liquid-filled type(s); cast aluminum or drawn steel; 4-1/2-inch nominal diameter.
5. Pressure-Element Assembly: Bourdon tube unless otherwise indicated.
6. Pressure Connection: Brass, with NPS 1/4 or NPS 1/2, ASME B1.20.1 pipe threads and bottom-outlet type unless back-outlet type is indicated.
7. Movement: Mechanical, with link to pressure element and connection to pointer.
8. Dial: Nonreflective aluminum with permanently etched scale markings graduated in psi.
9. Pointer: Dark-colored metal.
10. Window: Glass or plastic.
11. Ring: Metal.
12. Accuracy: Grade A, plus or minus 1 percent of middle half of scale range.

2.6 GAUGE ATTACHMENTS

A. Snubbers: ASME B40.100, brass; with NPS 1/4 or NPS 1/2, ASME B1.20.1 pipe threads and piston-type surge-dampening device. Include extension for use on insulated piping.

B. Siphons: Loop-shaped section of brass pipe with NPS 1/4 or NPS 1/2 pipe threads.

C. Valves: Brass ball, with NPS 1/4 or NPS 1/2, ASME B1.20.1 pipe threads.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install thermowells with socket extending a minimum of 2 inches into fluid and in vertical position in piping tees.

B. Install thermowells of sizes required to match thermometer connectors. Include bushings if required to match sizes.

C. Install thermowells with extension on insulated piping.

D. Fill thermowells with heat-transfer medium.

E. Install direct-mounted thermometers in thermowells and adjust vertical and tilted positions.

F. Install remote-mounted thermometer bulbs in thermowells and install cases on panels; connect cases with tubing and support tubing to prevent kinks. Use minimum tubing length.

G. Install direct-mounted pressure gauges in piping tees with pressure gauge located on pipe at the most readable position.

H. Install valve and snubber in piping for each pressure gauge for fluids (except steam).

I. Install permanent indicators on walls or brackets in accessible and readable positions.

J. Install connection fittings in accessible locations for attachment to portable indicators.

K. Mount thermal-energy meters on wall if accessible; if not, provide brackets to support meters.

L. Install thermometers in the following locations:

1. Two inlets and two outlets of each chiller.
2. Inlet and outlet of each boiler.
3. Inlet and outlet of each hydronic coil in air-handling units.

M. Install pressure gauges in the following locations:

1. Discharge of each pressure-reducing valve.
2. Inlet and outlet of each chiller chilled-water and condenser-water connection.
3. Suction and discharge of each pump.
4. Inlet and outlet of each boiler.

3.2 CONNECTIONS

A. Install meters and gauges adjacent to machines and equipment to allow service and maintenance of meters, gauges, machines, and equipment.

3.3 ADJUSTING

A. After installation, calibrate meters according to manufacturer's written instructions.

B. Adjust faces of meters and gauges to proper angle for best visibility.

3.4 THERMOMETER SCHEDULE

A. Thermometers at inlets and outlets of each chiller shall be one of the following:
   1. Industrial-style, liquid-in-glass type.

B. Thermometers at inlet and outlet of each hydronic coil in air-handling units and built-up central systems shall be one of the following:
   1. Industrial-style, liquid-in-glass type.

C. Thermometer stems shall be of length to match thermowell insertion length.

3.5 THERMOMETER SCALE-RANGE SCHEDULE

A. Scale Range for Chilled-Water Piping: 0 to 150 deg F.

B. Scale Range for Condenser-Water Piping: 0 to 250 deg F.

C. Scale Range for Heating Hot Water Piping: 0 to 250 deg F.

3.6 PRESSURE-GAUGE SCHEDULE

A. Pressure gauges at inlet and outlet of each chiller chilled-water and condenser-water connection shall be one of the following:

   1. Liquid-filled, direct-mounted, metal case.

B. Pressure gauges at suction and discharge of each pump shall be one of the following:

   1. Liquid-filled, direct-mounted, metal case.

3.7 PRESSURE-GAUGE SCALE-RANGE SCHEDULE

A. Scale Range for Chilled-Water Piping: 0 to 150 psi.

B. Scale Range for Condenser-Water Piping: 0 to 150 psi.

C. Scale Range for Heating Hot-Water Piping: 0 to 150 psi.

END OF SECTION 15122

SECTION 15123 - METERS AND GAUGES FOR PLUMBING PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Thermometers.
   2. Gauges.

1.2 SUBMITTALS

A. Product Data: For each type of product indicated.

PART 2 - PRODUCTS

2.1 METAL-CASE, LIQUID-IN-GLASS THERMOMETERS

A. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
   1. Palmer - Wahl Instruments Inc.
   2. Trerice, H. O. Co.
   3. Weiss Instruments, Inc.
   4. Weksler Instruments Operating Unit; Dresser Industries; Instrument Div.
   5. Other prior approved equal.

B. Case: Die-cast aluminum or brass, minimum 7 inches long.

C. Tube: Red or blue reading, mercury or organic-liquid filled, with magnifying lens.

D. Tube Background: Satin-faced, non-reflective aluminum with permanently etched scale markings.

E. Window: Glass.

F. Connector: Adjustable type, 180 degrees in vertical plane, 360 degrees in horizontal plane, with locking device.

G. Stem: Copper-plated steel, aluminum, or brass for thermowell installation and of length to suit installation.

H. Accuracy: Plus or minus 1 percent of range or plus or minus 1 scale division to maximum of 1.5 percent of range.

2.2 BIMETALLIC-ACTUATED DIAL THERMOMETERS

A. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
   1. Ashcroft Commercial Instrument Operations; Dresser Industries; Instrument Div.
   2. Ernst Gage Co.
   3. Eugene Ernst Products Co.
   4. Marsh Bellofram.
   5. Miljoco Corp.
   6. NANMAC Corporation.
   7. Noshok, Inc.
   8. Palmer - Wahl Instruments Inc.
   9. REO TEMP Instrument Corporation.
   10. Tel-Tru Manufacturing Company.
   11. Trerice, H. O. Co.
   12. Weiss Instruments, Inc.
   13. Weksler Instruments Operating Unit; Dresser Industries; Instrument Div.
   14. WIKA Instrument Corporation.
   15. Winters Instruments.
   16. Other prior approved equal.

B. Description: Direct-mounting, bimetallic-actuated dial thermometers complying with ASME B40.3.

C. Case: Dry type, stainless steel with minimum 3-inch diameter.

D. Element: Bimetal coil.

E. Dial: Satin-faced, nonreflective aluminum with permanently etched scale markings.

F. Pointer: Red metal.

G. Window: Glass.

H. Ring: Stainless steel.

I. Connector: Adjustable angle type.

J. Stem: Metal, for thermowell installation and of length to suit installation.

K. Accuracy: Plus or minus 1 percent of range or plus or minus 1 scale division to maximum of 1.5 percent of range.

2.3 THERMOWELLS

A. Manufacturers: Same as manufacturer of thermometer being used.

B. Description: Pressure-tight, socket-type metal fitting made for insertion into piping and of type, diameter, and length required to hold thermometer.

2.4 PRESSURE GAUGES

A. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
   1. AMETEK, Inc.; U.S. Gauge Div.
   2. Ashcroft Commercial Instrument Operations; Dresser Industries; Instrument Div.
   3. Ernst Gage Co.
   4. Eugene Ernst Products Co.
   5. KOBOLD Instruments, Inc.
   6. Marsh Bellofram.
   7. Miljoco Corp.
   8. Noshok, Inc.
   9. Palmer - Wahl Instruments Inc.
   10. REO TEMP Instrument Corporation.
   11. Trerice, H. O. Co.
   12. Weiss Instruments, Inc.
   13. Weksler Instruments Operating Unit; Dresser Industries; Instrument Div.
   14. WIKA Instrument Corporation.
   15. Winters Instruments.
   16. Other prior approved equal.

B. Direct-Mounting, Dial-Type Pressure Gauges: Indicating-dial type complying with ASME B40.100.
   1. Case: Dry type, drawn steel or cast aluminum, minimum 4-1/2-inch diameter.
   2. Pressure-Element Assembly: Bourdon tube, unless otherwise indicated.
   3. Pressure Connection: Brass, NPS 1/4, bottom-outlet type unless back-outlet type is indicated.
   4. Movement: Mechanical, with link to pressure element and connection to pointer.
   5. Dial: Satin-faced, non-reflective aluminum with permanently etched scale markings.
   6. Pointer: Red metal.
   7. Window: Glass.
   8. Ring: Metal.
   9. Accuracy: Grade B, plus or minus 2 percent of middle half scale.
   10. Vacuum-Pressure Range: 30-in. Hg of vacuum to 15 psig of pressure.
   11. Range for Fluids under Pressure: Two times operating pressure.

C. Pressure-Gauge Fittings:
   1. Valves: NPS 1/4 brass or stainless-steel needle type.
   2. Snubbers: ASME B40.5, NPS 1/4 brass bushing with corrosion-resistant, porous-metal disc of material suitable for system fluid and working pressure.

PART 3 - EXECUTION

3.1 THERMOMETER APPLICATIONS

A. Install liquid-in-glass thermometers in the outlet of each domestic, hot-water storage tank.

B. Install dry-case-type, bimetallic-actuated dial thermometers at suction and discharge of each pump.

C. Provide the following temperature ranges for thermometers:
   1. Domestic Hot Water: 30 to 180 deg F, with 2-degree scale divisions.
   2. Domestic Cold Water: 0 to 100 deg F, with 2-degree scale divisions.

3.2 GAUGE APPLICATIONS

A. Install dry-case-type pressure gauges for discharge of each pressure-reducing valve.

B. Install dry-case-type pressure gauges at suction and discharge of each pump.

3.3 INSTALLATIONS

A. Install direct-mounting thermometers and adjust vertical and tilted positions.

B. Install thermowells with socket extending a minimum of 2 inches into fluid or one-third of diameter of pipe and in vertical position in piping tees where thermometers are indicated.

C. Install direct-mounting pressure gauges in piping tees with pressure gauge located on pipe at most readable position.

D. Install needle-valve and snubber fitting in piping for each pressure gauge.

E. Install thermometers and gauges adjacent to machines and equipment to allow service and maintenance for thermometers, gauges, machines, and equipment.

F. Adjust faces of thermometers and gauges to proper angle for best visibility.

END OF SECTION 15123

SECTION 15140 - DOMESTIC WATER PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes domestic water piping from locations indicated to fixtures and equipment inside the building.

PART 2 - PRODUCTS

2.1 PIPING MATERIALS

A. Mechanical-Joint, Ductile-Iron Pipe: AWWA C151, with mechanical-joint, bell- and plain-spigot end unless grooved or flanged ends are indicated.

1. Mechanical-Joint, Ductile-Iron Fittings: AWWA C110, ductile- or gray-iron standard pattern or AWWA C153, ductile-iron compact pattern.

    a. Glands, Gaskets, and Bolts: AWWA C111, ductile- or gray-iron glands, rubber gaskets, and steel bolts.

B. Soft Copper Tube: ASTM B 88, Type K (ASTM B 88M, Types A), water tube, annealed temper.–For underground use only.

1. Copper Pressure Fittings: ASME B16.18, cast-copper-alloy or ASME B16.22, wrought-copper, solder-joint fittings. Furnish wrought-copper fittings if indicated.
2. Bronze Flanges: ASME B16.24, Class 150, with solder-joint end.
3. Copper Unions: MSS SP-123, cast-copper-alloy, hexagonal-stock body, with ball-and-socket, metal-to-metal seating surfaces and solder-joint or threaded ends.

C. Hard Copper Tube: ASTM B 88, Type L (ASTM B 88M, Types B), water tube, drawn temper.–For aboveground use only.

1. Copper Pressure Fittings: ASME B16.18, cast-copper-alloy or ASME B16.22, wrought- copper, solder-joint fittings. Furnish wrought-copper fittings if indicated.
2. Bronze Flanges: ASME B16.24, Class 150, with solder-joint end.
3. Copper Unions: MSS SP-123, cast-copper-alloy, hexagonal-stock body, with ball-and-socket, metal-to-metal seating surfaces and solder-joint or threaded ends.

2.2 VALVES

A. Refer to Division 15 Section "Valves" for bronze and cast-iron, general-duty valves.

B. Refer to Division 15 Section "Plumbing Specialties" for balancing and drain valves.

PART 3 - EXECUTION

3.1 PIPING APPLICATIONS

A. Domestic Water Piping Aboveground: Use the following piping materials for each size range:
   1. NPS 4 and Smaller: Hard copper tube, Type L (Type B); copper pressure fittings; and soldered joints.

B. Domestic Water Piping Underground: Use the following piping materials for each size range:
   1. NPS 2 and Smaller: Soft Copper tube, Type K (ASTM B 88M, Types A), water tube; and soldered joints.

   2. NPS 4 and Larger: Mechanical-Joint, Ductile-Iron Pipe. Class 150 cast iron water main with mechanical joints and full cement lining conforming to ANSI A21.4 standards.

      a. Provide tie rods, clamps and concrete thrust blocks as per NFPA No. 24 standard. Provide stainless steel tee head bolts with hexagonal nuts. All bolts, rods and nuts shall be given a full coat of Bitumastic #50 after being placed. The coating shall be allowed to dry before backfilling.

3.2 VALVE APPLICATIONS

A. Drawings indicate valve types to be used. Where specific valve types are not indicated, the following requirements apply:

   1. Shutoff Duty: Use bronze ball for piping NPS 2 and smaller. Use cast-iron butterfly with flanged ends for piping NPS 2-1/2 and larger.
   2. Throttling Duty: Use bronze ball for piping NPS 2 and smaller. Use cast-iron butterfly valves with flanged ends for piping NPS 2-1/2 and larger.
   3. Hot-Water-Piping, Balancing Duty: Calibrated automatic flow control valves.
   4. Drain Duty: Hose-end drain valves.

3.3 PIPING INSTALLATION

A. Refer to Division 15 Section "Basic Mechanical Materials and Methods" for basic piping installation.

B. Extend domestic water service piping to exterior water distribution piping in sizes and locations indicated.

C. Install shutoff valve inside building at each domestic water service. Refer to Division 15 Section "Plumbing Specialties" for drain valves and strainers.

D. Install domestic water piping level or slope downward toward drain.

E. Fill water piping. Check components to determine that they are not air bound and that piping is full of water.

F. Perform the following steps before operation:

1. Close drain valves, hydrants, and hose bibbs.
2. Open shutoff valves to fully open position.
3. Open throttling valves to proper setting.
4. Remove plugs used during testing of piping and plugs used for temporary sealing of piping during installation.
5. Close drain valves and replace drain plugs.

G. Check plumbing equipment and verify proper settings, adjustments, and operation. Do not operate water heaters before filling with water.

1. Check plumbing specialties and verify proper settings, adjustments, and operation.

3.4 JOINT CONSTRUCTION

A. Refer to Division 15 Section "Basic Mechanical Materials and Methods" for basic piping joint construction.

B. Soldered Joints: Use ASTM B 813, water-flushable, lead-free flux; ASTM B 32, lead-free-alloy solder; and ASTM B 828 procedure, unless otherwise indicated.

3.5 VALVE INSTALLATION

A. Install sectional valve close to water main on each branch and riser serving plumbing fixtures or equipment. Use ball valves for piping NPS 2 and smaller. Use butterfly valves for piping NPS 2-1/2 and larger.

B. Install shutoff valve on each water supply to equipment and on each water supply to plumbing fixtures without supply stops. Use ball valves for piping NPS 2 and smaller. Use butterfly valves for piping NPS 2-1/2 and larger.

C. Install drain valves for equipment, at low points in horizontal piping, and where required to drain water piping.

1. Install hose-end drain valves at low points in water mains and branches.

D. Install calibrated automatic flow control valves in each hot-water circulation return branch and discharge side of each pump and circulator. Enlist the services of a certified test and balancing Contractor to set balancing valves to achieve equal flow in all return branches.

Provide a written report of the final settings and flows at each return branch and circulating pump. Refer to Division 15 Section "Plumbing Specialties" for automatic flow control valves.

3.6 HANGER AND SUPPORT INSTALLATION

A. Refer to Division 22 Section "Hangers and Supports" for pipe hanger and support devices. Install the following:

1. Vertical Piping: MSS Type 8 clamps.
2. Individual, Straight, Horizontal Piping Runs: According to the following:

    a. 100 Feet and Less: MSS Type 1, adjustable, steel clevis hangers.

B. Install supports according to Division 22 Section "Hangers and Supports".

C. Support vertical piping and tubing at base and at each floor.

D. Rod diameter may be reduced 1 size for double-rod hangers, to a minimum of 3/8 inch.

E. Install hangers for copper tubing with the following maximum horizontal spacing and minimum rod diameters:

1. NPS 3/4 and Smaller: 60 inches with 3/8-inch rod.
2. NPS 1 and NPS 1-1/4: 72 inches with 3/8-inch rod.
3. NPS 1-1/2 and NPS 2: 96 inches with 3/8-inch rod.
4. NPS 2-1/2): 108 inches with 1/2-inch rod.
5. NPS 3 to NPS 5: 10 feet with 1/2-inch rod.

F. Install supports for vertical copper tubing at every floor.

G. Support piping and tubing not listed above according to MSS SP-69 and manufacturer's written instructions.

3.7 CONNECTIONS

A. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Install piping adjacent to equipment and machines to allow service and maintenance.

C. Connect domestic water piping to exterior water service piping. Use dielectric fitting to join dissimilar piping materials.

D. Connect domestic water piping to service piping with shutoff valve, and extend and connect to the following:
1. Water Heaters: Cold-water supply and hot-water outlet piping in sizes indicated, but not smaller than sizes of water heater connections.

2. Plumbing Fixtures: Cold and hot water supply piping in sizes indicated, but not smaller than required by plumbing code. Refer to Division 22 Section "Plumbing Fixtures."
3. Equipment: Cold and hot water supply piping as indicated, but not smaller than equipment connections. Provide shutoff valve and union for each connection. Use flanges instead of unions for NPS 2-1/2 and larger.

3.8 FIELD QUALITY CONTROL

A. Inspect domestic water piping as follows:

1. Do not enclose, cover, or put piping into operation until it is inspected and approved by authorities having jurisdiction.
2. During installation, notify Authorities Having Jurisdiction at least 72 hours before inspection must be made. Perform tests specified below in presence of Authorities Having Jurisdiction:

    a. Roughing-in Inspection: Arrange for inspection of piping before concealing or closing-in after roughing-in and before setting fixtures.
    b. Final Inspection: Arrange for final inspection by authorities having jurisdiction to observe tests specified below and to ensure compliance with requirements.

3. Re-inspection: If authorities having jurisdiction find that piping will not pass test or inspection, make required corrections and arrange for re-inspection.
4. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.

B. Test domestic water piping as follows:

1. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired. If testing is performed in segments, submit separate report for each test, complete with diagram of portion of piping tested.
2. Leave uncovered and unconcealed new, altered, extended, or replaced domestic water piping until it has been tested and approved. Expose work that was covered or concealed before it was tested.
3. Cap and subject piping to static water pressure of 100 psig above operating pressure, without exceeding pressure rating of piping system materials. Isolate test source and allow test to stand for four hours. Leaks and loss in test pressure constitute defects that must be repaired.
4. Repair leaks and defects with new materials and retest piping or portion thereof until satisfactory results are obtained.
5. Prepare reports for tests and required corrective action.

3.9 CLEANING

A. Clean and disinfect potable domestic water piping as follows:

1. Purge new piping and parts of existing domestic water piping that have been altered, extended, or repaired before using.
2. Use purging and disinfecting procedures prescribed by authorities having jurisdiction or, if methods are not prescribed, procedures described in either AWWA C651 or AWWA C652 or as described below:

    a. Flush piping system with clean, potable water until dirty water does not appear at outlets.
    b. Fill and isolate system according to either of the following:

        1) Fill system or part thereof with water/chlorine solution with at least 50 ppm (50 mg/L) of chlorine. Isolate with valves and allow water to stand for 24 hours.
        2) Fill system or part thereof with water/chlorine solution with at least 200 ppm (200 mg/L) of chlorine. Isolate and allow water to stand for three hours.

    c. Flush system with clean, potable water until no chlorine is in water coming from system after the standing time.
    d. Submit water samples in sterile bottles to authorities having jurisdiction. Repeat procedures if biological examination shows contamination.

B. Prepare and submit reports of purging and disinfecting activities.

C. Clean interior of domestic water piping system. Remove dirt and debris as work progresses.

END OF SECTION 15140

SECTION 15150 - SANITARY WASTE AND VENT PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes soil and waste, sanitary drainage and vent piping inside the building.

PART 2 - PRODUCTS

2.1 PIPING MATERIALS

A. PVC Pipe: ASTM D 2665, schedule 40, solid-wall drain, waste and vent.

1. PVC Socket Fittings: ASTM D 2665, socket type, made to ASTM D 3311, drain, waste and vent patterns.

B. PBC Special Fittings: ASTM F 409, drainage-pattern tube and tubular fittings with ends as required for application.

PART 3 - EXECUTION

3.2 PIPING INSTALLATION

A. Refer to Division 15 Section "Basic Mechanical Materials and Methods" for basic piping installation.

B. Install cleanouts at grade and extend to where building sanitary drains connect to building sanitary sewers.

C. Make changes in direction for soil and waste drainage and vent piping using appropriate branches, bends, and long-sweep bends. Sanitary tees and short-sweep 1/4 bends may be used on vertical stacks if change in direction of flow is from horizontal to vertical. Use long-turn, double Y-branch and 1/8-bend fittings if 2 fixtures are installed back to back or side by side with common drain pipe. Straight tees, elbows, and crosses may be used on vent lines. Do not change direction of flow more than 90 degrees. Use proper size of standard increasers and reducers if pipes of different sizes are connected. Reducing size of drainage piping in direction of flow is prohibited.

D. Lay buried building drainage piping beginning at low point of each system. Install true to grades and alignment indicated, with unbroken continuity of invert. Place hub ends of piping upstream. Install required gaskets according to manufacturer's written instructions

for use of lubricants, cements, and other installation requirements. Maintain swab in piping and pull past each joint as completed.

E. Install soil and waste drainage and vent piping at the following minimum slopes, unless otherwise indicated:

1. Piping up to NPS 3: 1/4"/ft.
2. Piping NPS 4 and larger: 1/8"/ft.

F. Install PVC soil and waste and vent piping according to ASTM D 2665. Install underground PVC soil and waste drainage piping according to ASTM D 2321.

G. Do not enclose, cover, or put piping into operation until it is inspected and approved by authorities having jurisdiction.

H. Provide stainless steel hanger rods to support all sanitary sewer and vent piping installed below building slabs and all structurally supported slabs that are not building slabs (service yards, driveways, etc.). Rods shall be minimum 1/4" diameter, type 316 stainless steel spaced at 5'-0" maximum spacing with hanger occurring at all pipe joints. Additional, provide support at each joint or fitting and at each “P-trap” and closet bend.

I. Install test plugs, wood plugs or caps in all open pipes at time of installation and do not remove until the pipes are connected tight into the existing systems. All cost incurred from damage to the project due to failure to make plumbing systems tight shall be borne by the contractor.

3.3 JOINT CONSTRUCTION

A. Refer to Division 15 Section "Basic Mechanical Materials and Methods" for basic piping joint construction.

B. PVC Nonpressure Piping Joints: Join piping according to ASTM D 2665.

3.4 HANGER AND SUPPORT INSTALLATION

A. Refer to Division 15 Section "Hangers and Supports" for pipe hanger and support devices. Install the following:

1. Vertical Piping: MSS Type 8 clamps.
2. Above Ground Individual, Straight, Horizontal Piping Runs: According to the following:

    a. 100 Feet and Less: MSS Type 1, adjustable, steel clevis hangers.

B. Install supports according to Division 15 Section "Hangers and Supports."

C. Support vertical piping and tubing at base and at each floor.

D. Rod diameter may be reduced 1 size for double-rod hangers, with 3/8-inch minimum rods.

E. Install hangers for PVC piping with the following maximum horizontal spacing and minimum rod diameters:

1. NPS 1-1/2 and NPS 2: 48 inches with 3/8-inch rod.
2. NPS 3: 48 inches with 1/2-inch rod.
3. NPS 4 and NPS 5: 48 inches with 5/8-inch rod.

F. Install supports for vertical soil piping at each floor level.

G. Support piping and tubing not listed above according to MSS SP-69 and manufacturer's written instructions.

3.5 CONNECTIONS

A. Connect soil and waste piping to exterior sanitary sewerage piping.

B. Connect drainage and vent piping to the following:

1. Plumbing Fixtures: Connect drainage piping in sizes indicated, but not smaller than required by plumbing code. Refer to Division 15 Section "Plumbing Fixtures."
2. Plumbing Fixtures and Equipment: Connect atmospheric vent piping in sizes indicated, but not smaller than required by authorities having jurisdiction.
3. Plumbing Specialties: Connect drainage and vent piping in sizes indicated, but not smaller than required by plumbing code. Refer to Division 15 Section "Plumbing Specialties."
4. Equipment: Connect drainage piping as indicated. Provide shutoff valve, if indicated, and union for each connection. Use flanges instead of unions for connections NPS 2-1/2 and larger.

3.6 FIELD QUALITY CONTROL

A. During installation, notify authorities having jurisdiction at least 72 hours before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction.

1. Roughing-in Inspection: Arrange for inspection of piping before concealing or closing-in after roughing-in and before setting fixtures.
2. Final Inspection: Arrange for final inspection by authorities having jurisdiction to observe tests specified below and to ensure compliance with requirements.

B. Re-inspection: If authorities having jurisdiction find that piping will not pass test or inspection, make required corrections and arrange for re-inspection.

C. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.

D. Test sanitary drainage and vent piping according to procedures of authorities having jurisdiction.

1. Repair leaks and defects with new materials and retest piping, or portion thereof, until satisfactory results are obtained.
2. Prepare reports for tests and required corrective action.

3.7 CLEANING

A. Clean interior of piping. Remove dirt and debris as work progresses.

B. Protect drains during remainder of construction period to avoid clogging with dirt and debris and to prevent damage from traffic and construction work.

C. Place plugs in ends of uncompleted piping at end of day and when work stops.

END OF SECTION 15150

SECTION 15160 - STORM DRAINAGE PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes storm drainage piping inside the building and perforated drainage piping underground.

1.2 QUALITY ASSURANCE

A. Comply with NSF 14, "Plastics Piping Systems Components and Related Materials," for plastic piping components. Include marking with "NSF-drain" for plastic drain piping and "NSF-sewer" for plastic sewer piping.

1.3 LEED Submittals:

A. Product Data for Credit IEQ 4.1: For solvent cements and adhesive primers, documentation including printed statement of VOC content.

B. Laboratory Test Reports for Credit IEQ 4: For solvent cements and adhesive primers, documentation indicating that products comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

PART 2 - PRODUCTS

2.1 PIPING MATERIALS

A. PVC Pipe: ASTM D 2665, solid-wall drain, waste, and vent.
   1. PVC Socket Fittings: ASTM D 2665, made to ASTM D 3311, drain, waste, and vent patterns.

B. Hubless Cast-Iron Pipe and Fittings: ASTM A 888 or CISPI 301.
   1. Couplings: ASTM C 1277 assembly of metal housing, corrosion-resistant fasteners, and ASTM C 564 rubber sleeve with integral center pipe stop.
      a. Compact, Stainless-Steel Couplings: CISPI 310 with ASTM A 167, Type 301, stainless-steel corrugated shield; stainless-steel bands; and sleeve.
         1) NPS 1-1/2 to NPS 4: 2-1/8-inch wide shield with 2 bands.
         2) NPS 5 and NPS 6: 3-inch wide shield with 4 bands.
         3) NPS 8 and NPS 10: 4-inch wide shield with 4 bands.
         4) NPS 12 and NPS 15: 5-1/2-inch wide shield with 6 bands.

C. PVC Perforated Pipe: ASTM 1785, perforated to AASHTO M278 under-drain specifications, with 3/8” hole size, 3” center to center distance, four rows (two at 90 degrees and two at 160 degrees).
   1. PVC Socket Fittings: ASTM D 2665, made to ASTM D 3311, drain, waste and vent patterns.

PART 3 - EXECUTION

3.1 PIPING APPLICATIONS

A. Building Storm Drainage Piping: Use the following piping materials for each size range:
   1. Above ground: Cast iron pipe and fittings joined with stainless-steel corrugated shield; stainless-steel bands; and sleeve.
   2. Underground: PVC solid wall pipe with socket fittings and solvent-cemented joints.

B. Crawl Space Drainage: Perforated PVC solid wall pipe with socket fittings and solvent-cemented joints. Use PVC solid wall pipe without perforations where indicated on the drains for headers and terminal pipe.

3.2 PIPING INSTALLATION

A. Refer to Division 2 Section "Storm Drainage" for Project site storm sewer and drainage piping.

B. Refer to Division 15 Section "Basic Mechanical Materials and Methods" for basic piping installation.

C. Refer to Division 15 Section "Pipe Insulation" for piping insulation above ceilings.

D. Install cleanouts at grade and extend to where building storm drains connect to building storm sewers.

E. Install underground PVC storm drainage piping according to ASTM D 2321.

F. Make changes in direction for storm piping using appropriate branches, bends, and long-sweep bends. Do not change direction of flow more than 90 degrees. Use proper size of standard increasers and reducers if pipes of different sizes are connected. Reducing size of drainage piping in direction of flow is prohibited.

G. Lay buried building drain piping beginning at low point of each system. Install true to grades and alignment indicated, with unbroken continuity of invert. Place hub ends of piping upstream. Install required gaskets according to manufacturer's written instructions for use of lubricants, cements, and other installation requirements. Maintain swab in piping and pull past each joint as completed.

H. Install storm drainage piping at the following minimum slopes, unless otherwise indicated:
   1. Building Storm Drain: 1/8"/feet downward in direction of flow.
   2. Underground Storm-Drainage Piping: 1/8"/feet downward in direction of flow.
   3. Crawl Space Perforated Drainage Piping: Refer to plans and details.

I. Do not enclose, cover, or put piping into operation until it is inspected and approved by the architect.

J. Provide stainless steel hanger rods to support all storm drainage piping installed below all structurally supported slabs that are not building slabs (service yards, driveways, etc.). Rods shall be minimum 1/4" diameter, type 316 stainless steel spaced at 5'-0" maximum spacing with hanger occurring at all pipe joints or in accordance with N.O. S&WB, whichever is less. Provide 1” wide, 18 gauge, stainless steel strap or saddle at pipe. The rod shall be bent into the center of the slab and span a minimum two steel reinforcing bars.

K. Insulate roof drain bodies and horizontal piping located between roof drains and vertical leaders, including the first vertical fitting and 1’-6” of the vertical leader.

3.3 JOINT CONSTRUCTION

A. Refer to Division 15 Section "Basic Mechanical Materials and Methods" for basic piping joint construction.

B. PVC Non-pressure Piping Joints: Join piping according to ASTM D 2665.

3.4 HANGER AND SUPPORT INSTALLATION

A. Refer to Division 15 Section "Hangers and Supports" for pipe hanger and support devices. Install the following:
   1. Vertical Piping: MSS Type 8 or Type 42 clamps.
   2. Above Ground, Individual, Straight, Horizontal Piping Runs: According to the following:
      a. 100 Feet and Less: MSS Type 1, adjustable, steel clevis hangers.

B. Install supports according to Division 22 Section "Hangers and Supports."

C. Refer to drawings for pipe supports attached to “Lite-Deck” framing system.

D. Support vertical piping at base and at each floor.

E. Rod diameter may be reduced 1 size for double-rod hangers, with 3/8-inch minimum rods.

3.5 CONNECTIONS

A. Connect interior storm drainage piping to exterior storm drainage piping. Use transition fitting to join dissimilar piping materials.

3.6 FIELD QUALITY CONTROL

A. During installation, notify the Architect at least 72 hours before inspection must be made.
   1. Roughing-in Inspection: Arrange for inspection of piping before concealing or closing-in after roughing-in.
   2. Final Inspection: Arrange for final inspection by authorities having jurisdiction to observe tests specified below and to ensure compliance with requirements.

B. Re-inspection: If authorities having jurisdiction find that piping will not pass test or inspection, make required corrections and arrange for re-inspection.

C. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.

D. Test storm drainage piping according to procedures of authorities having jurisdiction.

3.7 CLEANING

A. Clean interior of piping. Remove dirt and debris as work progresses.

B. Protect drains during remainder of construction period to avoid clogging with dirt and debris and to prevent damage from traffic and construction work.

C. Place plugs in ends of uncompleted piping at end of day and when work stops.

END OF SECTION 15160

SECTION 15183 - REFRIGERANT PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes refrigerant piping used for air-conditioning applications.

B. See Division 15 Section "Meters and Gages" for thermometers and pressure gages.

C. The “Manufacturer” as used herein in this Specification Section shall mean the Manufacturer of the air cooled condensing units, chillers with remote air cooled condensers, other Direct Expansion (D/X) refrigeration equipment, etc. requiring field fabricated and installed refrigerant piping and associated specialties.

1.2 SUBMITTALS

A. Product Data: Submit calculations and layout drawings of each complete refrigerant piping installation including, but not limited to, size, pressure drop, layout, and location of the following: Piping, valves, filters, dryers, site glasses, etc. as required by the Manufacturer.

B. Shop Drawings: Show layout of refrigerant piping and specialties, including pipe, tube, and fitting sizes, flow capacities, valve arrangements and locations, slopes of horizontal runs, oil traps, double risers, wall and floor penetrations, and equipment connection details. Show interface and spatial relationship between piping and equipment. Shop drawings shall be submitted for manufacturer approval prior to submittal to the architect.
   1. Refrigerant piping indicated is schematic only. Size piping and design the actual piping layout, including oil traps, double risers, specialties, and pipe and tube sizes, to ensure proper operation and compliance with warranties of connected equipment.

C. Welding and brazing certificates

D. Field quality-control test reports.

E. Operation and maintenance data.

1.3 QUALITY ASSURANCE

A. ASHRAE Standard: Comply with ASHRAE 15, "Safety Code for Mechanical Refrigeration."

B. ASME Standard: Comply with ASME B31.5, "Refrigeration Piping."

C. UL Standard: Provide products complying with UL 207, "Refrigerant-Containing Components and Accessories, Nonelectrical"; or UL 429, "Electrically Operated Valves."

PART 2 - PRODUCTS

2.1 COPPER TUBE AND FITTINGS

A. Drawn-Temper Copper Tube: ASTM B 280, Type ACR.

B. Annealed-Temper Copper Tube: ASTM B 280, Type ACR.

C. Wrought-Copper Fittings: ASME B16.22.

D. Wrought-Copper Unions: ASME B16.22.

E. Bronze Filler Metals: AWS A5.8, Classification BAg-1 (silver)

2.2 VALVES

A. Diaphragm Packless Valves: 500-psig working pressure and 275 deg F working temperature; globe design with straight-through or angle pattern; forged-brass or bronze body and bonnet, phosphor bronze and stainless-steel diaphragms, rising stem and handwheel, stainless-steel spring, nylon seat disc, and with solder-end connections.

B. Packed-Angle Valves: 500-psig working pressure and 275 deg F working temperature; forged-brass or bronze body, forged-brass seal caps with copper gasket, back seating, rising stem and seat, molded stem packing, and with solder-end connections.

C. Check Valves Smaller Than NPS 1: 400-psig operating pressure and 285 deg F operating temperature; cast-brass body, with removable piston, polytetrafluoroethylene seat, and stainless-steel spring; globe design. Valve shall be straight-through pattern, with solder-end connections.

D. Check Valves, NPS 1 and Larger: 400-psig operating pressure and 285 deg F operating temperature; cast-bronze body, with cast-bronze or forged-brass bolted bonnet; floating piston with mechanically retained polytetrafluoroethylene seat disc. Valve shall be straight-through or angle pattern, with solder-end connections.

E. Service Valves: 500-psig pressure rating; forged-brass body with copper stubs, brass caps, removable valve core, integral ball check valve, and with solder-end connections.

F. Solenoid Valves: Comply with ARI 760; 250 deg F temperature rating and 400-psig working pressure; forged brass, with polytetrafluoroethylene valve seat, 2-way, straight-through pattern, and solder-end connections; manual operator; fitted with suitable NEMA 250 enclosure of type required by location, with 1/2-inch conduit

adapter and holding coil. Coordinate the solenoid valve type, normally open or closed, and voltage with Manufacturer and Control Contractor.

G. Pressure-Regulating Valves: Comply with ARI 770; pilot operated, forged brass or cast bronze, stainless-steel bottom spring, pressure-gage tappings, 24-V dc standard coil, and wrought-copper fittings for solder-end connections; suitable for refrigerant specified.

H. Pressure-Regulating Valves: Comply with ARI 770; direct acting, brass; with pilot operator, stainless-steel diaphragm, standard coil, and solder-end connection; suitable for refrigerant specified.

I. Pressure Relief Valves: Straight-through or angle pattern, brass body and disc, neoprene seat, and factory sealed and ASME labeled for standard pressure setting.

J. Thermostatic Expansion Valves: Comply with ARI 750; brass body with stainless-steel parts; thermostatic-adjustable, modulating type; size and operating characteristics as recommended by manufacturer, and factory set for superheat requirements; solder-end connections; with sensing bulb, distributor having side connection for hot-gas bypass line, and external equalizer line.

K. Hot-Gas Bypass Valve: Pulsating-dampening design, stainless-steel bellows and polytetrafluoroethylene valve seat; adjustable; sized for capacity equal to last step of compressor unloading; with solder-end connections.

2.3 REFRIGERANT PIPING SPECIALITIES

A. Straight- or Angle-Type Strainers: 500-psig working pressure; forged-brass or steel body with stainless-steel wire or brass-reinforced Monel screen of 80 to 100 mesh in liquid lines up to 1-1/8 inches , 60 mesh in larger liquid lines, and 40 mesh in suction lines; with screwed cleanout plug and solder-end connections.

B. Moisture/Liquid Indicators: 500-psig maximum working pressure and 200 deg F operating temperature; all-brass body with replaceable, polished, optical viewing window with color-coded moisture indicator; with solder-end connections.

C. Replaceable-Core Filter-Dryers: 500-psig maximum working pressure; heavy gage protected with corrosion-resistant-painted steel shell, flanged ring and spring, ductile-iron cover plate with steel cap screws; wrought-copper fittings for solder-end connections; with replaceable-core kit, including gaskets and the following:
   1. Filter-Dryer Cartridge: Pleated media with solid-core sieve with activated alumina, ARI 730 rated for capacity.

2.4 RECEIVERS

A. Receivers, 6-Inch Diameter and Smaller: ARI 495, UL listed, steel, brazed, 400-psig pressure rating, with tappings for inlet, outlet, and pressure relief valve.

B. Receivers Larger Than 6-Inch Diameter: ARI 495, welded steel, tested and stamped according to ASME Boiler and Pressure Vessel Code: Section VIII; 400-psig pressure rating, with tappings for liquid inlet and outlet valves, pressure relief valve, and liquid-level indicator.

PART 3 - EXECUTION

3.1 PIPING APPLICATIONS

A. Aboveground, within Building: Type ACR drawn-copper tubing.

3.2 VALVE APPLICATIONS

A. Valve applications are subject to approval for use by the Manufacturer. Valves shall be applied as specified unless the manufacturer does not approve of the application.

B. Install diaphragm packless or packed-angle valves in suction and discharge lines of compressor, for gage taps at hot-gas bypass regulators, on each side of strainers.

C. Install check valves in compressor discharge lines and in condenser liquid lines on multiple condenser systems.

D. Install packed-angle valve in liquid line between receiver shutoff valve and thermostatic expansion valve for system charging.

E. Install diaphragm packless or packed-angle valves on each side of strainers and dryers, in liquid and suction lines at evaporators, and elsewhere as indicated.

F. Install solenoid valves upstream from each expansion valve and hot-gas bypass valve.
1. Install solenoid valves in horizontal lines with coil at top.
2. Electrical wiring for solenoid valves is work of this division and shall comply with Division 16 Sections.

G. Install thermostatic expansion valves as close as possible to evaporator.
1. If refrigerant distributors are used, install them directly on expansion-valve outlet.
2. Install valve so diaphragm case is warmer than bulb.
3. Secure bulb to clean, straight, horizontal section of suction line using two bulb straps. Do not mount bulb in a trap or at bottom of the line. Locate bulb as recommended by the manufacturer.
4. If external equalizer lines are required, make connection where it will reflect suction-line pressure at bulb location.

H. Install pressure-regulating and pressure relief valves as required by ASHRAE 15. Pipe pressure relief valve discharge to outside.

3.3 SPECIALTY APPLICATIONS

A. Install liquid indicators as recommended by manufacturer.

B. Install strainers as recommended by manufacturer.

C. Install moisture-liquid indicators in liquid lines between filter-dryers and thermostatic expansion valves and in liquid line to receiver.

D. Install pressure relief valves on ASME receivers; pipe discharge to outdoors.

E. Install filter/dryers and suction line filters as required by the Manufacturer. Fabricate the piping at all filter/dryers and suction line filter so that the core can be removed horizontally or down.

F. Install solenoid valves as recommended by manufacturer.

G. Install receivers, sized to accommodate pump-down charge, on systems 5 tons (17.5 kW) and larger and on systems with long piping runs as recommended by manufacturer.

H. Install flexible connectors at or near compressors where piping configuration does not absorb vibration.

3.4 PIPING INSTALLATION

A. Install refrigerant piping according to ASHRAE 15.

B. Basic piping installation requirements are specified in Division 23 Section "Basic Mechanical Materials and Methods."

C. Install piping as short and direct as possible, with a minimum number of joints, elbows, and fittings.

D. Arrange piping to allow inspection and service of compressor and other equipment. Install valves and specialties in accessible locations to allow for service and inspection.

E. Install piping with adequate clearance between pipe and adjacent walls and hangers or between pipes for insulation installation. Use sleeves through floors, walls, or ceilings, sized to permit installation of full-thickness insulation.

F. Belowground, install copper tubing in protective conduit. Vent conduit outdoors.

G. Install copper tubing in rigid or flexible conduit in locations where copper tubing will be exposed to mechanical injury.

H. Slope refrigerant piping as follows:
   1. Pitch all horizontal refrigerant lines ½" per 10' in the direction of refrigerant flow
   2. Install the suction line so that it drops below the evaporator coil before any horizontal run.

3. If the A/C System(s) have paired condensing units serving single AHU's with Intertwined coils, expansion valves at the evaporator coils may have to be field changed or modified. Follow Manufacturer's requirements.
4. Install traps and double risers to entrain oil in vertical runs.

I. Install unions to allow removal of solenoid valves, pressure-regulating valves, and expansion valves and at connections to compressors and evaporators.

J. When brazing, remove solenoid-valve coils and sight glasses; also remove valve stems, seats, and packing, and accessible internal parts of refrigerant specialties. Do not apply heat near expansion valve bulb.

K. Hanger, support, and anchor products are specified in Division 15 Section "Hangers and Supports."

L. Install the following pipe attachments:
1. Adjustable steel clevis hangers for individual horizontal runs less than 20 feet (6.0 m) long.
2. Roller hangers and spring hangers for individual horizontal runs 20 feet (6.0 m) or longer.
3. Pipe rollers for multiple horizontal runs 20 feet (6.0 m) or longer, supported by a trapeze.
4. Spring hangers to support vertical runs.

M. Install hangers with the following maximum spacing and minimum rod sizes:
1. NPS 1/2: Maximum span, 60 inches; minimum rod size, 1/4 inch.
2. NPS 5/8: Maximum span, 60 inches; minimum rod size, 1/4 inch.
3. NPS 1: Maximum span, 72 inches; minimum rod size, 1/4 inch.
4. NPS 1-1/4: Maximum span, 96 inches; minimum rod size, 3/8 inch.
5. NPS 1-1/2: Maximum span, 96 inches; minimum rod size, 3/8 inch.
6. NPS 2: Maximum span, 96 inches; minimum rod size, 3/8 inch.
7. NPS 2-1/2: Maximum span, 108 inches; minimum rod size, 3/8 inch.
8. NPS 3: Maximum span, 10 feet; minimum rod size, 3/8 inch.
9. NPS 4: Maximum span, 12 feet; minimum rod size, 1/2 inch.

N. Support vertical runs at each floor.

3.5 PIPE JOINT CONSTRUCTION

A. Braze joints according to Division 15 Section "Basic Mechanical Materials and Methods."

B. Fill pipe and fittings with an inert gas (nitrogen or carbon dioxide) during brazing to prevent scale formation.

3.6 REFRIGERANT PIPE INSULATION

A. Insulate all suction lines as specified in Division 15 "Mechanical Pipe Insulation".

B. Do not insulate the liquid lines, except where they come in Contact with the suction lines.

C. Do not apply the insulation until the refrigerant piping system has passed all tests and inspections as specified herein, but not limited to, pressure testing and the Manufacturer inspection.

3.7 FIELD QUALITY CONTROL

A. Test and inspect refrigerant piping according to ASME B31.5, Chapter VI.
   1. Test refrigerant piping, specialties, and receivers. Isolate compressor, condenser, evaporator, and safety devices from test pressure.
   2. Test high- and low-pressure side piping of each system at not less than the lower of the design pressure or the setting of pressure relief device protecting high and low side of system.
      a. System shall maintain test pressure at the manifold gage throughout duration of test.
      b. Test joints and fittings by brushing a small amount of soap and glycerine solution over joint.
      c. Fill system with nitrogen to raise a test pressure of 150 psig or higher as required by authorities having jurisdiction.
      d. Remake leaking joints using new materials and retest until satisfactory results are achieved.

B. The contractor shall not startup the equipment served by the refrigerant piping system until given written approval by the Manufacturer with copies to the Architect/Engineer that the installed refrigerant piping system meets their standards and adheres to the submitted shop drawings.

3.8 SYSTEM CHARGING

A. Charge system using the following procedures:
   1. Install core in filter-dryer after leak test but before evacuation.
   2. Evacuate entire refrigerant system with a vacuum pump to a vacuum of 500 micrometers. If vacuum holds for 12 hours, system is ready for charging.
   3. Break vacuum with refrigerant gas, allowing pressure to build up to 2 psig.
   4. Charge system with a new filter-dryer core in charging line. Provide full-operating charge.

END OF SECTION 15183

SECTION 15194 - FUEL GAS PIPING

1PART - GENERAL

1.1 SUMMARY

A. This Section includes fuel gas piping, specialties, and accessories within the building.

1.2 PROJECT CONDITIONS

A. Gas System Pressure: One pressure range. 0.5 psig or less.

1.3 SUBMITTALS

A. Product Data:

1. Specialty valves. Include pressure rating, capacity, settings, and electrical connection data of selected models.

B. Field quality-control test reports.

C. Operation and maintenance data.

1.4 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

B. ANSI Standard: Comply with ANSI Z223.1, "National Fuel Gas Code."

C. UL Standard: Provide components listed in UL's "Gas and Oil Equipment Directory" if specified to be UL listed.

2PART - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where subparagraph titles below introduce lists, the following requirements apply for product selection:

1. Manufacturers: Subject to compliance with requirements, provide products by the manufacturers specified.

2.2 PIPING MATERIALS

A. Interior Pipe: ASTM A 53; Type E or S; Grade B; Schedule 40; black steel.

1. Malleable-Iron Threaded Fittings: ASME B16.3, Class 150, standard pattern, with threaded ends according to ASME B1.20.1.
2. Unions: ASME B16.39, Class 150, malleable iron with brass-to-iron seat, ground joint, and threaded ends according to ASME B1.20.1.
3. Cast-Iron Flanges and Flanged Fittings: ASME B16.1, Class 125.
4. Steel Welding Fittings: ASME B16.9, wrought steel or ASME B16.11, forged steel.
5. Steel Threaded Fittings: ASME B16.11, forged steel with threaded ends according to ASME B1.20.1.
6. Joint Compound and Tape: Suitable for natural gas.
7. Steel Flanges and Flanged Fittings: ASME B16.5.
8. Gasket Material: Thickness, material, and type suitable for natural gas.~~ASTM B 88, Type L (ASTM B 88M, Type B~~

B. Exterior Pipe: Hot dipped galvanized schedule 40 steel. All fittings and pipe shall be hot dipped galvanized with threaded connections.

C. Transition Fittings: Type, material, and end connections to match piping being joined.

D. Common Joining Materials: Refer to Division 22 Section "Basic Mechanical Materials and Methods" for joining materials not in this Section.

2.3 PROTECTIVE COATING

A. Furnish pipe and fittings with factory-applied, corrosion-resistant polyethylene coating for use underground.

2.4 VALVES

A. Valves, NPS 2 and Smaller: Threaded ends according to ASME B1.20.1 for pipe threads.

B. Valves, NPS 2-1/2 and Larger: Flanged ends according to ASME B16.5 for steel flanges and according to ASME B16.24 for copper and copper-alloy flanges.

C. Appliance Connector Valves: ANSI Z21.15 listed.

D. Gas Stops: Bronze body with AGA stamp, plug type with bronze plug and flat or square head, ball type with chrome-plated brass ball and lever handle, or butterfly valve with

stainless-steel disc and fluorocarbon elastomer seal and lever handle; 2-psig minimum pressure rating.

E. Gas Valves, NPS 2 and Smaller: ASME B16.33 and IAS-listed bronze body and 125-psig pressure rating.

F. Plug Valves, NPS 2-1/2 and Larger: ASME B16.38 and MSS SP-78 cast-iron, lubricated plug valves, with 125-psig pressure rating.

G. General-Duty Valves, NPS 2-1/2 and Larger: MSS SP-70, ASME B16.38, cast-iron body gate valves, OS&Y type with solid wedge, suitable for fuel gas service, with "WOG" indicated on valve body, and 125-psig pressure rating.

2.5 METERS

A. Service Meters: Service meter shall be provided and installed by local utility company. Contractor is responsible for all connection and service fees. Provide the necessary piping and appurtenances as required by the local utility company.

3PART - EXECUTION

3.1 PIPING APPLICATIONS

A. Use flanges, unions, transition, and special fittings in applications below, unless otherwise indicated.

1. NPS 1-1/2 and smaller: Steel pipe, malleable-iron threaded fittings, and threaded joints.
2. NPS 2 and larger: Steel pipe, steel welded fittings and welded joints.

3.2 VALVE APPLICATIONS

A. Appliance Shutoff Valves for Pressure 0.5 psig or Less: Appliance connector valve or gas stop.

B. Piping Line Valves, NPS 2 and Smaller: Gas valve.

C. Piping Line Valves, NPS 2-1/2 and Larger: Plug valve or general-duty valve.

D. Valves at Service Meter, NPS 2 and Smaller: Gas valve.

E. Valves at Service Meter, NPS 2-1/2 and Larger: Plug valve.

3.3 INSTALLATION

A. Refer to Division 15 Section "Basic Mechanical Materials and Methods" for basic piping installation requirements and piping joint construction.~~**NPS 1 (DN 25**~~
~~5.~~NPS 1 (DN 25~~NPS 1 (DN 25~~

B. Service Entrance Piping: Extend fuel gas piping and connect to fuel gas distribution for service entrance to building.

1. Exterior fuel gas distribution system piping, service pressure regulator, and service meter will be provided by gas utility.
2. Install dielectric fitting downstream from and adjacent to each service meter unless meter is supported from service-meter bar with integral dielectric fitting. Install shutoff valve downstream from and adjacent to dielectric fitting. Refer to Division 15 Section "Basic Mechanical Materials and Methods" for dielectric fittings.

C. Concealed Locations: Except as specified below, install concealed gas piping in airtight conduit constructed of Schedule 40, seamless, black steel pipe with welded joints. Vent conduit to outside and terminate with screened vent cap.

1. Above-Ceiling Locations: Gas piping may be installed in accessible spaces, subject to approval of authorities having jurisdiction, whether or not such spaces are used as plenums. Do not locate valves above ceilings.
2. In Partitions: Do not install concealed piping in solid partitions. Protect tubing from physical damage when installed inside partitions or hollow walls.
3. Prohibited Locations: Do not install gas piping in or through circulating air ducts, clothes or trash chutes, chimneys or gas vents (flues), ventilating ducts, or dumbwaiter or elevator shafts.

D. Drips and Sediment Traps: Install drips at points where condensate may collect. Include outlets of service meters. Locate where readily accessible for cleaning and emptying. Do not install where condensate would be subject to freezing.

1. Construct drips and sediment traps using tee fitting with bottom outlet plugged or capped. Use minimum-length nipple of 3 pipe diameters, but not less than 3 inches (75 mm) long, and same size as connected pipe. Install with space between bottom of drip and floor for removal of plug or cap.

E. Conceal pipe installations in walls, pipe spaces, utility spaces, above ceilings and below grade, unless indicated to be exposed to view.

F. Install fuel gas piping at uniform grade of 0.1 percent slope upward toward risers.

G. Use eccentric reducer fittings to make reductions in pipe sizes. Install fittings with level side down.

H. Connect branch piping from top or side of horizontal piping.

I. Install unions in pipes NPS 2 and smaller, adjacent to each valve, at final connection to each piece of equipment, and elsewhere as indicated. Unions are not required on flanged devices.

J. Install strainer on inlet of each line pressure regulator and automatic and electrically operated valve.

K. Install flanges on valves, specialties, and equipment having NPS 2-1/2 and larger connections.

3.4 HANGERS AND SUPPORTS

A. Refer to Division 15 Section "Hangers and Supports" for pipe hanger and support devices.

B. Install hangers for horizontal steel piping with the following maximum spacing and minimum rod sizes:

1. NPS 3/44 and Smaller: Maximum span, 96 inches; minimum rod size, 3/8 inch.
2. NPS 1-1/4: Maximum span, 108 inches; minimum rod size, 3/8 inch.
3. NPS 1-1/2 and NPS 2: Maximum span, 108 inches; minimum rod size, 3/8 inch.
4. NPS 2-1/2 to NPS 4: Maximum span, 10 feet; minimum rod size, 1/2 inch.

3.5 CONNECTIONS

A. Install piping adjacent to appliances to allow service and maintenance. Connect piping to appliances using gas with shutoff valves and unions. Install valve upstream from and within 72 inches of each appliance. Install union downstream from valve.

3.6 FIELD QUALITY CONTROL

A. Inspect, test, and purge piping according to ANSI Z223.1, Part 4 "Inspection, Testing, and Purging," and requirements of authorities having jurisdiction. Repair leaks and defects with new materials and retest system until satisfactory results are obtained.

END OF SECTION 15194

SECTION 15410 - PLUMBING FIXTURES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes plumbing fixtures and related components.

B. See Division 15 Section "Plumbing Specialties" for backflow preventers and specialty fixtures not in this Section.

1.2 DEFINITIONS

A. Accessible Fixture: Plumbing fixture that can be approached, entered, and used by people with disabilities.

1.3 SUBMITTALS

A. Product Data: Include selected fixture and trim, fittings, accessories, appliances, appurtenances, equipment, and supports and indicate materials and finishes, dimensions, construction details, and flow-control rates for each type of fixture indicated.

B. Wiring Diagrams: Power, signal, and control wiring.

C. Operation and maintenance data.

1.4 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

B. Regulatory Requirements: Comply with requirements in ICC A117.1, "Accessible and Usable Buildings and Facilities"[; Public Law 90-480, "Architectural Barriers Act"; and Public Law 101-336, "Americans with Disabilities Act";] about plumbing fixtures for people with disabilities.

C. Regulatory Requirements: Comply with requirements in U.S. Architectural & Transportation Barriers Compliance Board's "Uniform Federal Accessibility Standards (UFAS), 1985-494-187" about plumbing fixtures for people with disabilities.

D. Regulatory Requirements: Comply with requirements in Public Law 102-486, "Energy Policy Act," about water flow and consumption rates for plumbing fixtures.

E. NSF Standard: Comply with NSF 61, "Drinking Water System Components--Health Effects," for fixture materials that will be in contact with potable water.

F. Select combinations of fixtures and trim, faucets, fittings, and other components that are compatible.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where subparagraph titles below introduce lists, the following requirements apply for product selection:
   1. Products: Subject to compliance with requirements, provide one of the products specified.
   2. Manufacturers: Subject to compliance with requirements, provide products by the manufacturers specified.

2.2 PLUMBING FIXTURES

A. Refer to drawing fixture schedule for plumbing fixtures

PART 3 - EXECUTION

3.1 FIXTURE INSTALLATION

A. Assemble fixtures, trim, fittings, and other components according to manufacturers' written instructions.

B. For wall-hanging fixtures, install off-floor supports affixed to building substrate.
   1. Use carrier supports with waste fitting and seal for back-outlet fixtures.
   2. Use carrier supports without waste fitting for fixtures with tubular waste piping.
   3. Use chair-type carrier supports with rectangular steel uprights for accessible fixtures.

C. Install back-outlet, wall-hanging fixtures onto waste fitting seals and attach to supports.

D. Install floor-mounting fixtures on closet flanges or other attachments to piping or building substrate.

E. Install wall-hanging fixtures with tubular waste piping attached to supports.

F. Install floor-mounting, back-outlet water closets attached to building floor substrate and wall bracket and onto waste fitting seals.

G. Install counter-mounting fixtures in and attached to casework.

H. Install fixtures level and plumb according to manufacturers' written instructions and roughing-in drawings.

I. Install water-supply piping with stop on each supply to each fixture to be connected to water distribution piping. Attach supplies to supports or substrate within pipe spaces behind fixtures. Install stops in locations where they can be easily reached for operation.
   1. Exception: Use ball, gate, or globe valve if stops are not specified with fixture. Refer to Division 15 Section "Valves" for general-duty valves.

J. Install trap and tubular waste piping on drain outlet of each fixture to be directly connected to sanitary drainage system.

K. Install flushometer valves for accessible water closets and urinals with handle mounted on wide side of compartment. Install other actuators in locations that are easy for people with disabilities to reach.

L. Install tanks for accessible, tank-type water closets with lever handle mounted on wide side of compartment.

M. Install toilet seats on water closets.

N. Install faucet-spout fittings with specified flow rates and patterns in faucet spouts if faucets are not available with required rates and patterns. Include adapters if required.

O. Install water-supply, flow-control fittings with specified flow rates in fixture supplies at stop valves.

P. Install faucet, flow-control fittings with specified flow rates and patterns in faucet spouts if faucets are not available with required rates and patterns. Include adapters if required.

Q. Install shower, flow-control fittings with specified maximum flow rates in shower arms.

R. Install traps on fixture outlets.
   1. Exception: Omit trap on fixtures with integral traps.

S. Install escutcheons at piping wall ceiling penetrations in exposed, finished locations and within cabinets and millwork. Use deep-pattern escutcheons if required to conceal protruding fittings. Refer to Division 22 Section "Basic Mechanical Materials and Methods" for escutcheons.

T. Set service basins in leveling bed of cement grout. Refer to Division 15 Section "Basic Mechanical Materials and Methods" for grout.

U. Seal joints between fixtures and walls, floors, and counters using sanitary-type, one-part, mildew-resistant, silicone sealant. Match sealant color to fixture color.

3.2 CONNECTIONS

A. Connect water supplies from water distribution piping to fixtures.

B. Connect drain piping from fixtures to sanitary sewer piping.

C. Supply and Waste Connections to Plumbing Fixtures: Connect fixtures with water supplies, stops, risers, traps, and waste piping. Use size fittings required to match fixtures. Connect to plumbing piping.

D. Supply and Waste Connections to Fixtures and Equipment Specified in Other Sections: Connect fixtures and equipment with water supplies, stops, risers, traps, and waste piping specified. Use size fittings required to match fixtures and equipment. Connect to plumbing piping.

3.3 PROTECTION

A. Provide protective covering for installed fixtures and fittings.

B. Do not allow use of fixtures for temporary facilities unless approved in writing by Owner.

END OF SECTION 15410

SECTION 15430 - PLUMBING SPECIALTIES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following plumbing specialties:
   1. Backflow preventers.
   2. Thermostatic water mixing valves.
   3. Outlet boxes.
   4. Wall hydrants.
   5. Trap seal primer valves.
   6. Miscellaneous piping specialties.
   7. Cleanouts.
   8. Floor drains.
   9. Trough drains.
   10. Floor sinks.

1.2 PERFORMANCE REQUIREMENTS

A. Provide components and installation capable of producing piping systems with following minimum working-pressure ratings, unless otherwise indicated:
   1. Domestic Water Piping: 125 psig.
   2. Sanitary Waste and Vent Piping: 10-foot head of water.

1.3 SUBMITTALS

A. Product Data: Include rated capacities and indicate materials, finishes, dimensions, required clearances, and methods of assembly of components; and piping and wiring connections for the following:
   1. Backflow preventers and water regulators.
   2. Thermostatic water mixing valves.
   3. Water hammer arresters, air vents, and trap seal primer valves and systems.
   4. Hose bibbs and hydrants.
   5. Cleanouts, floor drains and open receptors.

B. Field quality-control test reports.

C. Operation and maintenance data for the following:
   1. Backflow preventers and water regulators.
   2. Thermostatic water mixing valves.
   3. Trap seal primer valves.

1.4 QUALITY ASSURANCE

A. Plumbing specialties shall bear label, stamp, or other markings of specified testing agency.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

C. ASME Compliance: Comply with ASME B31.9, "Building Services Piping," for piping materials and installation.

D. NSF Compliance:
   1. Comply with NSF 14, "Plastics Piping Components and Related Materials," for plastic domestic water piping components. Include marking "NSF-PW" on plastic potable-water piping and "NSF-DWV" on plastic drain, waste, and vent piping.
   2. Comply with NSF 61, "Drinking Water System Components--Health Effects, Sections 1 through 9," for potable domestic water plumbing specialties.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where subparagraph titles below introduce lists, the following requirements apply for product selection:
   1. Products: Subject to compliance with requirements, provide one of the products specified.
   2. Manufacturers: Subject to compliance with requirements, provide products by the manufacturers specified.

2.2 BACKFLOW PREVENTERS

A. The double check backflow preventer assembly shall be factory assembled and tested. The unit shall consist of two independent Tri-Link Check modules located within a single housing; a sleeve access port; four bronze body nickel plated test cocks; and two drip-tight, butterfly shut off valves. The check valve modules must be removable and serviceable without the use of special tools. The unit’s housing shall be constructed of type 304 stainless steel schedule 40 pipe having grooved connections. The check valves shall have reversible EPDM elastomer discs and shall provide drip tight closure against reverse flow of liquids caused by back pressure or back siphonage. All pins, fasteners and springs shall be constructed of stainless steel. The unit shall be approved for installation in both the horizontal and vertical position

B. Hose-Connection Vacuum Breakers: ASSE 1011, nickel plated, with non-removable and manual drain features, and ASME B1.20.7, garden-hose threads on outlet. Units attached to rough-bronze-finish hose connections may be rough bronze.

2.3 THERMOSTATIC WATER MIXING VALVES

A. General: ASSE 1070 certified, manually adjustable, thermostatic water mixing valve with bronze body. Include check stop and union on hot-and-cold-supply inlets, adjustable temperature setting and thermometer.

2.4 OUTLET BOXES

A. Manufacturers:
1. Guy Gray Manufacturing Co., Inc.
2. Oatey.
3. Symmons Industries, Inc.
4. Zurn Industries, Inc.; Jonespec Div.

B. General: Recessed-mounting outlet boxes with supply fittings complying with ASME A112.18.1M. Include box with faceplate, services indicated for equipment connections, and wood-blocking reinforcement.

C. Clothes Washer Outlet Boxes: With hot- and cold-water hose connections, drain, and the following:
1. Box and Faceplate: Enameled or epoxy-painted steel.
2. Shutoff Fitting(s): Two hose bibbs.
3. Supply Fittings: Two NPS 3/4 gate, globe, or ball valves and NPS 3/4 copper, water tubing.
4. Drain: NPS 2 standpipe, P-trap, and direct waste connection to drainage piping.

D. Icemaker Outlet Boxes: With hose connection and the following:
1. Box and Faceplate: Enameled or epoxy-painted steel.
2. Shutoff Fitting: Hose bibb.
3. Supply Fitting: NPS 1/4 gate, globe, or ball valve and NPS 1/2 copper, water tubing.

2.5 WALL BOX HYDRANT

A. Manufacturers:
1. NIBCO INC.
2. Watts Industries, Inc.; Water Products Div.
3. Woodford Manufacturing Co.
4. Zurn Industries, Inc.; Jonespec Div.

B. Description: Frost-proof design similar to ASME A112.21.3M, for wall mounting with wheel-handle operation, NPS 3/4 threaded or solder-joint inlet, casing and operating rod to match wall thickness, and projecting outlet with ASME B1.20.7 garden-hose threads on outlet. Include wall clamp; integral vacuum breaker or nonremovable, drainable hose-connection vacuum breaker complying with ASSE 1011 or backflow preventer complying with ASSE 1052; and garden-hose threads complying with ASME B1.20.7 on outlet.

2.6 TRAP SEAL PRIMER VALVES

A. Supply-Type Trap Seal Primer Valves: ASSE 1018, water-supply-fed type, with the following characteristics:
   1. Manufacturers:
      a. Precision Plumbing Products, Inc.
      b. Smith, Jay R. Mfg. Co.
      c. Watts Industries, Inc.; Water Products Div.
   2. 125-psig minimum working pressure.
   3. Bronze body with atmospheric-vented drain chamber.
   4. Inlet and Outlet Connections: NPS 1/2 threaded, union, or solder joint.
   5. Gravity Drain Outlet Connection: NPS 1/2 threaded or solder joint.
   6. Finish: Chrome plated, or rough bronze for units used with pipe or tube that is not chrome finished.

2.7 DRAIN VALVES

A. Hose-End Drain Valves: MSS SP-110, NPS 3/4 ball valve, rated for 400-psig minimum CWP. Include two-piece, copper-alloy body with standard port, chrome-plated brass ball, replaceable seats and seals, blowout-proof stem, and vinyl-covered steel handle.

   1. Inlet: Threaded or solder joint.
   2. Outlet: Short-threaded nipple with ASME B1.20.7, garden-hose threads and cap.

2.8 MISCELLANEOUS PIPING SPECIALTIES

A. Water Hammer Arresters: ASSE 1010 or PDI-WH 201, metal-bellows type with pressurized metal cushioning chamber. Size per ASSE 1010 or PDI-WH 201 recommendations, Sizes A through F.
   1. Manufacturers:
      a. Smith, Jay R. Mfg. Co.
      b. Precision Plumbing Products, Inc.

B. Air Vents: Float type for automatic air venting.
   1. Bolted Construction: Bronze body with replaceable, corrosion-resistant metal float and stainless-steel mechanism and seat; threaded NPS 1/2 minimum inlet; 125-psig minimum pressure rating at 140 deg F; and threaded vent outlet.

C. Open Drains: Shop or field fabricate from ASTM A 74, Service class, hub-and-spigot, cast-iron, soil-pipe fittings. Include P-trap, hub-and-spigot riser section; and where required, increaser fitting, joined with ASTM C 564, rubber gaskets.

2.9 CLEANOUTS AND CLEANOUT COVERS

A. Cleanouts shall consist of cast iron bodies or ferrule material and brass closure plugs with tapered threads.

B. Cleanout covers shall be flush scoriated, secured tops and frames with nickel bronze finish for all uncarpeted areas, equal to “J.R. Smith” Model 4810. In carpeted areas

cleanout covers shall be installed flush with floor under the carpet and provided with screw marker. Minimum opening shall be 10 inches clear.

C. Exterior cleanouts shall be brought to grade and recessed in a 20" x 20” x 6" deep concrete box with cast iron access cover and frame.

2.10 FLOOR DRAINS

A. Floor drains and shower drains shall be supplied with cast iron bodies with flashing collar and round adjustable strainer head with nickel bronze finish, equal to “J.R. Smith” Model 2005-A.

B. Strainers shall be minimum 5" diameter for 2" floor drains and minimum 8" diameter for 4" drains.

C. Floor drains shall be provided with trap primer inlet connection.

2.11 TROUGH DRAINS

A. Trough Drains shall be equal to “J.R. Smith” model 9600. Drain shall be supplied with ADA compliant stainless steel grate.

2.12 FLOOR SINKS

A. Floor sinks shall be furnished with cast iron bodies with acid resistant coated interior, medium depth sumps, trap primer inlet connection, minimum 8” nickel bronze square tops with secured half grates and sediment buckets.

2.13 ROOF FLASHING FOR VENT STACKS

A. Flashing shall be lead of not less than four pounds per square feet and shall be tall enough to turn into the top of the vent pipe 12" above the roof and extend out from the roof stacks at least 12" on each side.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Refer to Division 15 Section "Basic Mechanical Materials and Methods" for piping joining materials, joint construction, and basic installation requirements.

B. Install trap seal primer valves with outlet piping pitched down toward drain trap a minimum of 1 percent and connect to floor-drain body, trap, or inlet fitting. Adjust valve for proper flow.

C. Install cleanouts in aboveground piping and building drain.

D. Install cleanout access covers with top flush with finished floor.

E. Install cleanout wall access covers, of types indicated, with frame and cover flush with finished wall, for cleanouts located in concealed piping.

F. Install floor drains at low points of surface areas to be drained. Set grates of drains flush with finished floor, unless otherwise indicated.
   1. Position floor drains for easy access and maintenance.
   2. Install floor-drain flashing collar or flange so no leakage occurs between drain and adjoining flooring. Maintain integrity of waterproof membranes where penetrated.
   3. Install individual traps for floor drains connected to sanitary building drain, unless otherwise indicated.

G. Install interceptors according to authorities having jurisdiction and with clear space for servicing.
   1. Flush with Floor Installation: Set unit and extension, if required, with cover flush with finished floor.
   2. Install cleanout immediately downstream from interceptors.

H. Fasten wall-hanging plumbing specialties securely to supports attached to building substrate if supports are specified and to building wall construction if no support is indicated.

I. Fasten recessed-type plumbing specialties to reinforcement built into walls.

J. Install wood-blocking reinforcement for wall-mounting and recessed-type plumbing specialties.

K. Install individual shutoff valve in each water supply to plumbing specialties. Use ball valve. Install shutoff valves in accessible locations. Refer to Division 15 Section "Valves" for general-duty ball, butterfly and check valves.

L. Install air vents at piping high points. Include ball valve in inlet and drain piping from outlet to floor drain.

M. Install traps on plumbing specialty drain outlets. Omit traps on indirect wastes unless trap is indicated.

N. Install escutcheons at wall, floor, and ceiling penetrations in exposed finished locations and within cabinets and millwork. Use deep-pattern escutcheons if required to conceal protruding pipe fittings.

O. All fixtures equipped with quick closing valves and flush valves shall be provided with a pre-manufactured shock absorber installed at the fixture connection or battery when multiple fixtures are served by a header.

3.2 CONNECTIONS

A. Install piping adjacent to equipment to allow service and maintenance.

B. Connect plumbing specialties and devices that require power according to Division 26 Sections.

3.3 PROTECTION

A. Protect drains during remainder of construction period to avoid clogging with dirt and debris and to prevent damage from traffic and construction work.
   1. Place plugs in ends of uncompleted piping at end of each day or when work stops

B. Test and certify backflow preventers in accordance with the Louisiana State Plumbing Code.

END OF SECTION 15430

SECTION 15485 – ELECTRIC DOMESTIC WATER HEATERS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes commercial electric water heaters.

1.2 SUBMITTALS

A. Product Data: Include rated capacities, furnished specialties, and accessories for each type and size of water heater indicated.

1.3 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

B. ASHRAE Standards: Comply with performance efficiencies prescribed for the following:

1. ASHRAE 90.1, "Energy Efficient Design of New Buildings except Low-Rise Residential Buildings," for commercial water heaters.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where subparagraph titles below introduce lists, the following requirements apply for product selection:
1. Manufacturers: Subject to compliance with requirements, provide products by the manufacturers specified.

2.3 LIGHT-COMMERCIAL, STORAGE, ELECTRIC WATER HEATERS

A. Description: Comply with UL 174 or UL 1453, and listed by manufacturer for commercial applications.
1. Manufacturers:

a. Rheem Manufacturing Co.; Ruud Water Heater Div.
b. Smith, A. O. Water Products Co.
c. State Industries, Inc.

2. Storage Tank Construction: Non-ASME-code steel with 150-psig working-pressure rating. Tank shall be U.L. label service listed and National Board stamped.

    a. Tappings: Factory fabricated of materials compatible with tank for piping connections, relief valve, pressure gage, thermometer, drain, anode rod, and controls as required. Attach tappings to tank before testing and labeling. Include ASME B1.20.1, pipe thread.
    b. Interior Finish: Materials and thicknesses complying with NSF 61, barrier materials for potable-water tank linings. Extend finish into and through tank fittings and outlets. Provide full three year factory tank warranty.
    c. Insulation: Comply with ASHRAE 90.1. Surround entire storage tank except connections and controls.
    d. Jacket: Steel, with enameled finish.

3. Heating Elements: Electric, screw-in, immersion type.
4. Temperature Control: Adjustable thermostat for each element with wiring arrangement for simultaneous operation.
5. Safety Controls: Automatic, high-temperature-limit and low-water cutoff devices or systems.
6. Drain Valve: ASSE 1005, corrosion-resistant metal, factory installed.
7. Anode Rod: Factory installed, magnesium.
8. Dip Tube: Factory installed. Not required if cold-water inlet is near bottom of storage tank.
9. Special Requirement: NSF 5 construction.
10. Gauges: Combination temperature and pressure type or separate thermometers and pressure gauges.

2.4 WATER HEATER ACCESSORIES

A. Combination Temperature and Pressure Relief Valves: ASME rated and stamped and complying with ASME PTC 25.3. Include relieving capacity at least as great as heat input and include pressure setting less than water heater working-pressure rating. Select relief valve with sensing element that extends into tank.

1. Option: Separate temperature and pressure relief valves are acceptable instead of combination relief valve.
2. Exception: Omit combination temperature and pressure relief valve for tankless water heater, and furnish pressure relief valve for installation in piping.

B. Pressure Relief Valves: ASME rated and stamped and complying with ASME PTC 25.3. Include pressure setting less than heat-exchanger working-pressure rating.

C. Vacuum Relief Valves: Comply with ASME PTC 25.3. Furnish for installation in piping.

1. Exception: Omit if water heater has integral vacuum-relieving device.

D. Expansion Tank: Pre-charged steel thermal expansion tank with a fixed FDA approved butyl diaphragm. The tank shall have a top NPT stainless steel system connection and a charging valve connection (standard tire valve) to facilitate on-site charging of the

tank to meet the system requirements. The tank shall be constructed in accordance with Section VIII of the ASME Boiler and Pressure Vessel Code and stamped for 150 psig working pressure.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install water heaters, level and plumb, according to layout drawings, original design, and referenced standards. Maintain manufacturer's recommended clearances.

B. Install temperature and pressure relief valves in top portion of storage tanks. Use relief valves with sensing elements that extend into tanks. Extend relief valve outlet with water piping in continuous downward pitch and discharge onto closest floor drain.

C. Install vacuum relief valves in cold-water-inlet piping.

D. Install water heater drain piping as indirect waste to spill into open drains or over floor drains. Install hose-end drain valves at low points in water piping for water heaters that do not have tank drains. Refer to Division 15 Section "Plumbing Specialties" for drain valves.

E. Install piping-type heat traps on inlet and outlet piping of water heater storage tanks without integral or fitting-type heat traps.

F. Install piping adjacent to heaters to allow service and maintenance.

3.2 CONNECTIONS

A. Connect hot and cold water piping with shutoff valves and unions.

B. Make connections with dielectric fittings where piping is made of dissimilar metal.

C. Electrical Connections: Power wiring and disconnect switches are specified in Division 16 Sections. Arrange wiring to allow unit service.

D. Expansion Tank: Sized thermal expansion tank per manufacturer’s recommendations.

3.3 FIELD QUALITY CONTROL

A. In addition to manufacturer's written installation and startup checks, perform the following:

1. Check for clear relief valve inlets, outlets, and drain piping.
2. Test operation of safety controls, relief valves, and devices.
3. Adjust operating controls.
4. Adjust hot-water-outlet temperature settings. Do not set above 120 degrees F, unless piping system application requires higher temperature.

B. The Contractor shall schedule an inspection by the State Fire Marshal or National ASME Board Commissioned Inspector for all commercial installation domestic water heaters of 50 gallons or greater capacity prior to the final State Fire Marshal inspection or substantial completion, whichever is earlier. The contractor is responsible for all inspection fees.

END OF SECTION 15485

SECTION 15486 - GAS~~FUEL~~-FIRED DOMESTIC WATER HEATERS

1PART - GENERAL

1.1 SUMMARY

A. This Section includes commercial, gas-fired water heaters.

1.2 SUBMITTALS

A. Product Data: Include rated capacities, furnished specialties, and accessories for each type and size of water heater indicated.

B. Shop Drawings: Detail water heater assemblies and indicate dimensions, required clearances, method of field assembly, components, and location and size of each field connection.

1. Wiring Diagrams: Power, signal, and control wiring.

C. Operation and maintenance data.

D. Warranties.

1.3 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

B. ANSI Compliance: Water heaters shall comply with ANSI standards for gas water heaters and related products and bear AGA certification label.

C. ASME Compliance: Water heater, hot-water storage tanks shall be fabricated and labeled according to ASME Boiler and Pressure Vessel Code: Section VIII, "Pressure Vessels," Division 1.

D. ASHRAE Standards:

1. ASHRAE 90.1, "Energy Efficient Design of New Buildings except Low-Rise Residential Buildings," for commercial water heaters.

2PART - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where subparagraph titles below introduce lists, the following requirements apply for product selection:

1. Manufacturers: Subject to compliance with requirements, provide products by the manufacturers specified.

2.2 COMMERCIAL, STORAGE, GAS WATER HEATERS

A. Description: Comply with ANSI Z21.10.3.

1. Manufacturers:

a. PVI Industries, Inc.
b. Rheem Manufacturing Co.; Rheem Water Heater Div.
c. Smith, A. O. Water Products Co.
d. State Industries.

2. Storage Tank Construction: ASME-code steel with 150-psig working-pressure rating.

a. Tappings: Factory fabricated of materials compatible with tank for piping connections, relief valve, pressure gage, thermometer, drain, anode rods, and controls as required. Attach tappings to tank shell before testing and labeling.

1) NPS 2 and Smaller: Threaded ends according to ASME B1.20.1, pipe threads.
2) NPS 2-1/2 and Larger: Flanged ends according to ASME B16.5 for steel and stainless-steel flanges and according to ASME B16.24 for copper and copper-alloy flanges.

b. Tank: The tank shall be constructed in accordance with ASME Code Section IV Part HLS and stamped with the appropriate symbol for 150 psig working pressure and 225 psig test pressure and be National Board stamped and registered. The tubes shall be covered with pure, dead soft copper, expanded, and welded into the tube sheet. After complete tank fabrication, the interior tank surfaces shall be coated with three separate coats of a thermosetting, polymerized fluorocarbon lining with high temperature resistance and hydrophobic qualities. Manufacturer’s warranty shall be a part of the submittals and the water heater tank shall be covered by the manufacturer’s three year non-prorated warranty against failure.
c. Insulation: The tank shall be insulated with heavy density fiberglass insulation and trimmed with a baked enamel steel jacket. The water heater shall have factory installed ASME rated temperature and pressure relief valve and solid brass drain valve. The entire water heater shall ve Underwrites Laboratories listed and tested under ANSI Z21.10.3 as a complete unit.
d. Jacket: Steel, with enameled finish.
e. Tank shall be mounted on factory channel skids.

3. Burner: Power burner for use with tank type water heaters for natural-gas fuel.

a. Temperature Control: Adjustable thermostat.
b. Safety Controls: Manual reset high-temperature-limit and low-water cutoff devices or systems.
c. Automatic Ignition: ANSI Z21.20, automatic gas-ignition system and components.
d. Automatic Damper: ANSI Z21.66, gas-fired-appliance, automatic-vent-damper device.

4. Ignition: Heater shall have intermittent electronic ignition ,120VAC control system. Heater may be equipped with electrically operated flue damper as required by Federal Energy Policy Act of 1992.
5. Anode Rods: Factory installed, magnesium.
6. Dip Tube: Factory installed. Not required if cold-water inlet is near bottom of storage tank.
7. Drain Valve: ASSE 1005, corrosion-resistant metal, factory installed.
8. Provide flame inspection port.
9. Provide diaphram air flow switch for proof of blower operation.
~~11.150 psig (1035 kPa~~

2.3 EXPANSION TANKS

A. Description: Steel, pressure-rated tank constructed with welded joints and factory-installed, butyl-rubber diaphragm. Include air pre-charge to minimum system-operating pressure at tank.

1. Manufacturers:

a. Amtrol, Inc.
b. Smith, A. O. ; Aqua-Air Div.
c. State Industries.
d. Elbi of America

2. Construction: 150-psig working-pressure rating.
3. Tappings: Factory-fabricated steel, welded to tank before testing and labeling. Include ASME B1.20.1, pipe thread.
4. Tank Interior Finish: Materials and thicknesses complying with NSF 61, barrier materials for potable-water tank linings. Extend finish into and through tank fittings and outlets.
5. Tank Exterior Finish: Manufacturer's standard, unless finish is indicated
6. Air-Charging Valve: Factory installed.

2.4 WATER HEATER ACCESSORIES

A. Combination Temperature and Pressure Relief Valves:

1. Gas Water Heaters: ANSI Z21.22, combination temperature and pressure relief valve.

B. Vacuum Relief Valves:

1. Gas Water Heaters: ANSI Z21.22.
2. Exception: Omit if water heater has integral vacuum-relieving device.

C. Gas Shutoff Valves: ANSI Z21.15, manually operated. Furnish for installation in piping. Provide redundant solenoid gas valve downstream of manual valve.

D. Gas Pressure Regulators: ANSI Z21.18, appliance type, factory or field installed. Include pressure rating, capacity, and pressure differential required for water heater and gas supply.

E. Piping-Type Heat Traps: Field-fabricated piping arrangement according to ASHRAE 90.1 or ASHRAE 90.2.

3PART - EXECUTION

3.1 INSTALLATION

A. Install commercial water heaters on concrete floor.

B. Install water heaters, level and plumb, according to layout drawings, original design, and referenced standards. Maintain manufacturer's recommended clearances. Arrange units so controls and devices needing service are accessible.

C. Install and connect gas water heaters according to NFPA 54.

1. Install appliance, gas pressure regulators on gas-burner inlets of water heaters without pressure regulators.
2. Install vent piping from gas-train pressure regulators and valves to outside of building where required. Terminate vent piping with brass-screened vent cap fitting. Do not combine vents except with approval of authorities having jurisdiction.

D. Install temperature and pressure relief valves in top portion of storage tanks. Use relief valves with sensing elements that extend into tanks. Extend relief valve outlet with water piping in continuous downward pitch and discharge onto closest floor drain.

E. Install vacuum relief valves in cold-water-inlet piping.

F. Install water heater drain piping as indirect waste to spill into open drains or over floor drains. Install hose-end drain valves at low points in water piping for water heaters that do not have tank drains. Refer to Division 15 Section "Plumbing Specialties " for drain valves..

G. Arrange for insulation on equipment and piping not furnished with factory-applied insulation.

H. Install piping-type heat traps on inlet and outlet piping of water heater storage tanks without integral or fitting-type heat traps.

I. Charge expansion tanks with air.

3.2 CONNECTIONS

A. Install piping adjacent to machine to allow service and maintenance.

B. Connect hot- and cold-water piping with shutoff valves and unions. Connect hot-water-circulating piping with shutoff valve, check valve, and union.

C. Connect gas piping to gas burner with drip leg, tee, shutoff valve, and union; minimum size same as inlet connection.

D. Make connections with dielectric fittings where piping is made of dissimilar metal.

E. Gas, Water Heater Vent Connections: Connect to vent system. Include draft hoods and diverters where required. Use vents same size as or larger than water heater outlets, but not smaller than indicated unless smaller vent size has been calculated according to NFPA 54. Comply with gas utility requirements for sizing.

F. Electrical Connections: Power wiring and disconnect switches are specified in Division 16 Sections. Arrange wiring to allow unit service.

3.3 FIELD QUALITY CONTROL

A. Engage a factory-authorized service representative to perform startup service and to train Owner's maintenance personnel to adjust, operate, and maintain water heaters.

B. In addition to manufacturer's written installation and startup checks, perform the following:

1. Check for clear relief valve inlets, outlets, and drain piping.
2. Test operation of safety controls, relief valves, and devices.
3. Adjust operating controls.
4. Adjust hot-water-outlet temperature settings. Do not set above 140 degrees F unless piping system application requires higher temperature.
5. Balance water flow through manifolds of multiple-unit installations.
6. Check and adjust controls for automatic draft fan system.

C. The contractor shall schedule an inspection by the State Fire Marshal or National ASME Board Commissioned Inspector for all commercial installation domestic water heaters of 50 gallons or greater capacity or 100,000 Btuh or greater input prior to the final state fire marshal inspection or substantial completion, whichever is earlier. The contractor is responsible for all inspection fees.

3.4 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain fuel-fired, domestic water heaters. Refer to Division 1 Section "Closeout Procedures ."

END OF SECTION 15486

SECTION 15489 - SUMP PUMPS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Submersible sump pumps.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Wiring Diagrams: For power, signal, and control wiring.

1.3 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

1.4 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. UL Compliance: Comply with UL 778 for motor-operated water pumps.

PART 2 - PRODUCTS

2.1 SUBMERSIBLE SUMP PUMPS

A. Submersible, Fixed-Position, Single-Seal Sump Pumps:

1. Manufacturers: Subject to compliance with requirements available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. Bell & Gossett Domestic Pump; ITT Corporation.
b. Glentronics, Inc.
c. Goulds Pumps; ITT Corporation.
d. Grundfos Pumps Corp.
e. Weil Pump Company, Inc.

2. Description: Factory-assembled and -tested sump-pump unit.
3. Pump Type: Submersible, end-suction, single-stage, close-coupled, overhung-impeller, centrifugal sump pump as defined in HI 1.1-1.2 and HI 1.3.
4. Pump Casing: Cast iron, with strainer inlet, legs that elevate pump to permit flow into impeller, and vertical discharge for piping connection.
5. Impeller: Statically and dynamically balanced, ASTM A 48/A 48M, Class No. 25 A cast iron design for clear wastewater handling, and keyed and secured to shaft.
6. Pump and Motor Shaft: Stainless steel [or steel], with factory-sealed, grease-lubricated ball bearings.
7. Seal: Mechanical.
8. Motor: Hermetically sealed, capacitor-start type; with built-in overload protection; lifting eye or lug; and three-conductor, waterproof power cable of length required and with grounding plug and cable-sealing assembly for connection at pump.

    a. Motor Housing Fluid: Air.

9. Controls:
    a. Switch Type: Mechanical-float type in NEMA 250 Type 6 enclosure.

2.2 MOTORS

A. Comply with NEMA designation, temperature rating, service factor, enclosure type, and efficiency requirements for motors specified in Division 15 Section "Common Motor Requirements for Plumbing Equipment."

1. Motor Sizes: Minimum size as indicated. If not indicated, large enough so driven load will not require motor to operate in service factor range above 1.0.
2. Controllers, Electrical Devices, and Wiring: Comply with requirements for electrical devices and connections specified in Division 26 Sections.

B. Motors for submersible pumps shall be hermetically sealed.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Pump Installation Standard: Comply with HI 1.4 for installation of sump pumps.

B. Route elevator sump discharge piping through oil water separator and discharge to storm drain.

END OF SECTION 15489

SECTION 15500 – AUTOMATIC SPRINKLER SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings & General Provisions of Contract, including General& Supplementary Conditions & Division 1.

B. Each of the following Specification Sections:

SECTION 15500 – AUTOMATIC SPRINKLER SYSTEMS
SECTION 15501 - COMMON WORK RESULTS FOR FIRE-SUPPRESSION
SECTION 15502 - FIRE PROTECTION PIPING, VALVES AND ACCESSORIES
SECTION 15517 - SLEEVES AND SLEEVE SEALS FOR FIRE-SUPPRESSION PIPING
SECTION 15548 - VIBRATION AND SEISMIC CONTROLS FOR FIRE-SUPPRESSION PIPING
SECTION 15553 – IDENTIFICATION FOR FIRE SUPRESSION PIPING AND EQUIPMENT

1.2 WORK INCLUDED

A. This section of the specifications includes the furnishing and installation of the Fire Suppression systems as described herein and as indicated on the Drawings.

1.3 SYSTEM DESCRIPTION

A. System to provide coverage for entire building.

B. Provide system to NFPA 13, 2007 edition.

C. Interface system with building fire and smoke alarm system.

D. Provide fire department connections as indicated.

1.4 SYSTEM DESIGN

A. Sprinkler systems shall be designed in accordance with the 2007 edition of NFPA 13 requirements and shall be hydraulically designed to provide 0.10 gpm/S.F. applied to the hydraulically most demanding 1500 square foot area for Light Hazard areas, 0.15 gpm/S.F. applied to the hydraulically most demanding 1500 square foot area for Ordinary Hazard, Group 1 areas, 0.20 gpm/S.F. applied to the hydraulically most demanding 1500 square foot area for Ordinary Hazard, Group 2 areas. Where quick

response sprinkler heads are installed throughout, the hydraulic area may be reduced as allowed by NFPA 13:112.3.2.3 requirements.

B. The Contractor shall include a minimum 5.0 psig safety margin in his calculations between the system demand pressure and the available pressure at the required demand flow.

1.5 SUBMITTALS

A. Submit under provisions of Division 1.

B. Shop Drawings: Provide hydraulic calculations, detailed pipe layout, hangers and supports, components and accessories. Indicate system controls. Shop drawings shall show reflected ceiling layout, lights, diffusers, etc.

C. Product Data: Provide data on sprinkler heads, valves, and specialties, including manufacturer’s catalog information. Submit performance ratings rough-in details, weights, support requirements, and piping connections.

D. Submit shop drawings, product data and hydraulic calculations to Owner's insurance underwriter for approval. Submit proof of approval to Architect.

E. Fire Hydrant Flow Test Report.

F. Contractor shall fill out and submit "Plan Review Application for Fire Protection Systems" application for review by the Louisiana Department of Public Safety and Corrections - Office of State Fire Marshal along with a check for the appropriate plan review fee.

G. Contractor shall fill out and submit a "Signaling/Suppression Permit Application", as required by the City of New Orleans - Department of Fire (New Orleans Fire Prevention Division), along with a check for the appropriate permit fee.

H. Manufacturer's Certificate: Certify that systems have been tested and meet, or exceed, the specified requirements.

I. Contractor’s Certificate: Submit Contractor’s “Test and Materials Certificates” to show that the system has been tested and meets or exceeds the specified requirements.

1.6 PROJECT RECORD DOCUMENTS

A. Submit under provisions of Division 1.

B. Record actual locations of sprinkler heads and deviations of piping from Drawings. Indicate drain and test locations.

1.7 OPERATION AND MAINTENANCE DATA

A. Submit under provisions of Division 1.

B. Maintenance Data: Include components of system, servicing requirements, Record Drawings, inspection data, replacement part numbers and availability, and location and numbers of service depot.

1.8 QUALITY ASSURANCE

A. Perform Work in accordance with NFPA 13 requirements.

B. Equipment and Components: Bear UL and FM label or marking.

1.9 QUALIFICATIONS

A. Installer: Company specializing in performing work of this Section with minimum five (5) years experience.

B. Design sprinkler system under direct supervision of a Certified "NICET" Level - III Designer experienced in design of this work and licensed in the State of Louisiana.

1.10 REGULATORY REQUIREMENTS

A. Hydraulic Calculations, Product Data, Shop Drawings: Bear stamp of approval of the State Fire Marshal and the Owner's fire insurance underwriter.

1.11 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store and protect products to site under provisions of Division 1.

B. Store products in shipping containers and maintain in place until installation. Provide temporary inlet and outlet caps. Maintain caps in place until installation.

1.12 EXTRA MATERIALS

A. Furnish under provisions of Division 1.

B. Provide extra sprinkler heads as required by the provisions of NFPA 13.

C. Provide suitable wrenches for each head type.

D. Provide metal storage cabinet to be located where directed by the Architect.

PART 2 - PRODUCTS

2.1 SPRINKLER HEADS

A. Quick response, fully concealed, flush pendant style, chrome plated finished head with 3 mm glass bulb rated for nominal 155 degree F temperature rating for sprinkler and 135 degree F temperature rating for cover plate. Cover plate shall be factory finished to match adjacent ceiling.

B. Quick response, upright style, brass finish with glass bulb rated for nominal 155 degree F temperature rating for wet pipe system.

C. Quick response, semi-recessed, horizontal sidewall style, chrome plated finished head with glass bulb rated for nominal 155 degree F temperature rating for wet pipe system with matching white push on escutcheon plate.

PART 3 - EXECUTION

3.1 PREPARATION

A. Coordinate work of this Section with other affected work.

3.2 INSTALLATION

A. Install equipment in accordance with manufacturer’s instructions.

B. Locate outside water alarm bell on building wall as indicated.

C. Place pipe runs to minimize obstruction to other work.

D. Place piping in concealed spaces above finished ceilings.

E. Center sprinklers in two directions in ceiling tile and provide piping offsets as required.

F. Apply masking tape or paper cover to ensure concealed sprinkler cover plates do not receive field paint finish.

G. Flush entire piping system of foreign matter.

H. Hydrostatically test entire system.

I. Require test be witnessed by the State Fire Marshal, the Owner's insurance underwriter and the Architect.

END OF SECTION 15500

SECTION 15501 - COMMON WORK RESULTS FOR FIRE SUPPRESSION

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Piping materials and installation instructions common to most piping systems.
2. Mechanical sleeve seals.
3. Sleeves.
4. Escutcheons.
5. Grout.
6. Fire-suppression demolition.
7. Concrete bases.
8. Supports and anchorages.

1.2 DEFINITIONS

A. Finished Spaces: Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe chases, unheated spaces immediately below roof, spaces above ceilings, unexcavated spaces, crawlspaces, and tunnels.

B. Exposed, Interior Installations: Exposed to view indoors. Examples include finished occupied spaces and mechanical equipment rooms.

C. Exposed, Exterior Installations: Exposed to view outdoors or subject to outdoor ambient temperatures and weather conditions. Examples include rooftop locations.

D. Concealed, Interior Installations: Concealed from view and protected from physical contact by building occupants. Examples include above ceilings and in chases.

E. Concealed, Exterior Installations: Concealed from view and protected from weather conditions and physical contact by building occupants but subject to outdoor ambient temperatures. Examples include installations within unheated shelters.

1.3 SUBMITTALS

A. Welding certificates.

1.4 QUALITY ASSURANCE

A. Steel Support Welding: Qualify processes and operators according to AWS D1.1, "Structural Welding Code--Steel."

B. Steel Pipe Welding: Qualify processes and operators according to ASME Boiler and Pressure Vessel Code: Section IX, "Welding and Brazing Qualifications."

1. Comply with provisions in ASME B31 Series, "Code for Pressure Piping."
2. Certify that each welder has passed AWS qualification tests for welding processes involved and that certification is current.

C. Electrical Characteristics for Fire-Suppression Equipment: Equipment of higher electrical characteristics may be furnished provided such proposed equipment is approved in writing and connecting electrical services, circuit breakers, and conduit sizes are appropriately modified. If minimum energy ratings or efficiencies are specified, equipment shall comply with requirements.

PART 2 - PRODUCTS

2.1 PIPE, TUBE, AND FITTINGS

A. Refer to individual Division 15 piping Sections for pipe, tube, and fitting materials and joining methods.

B. Pipe Threads: ASME B1.20.1 for factory-threaded pipe and pipe fittings.

2.2 JOINING MATERIALS

A. Refer to individual Division 15 piping Sections for special joining materials not listed below.

B. Pipe-Flange Gasket Materials: ASME B16.21, nonmetallic, flat, asbestos-free, 1/8-inch maximum thickness unless thickness or specific material is indicated.

C. Plastic, Pipe-Flange Gasket, Bolts, and Nuts: Type and material recommended by piping system manufacturer, unless otherwise indicated.

D. Solder Filler Metals: ASTM B 32, lead-free alloys. Include water-flushable flux according to ASTM B 813.

E. Brazing Filler Metals: AWS A5.8, BCuP Series or BAg1, unless otherwise indicated.

F. Welding Filler Metals: Comply with AWS D10.12.

G. Solvent Cements for Joining CPVC Plastic Piping: ASTM F 493.

2.3 MECHANICAL SLEEVE SEALS

A. Description: Modular sealing element unit, designed for field assembly, to fill annular space between pipe and sleeve.

B. Sealing Elements: EPDM or NBR interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe.

C. Pressure Plates: Stainless steel. Include two for each sealing element.

D. Connecting Bolts and Nuts: Stainless steel of length required to secure pressure plates to sealing elements. Include one for each sealing element.

2.4 SLEEVES

A. Galvanized-Steel Sheet: 0.0239-inch minimum thickness; round tube closed with welded longitudinal joint.

B. Steel Pipe: ASTM A 53, Type E, Grade B, Schedule 40, galvanized, plain ends.

C. Cast Iron: Cast or fabricated "wall pipe" equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop, unless otherwise indicated.

D. Stack Sleeve Fittings: Manufactured, cast-iron sleeve with integral clamping flange. Include clamping ring and bolts and nuts for membrane flashing.

1. Underdeck Clamp: Clamping ring with set screws.

E. Molded PVC: Permanent, with nailing flange for attaching to wooden forms.

F. PVC Pipe: ASTM D 1785, Schedule 40.

G. Molded PE: Reusable, PE, tapered-cup shaped, and smooth-outer surface with nailing flange for attaching to wooden forms.

2.5 ESCUTCHEONS

A. Description: Manufactured wall and ceiling escutcheons and floor plates, with an ID to closely fit around pipe, tube, and insulation of insulated piping and an OD that completely covers opening.

B. One-Piece, Deep-Pattern Type: Deep-drawn, box-shaped brass with polished chrome-plated finish.

C. One-Piece, Cast-Brass Type: With set screw.

1. Finish: Polished chrome-plated and rough brass.

D. Split-Casting, Cast-Brass Type: With concealed hinge and set screw.

1. Finish: Polished chrome-plated and rough brass.

2.6 GROUT

A. Description: ASTM C 1107, Grade B, nonshrink and nonmetallic, dry hydraulic-cement grout.

1. Characteristics: Post-hardening, volume-adjusting, nonstaining, noncorrosive, nongaseous, and recommended for interior and exterior applications.
2. Design Mix: 5000-psi (34.5-MPa), 28-day compressive strength.
3. Packaging: Premixed and factory packaged.

PART 3 - EXECUTION

3.1 FIRE-SUPPRESSION DEMOLITION

A. Refer to Division 01 Section "Cutting and Patching" and Division 02 Section "Selective Structure Demolition" for general demolition requirements and procedures.

B. Disconnect, demolish, and remove fire-suppression systems, equipment, and components indicated to be removed.

1. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.
2. Piping to Be Abandoned in Place: Drain piping and cap or plug piping with same or compatible piping material.
3. Equipment to Be Removed: Disconnect and cap services and remove equipment.
4. Equipment to Be Removed and Reinstalled: Disconnect and cap services and remove, clean, and store equipment; when appropriate, reinstall, reconnect, and make equipment operational.
5. Equipment to Be Removed and Salvaged: Disconnect and cap services and remove equipment and deliver to Owner.

C. If pipe, insulation, or equipment to remain is damaged in appearance or is unserviceable, remove damaged or unserviceable portions and replace with new products of equal capacity and quality.

3.2 PIPING SYSTEMS - COMMON REQUIREMENTS

A. Install piping according to the following requirements and Division 15 Sections specifying piping systems.

B. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.

C. Install piping in concealed locations, unless otherwise indicated and except in equipment rooms and service areas.

D. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

E. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.

F. Install piping to permit valve servicing.

G. Install piping at indicated slopes.

H. Install piping free of sags and bends.

I. Install fittings for changes in direction and branch connections.

J. Install piping to allow application of insulation.

K. Select system components with pressure rating equal to or greater than system operating pressure.

L. Install escutcheons for penetrations of walls, ceilings, and floors.

M. Install sleeves for pipes passing through concrete and masonry walls, gypsum-board partitions, and concrete floor and roof slabs.

N. Aboveground, Exterior-Wall Pipe Penetrations: Seal penetrations using sleeves and mechanical sleeve seals. Select sleeve size to allow for 1-inch annular clear space between pipe and sleeve for installing mechanical sleeve seals.

1. Install steel pipe for sleeves smaller than 6 inches in diameter.
2. Install cast-iron "wall pipes" for sleeves 6 inches and larger in diameter.
3. Mechanical Sleeve Seal Installation: Select type and number of sealing elements required for pipe material and size. Position pipe in center of sleeve. Assemble mechanical sleeve seals and install in annular space between pipe and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

O. Underground, Exterior-Wall Pipe Penetrations: Install cast-iron "wall pipes" for sleeves. Seal pipe penetrations using mechanical sleeve seals. Select sleeve size to allow for 1-inch annular clear space between pipe and sleeve for installing mechanical sleeve seals.

1. Mechanical Sleeve Seal Installation: Select type and number of sealing elements required for pipe material and size. Position pipe in center of sleeve. Assemble mechanical sleeve seals and install in annular space between pipe and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

P. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestop materials. Refer to Division 07 Section "Penetration Firestopping" for materials.

Q. Verify final equipment locations for roughing-in.

R. Refer to equipment specifications in other Sections of these Specifications for roughing-in requirements.

3.3 PIPING JOINT CONSTRUCTION

A. Join pipe and fittings according to the following requirements and Division 21 Sections specifying piping systems.

B. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.

C. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.

D. Soldered Joints: Apply ASTM B 813, water-flushable flux, unless otherwise indicated, to tube end. Construct joints according to ASTM B 828 or CDA's "Copper Tube Handbook," using lead-free solder alloy complying with ASTM B 32.

E. Brazed Joints: Construct joints according to AWS's "Brazing Handbook," "Pipe and Tube" Chapter, using copper-phosphorus brazing filler metal complying with AWS A5.8.

F. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:

1. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.
2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.

G. Welded Joints: Construct joints according to AWS D10.12, using qualified processes and welding operators according to Part 1 "Quality Assurance" Article.

H. Flanged Joints: Select appropriate gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Use suitable lubricants on bolt threads.

I. Plastic Piping Solvent-Cement Joints: Clean and dry joining surfaces. Join pipe and fittings according to the following:

1. Comply with ASTM F 402, for safe-handling practice of cleaners, primers, and solvent cements.
2. CPVC Piping: Join according to ASTM D 2846/D 2846M Appendix.

J. Plastic Pressure Piping Gasketed Joints: Join according to ASTM D 3139.

3.4 CONCRETE BASES

A. Concrete Bases: Anchor equipment to concrete base according to equipment manufacturer's written instructions and according to seismic codes at Project.

1. Construct concrete bases of dimensions indicated, but not less than 4 inches larger in both directions than supported unit.
2. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch centers around the full perimeter of the base.
3. Install epoxy-coated anchor bolts for supported equipment that extend through concrete base, and anchor into structural concrete floor.
4. Place and secure anchorage devices. Use supported equipment manufacturer's setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
5. Install anchor bolts to elevations required for proper attachment to supported equipment.
6. Install anchor bolts according to anchor-bolt manufacturer's written instructions.
7. Use 3000-psi, 28-day compressive-strength concrete and reinforcement as specified in Division 03 Section "Cast-in-Place Concrete".

3.5 ERECTION OF METAL SUPPORTS AND ANCHORAGES

A. Refer to Division 05 Section "Metal Fabrications" for structural steel.

B. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor fire-suppression materials and equipment.

C. Field Welding: Comply with AWS D1.1.

3.6 GROUTING

A. Mix and install grout for fire-suppression equipment base bearing surfaces, pump and other equipment base plates, and anchors.

B. Clean surfaces that will come into contact with grout.

C. Provide forms as required for placement of grout.

D. Avoid air entrapment during placement of grout.

E. Place grout, completely filling equipment bases.

F. Place grout on concrete bases and provide smooth bearing surface for equipment.

G. Place grout around anchors.

H. Cure placed grout.

END OF SECTION 15501

SECTION – 15502 FIRE PROTECTION PIPING, VALVES AND ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and General Provisions of Contract, including General and Supplementary Conditions and Division 1.

1.2 SUMMARY

A. This section of the specifications includes the furnishing and installation of the Fire Protection systems as described herein and as indicated on the drawings.

1.3 COORDINATION

A. Coordination Drawings for Acoustical and Drywall Ceilings, Plumbing, HVAC, Data, Fire Suppression, and Electrical:

1. Coordination drawings are required for the trades noted above. The HVAC contractor shall prepare reproducible coordination layout and installation drawings. (At least 1/8" scale or as approved by the Architect) for resolution of interferences and conflicts of other trades. drawings and verify layout and elevations to eliminate conflicts. Any conflicts shall be highlighted and these drawings shall be forwarded to the Architect for resolution. Priority shall be given to "gravity" systems above the ceiling. Each trade shall initial acknowledgement that the preceding has been completed. No fabrication of ductwork, fire protection, or other prefabricated systems shall begin until these coordination drawings have been completed and reviewed by the Architect/Engineers. Any subcontractor that fabricates and installs items above the ceiling before the coordinated drawings are reviewed and conflicts resolved shall do so at their own risk, and be responsible to relocate said equipment in the event conflicts arise, at no cost to the Owner.

2. Additionally, all trades shall show the proposed location of access panels (for maintenance) in "hard" ceilings for access to HVAC boxes, control' valves, fire damper motors, plumbing valves, valves, light fixture remote ballasts, ceiling hung equipment, etc., for coordination with the reflected ceiling plans. Indicate on same drawings the location of access panels in walls as well as location of plumbing cleanouts.

3. Upon A/E completion of the review of the coordination drawings, General Contractor and Subcontractors shall conduct a pre-installation coordination meeting for all "fit-up" above ceilings. No ceiling shall be lowered without the expressed approval of the Owner and the Architect.

1.4 SUBMITTALS

A. Submit under provisions of Division 1.

B. Shop Drawings: Indicate pipe materials used; jointing methods; supports; floor and wall penetration seals. Indicate installation, layout, weights, mounting and support details, and piping connections.

C. Product Data: Provide manufacturers catalogue information. Indicate valve data and ratings.

1.5 OPERATION AND MAINTENANCE DATA

A. Submit under provisions of Division 1.

B. Maintenance Instructions: Include installation instructions, spare parts lists, procedures, and treatment programs.

1.6 QUALITY ASSURANCE

A. Sprinkler Systems: Perform work to NFPA 13 Standards, 2007 edition.

B. Manual Dry Standpipe and Fire Department Valve Systems: Perform work to NFPA 14 Standards 2007 edition.

C. Underground Piping Systems: Perform work to NFPA 24 Standards, 2007 edition.

D. Welding Materials and Procedures: Perform to ASME Code.

E. Valves: Bear UL and FM label or marking. Provide manufacturer's name and pressure rating marked on valve body.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, protect and handle products to site under provisions of Division 1.

B. Deliver and store valves in shipping containers with labeling in place.

C. Provide temporary protective coating on cast iron and steel valves.

D. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.

1.8 FIRESTOPPING

A. Fire safe all floor and wall penetrations thru rated walls and floors to prevent the passage of smoke and to maintain integrity of fire rating of the barrier being penetrated. Materials and installation shall be in accordance with standard U.L. listed assemblies.

1.9 AS-BUILT DRAWINGS

A. Maintain updated drawings showing all deviations from the approved fabrication drawings. At the end of the project, furnish one set of "as-built" drawings showing dimensional locations of pipes, risers, valves, etc.

1.10 SHOP DRAWINGS

A. Product Data: Include rated capacities and indicate materials, finishes, dimensions, required clearances and methods of assembly of components; electrical characteristics and wiring for the following:

1. Pipe and Fittings.
2. Valves
3. Backflow Preventer
4. Water Motor Gong
5. Fire Department Connections
6. Fire Department Hose Valves
7. Flow and Tamper Switches

B. Field Quality-Control Test Reports

1. Certification of backflow preventers
2. Laboratory analysis of water supply test

C. Operation and Maintenance Date for the Following:

1. Backflow Preventers
2. Flow and Tamper Switches
3. Electric Alarm Bell

PART 2 - PRODUCTS

2.1 SPRINKLER PIPING, BURIED

A. Ductile Iron Pipe: ANSI/AWWA C151, with AWWA C105 polyethylene encasement, and AWWA C104 cement mortar lining.

B. Fittings: ANSI/AWWA C110, standard thickness, restrained type, with AWWA C104 cement mortar lining.

C. Joints: ANSI/AWWA C111, rubber gasket.

D. Underground Piping shall be restrained joint type system equal to "American Ductile Iron Pipe" flex-ring system.

E. Ductile-Iron Deflection Fittings:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. EBAA Iron, Inc.
b. ROMAC Industries, Inc.

2. Description: Compound, ductile-iron coupling fitting with sleeve and one or two flexing sections for up to 15-degree deflection, gaskets, and restrained-joint ends complying with AWWA C110 or AWWA C153. Include AWWA C111, ductile-iron glands, rubber gaskets, and steel bolts.
3. Pressure Rating: 250 psig minimum.

2.2 SPRINKLER AND STANDPIPE PIPING, ABOVE GROUND

A. Wet Pipe Sprinkler System: Steel Pipe: ASTM A53; ASTM A795; ANSI/ASTM A135; Schedule 10 for pipe sizes 2" and larger and schedule 40 for 1-1/2" and smaller, black.

B. Wet Pipe Sprinkler System Steel Fittings: ANSI/ASME B16.9, wrought steel, butt welded; ANSI/ASME B16.25, butt weld ends; ASTM A234, wrought carbon steel and alloy steel; ANSI/ASME B16.5, steel flanges and fittings; ANSI/ASME B16.11, forged steel socket welded and threaded.

C. Wet Pipe Sprinkler System Cast Iron Fittings: ANSI/ASME B16.1, flanges and fittings; ANSI/ASME B16.4, screwed fittings.

D. Dry Pipe Standpipe System: Steel Pipe, ASTM A53; Schedule 40 for all pipe sizes, galvanized.

E. Mechanical Tee Fittings for Galvanized System: UL 213, ductile iron housing with pressure responsive gasket, bolts and threaded outlet.

F. Mechanical Grooved Couplings: Malleable iron housing clamps to engage and lock, "C" shaped composition sealing gasket, steel bolts, nuts, and washers.

2.3 SPECIAL PIPE FITTINGS

A. Ductile-Iron Flexible Expansion Joints

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. EBAA Iron, Inc.
b. ROMAC Industries, Inc.
c. Star Pipe Products.

2. Description: Compound, ductile-iron fitting with combination of flanged and mechanical-joint ends complying with AWWA C110 or AWWA C153. Include two gasketed ball-joint sections and one or more gasketed sleeve sections. Assemble

components for offset and expansion indicated. Include AWWA C111, ductile-iron glands, rubber gaskets, and steel bolts.

3. Pressure Rating: 250 psig minimum.

B. Ductile-Iron Deflection Fittings:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. EBAA Iron, Inc.
b. ROMAC Industries, Inc.

2. Description: Compound, ductile-iron coupling fitting with sleeve and one or two flexing sections for up to 15-degree deflection, gaskets, and restrained-joint ends complying with AWWA C110 or AWWA C153. Include AWWA C111, ductile-iron glands, rubber gaskets, and steel bolts.

3. Pressure Rating: 250 psig minimum.

2.4 GATE VALVES

A. Up to and including 2 Inches: UL 262, bronze body, bronze trim, rising stem, handwheel, inside screw, single wedge or disc, threaded ends.

B. Over 2 Inches: UL 262, iron body, bronze trim, rising stem, handwheel, OS&Y, single wedge, flanged ends.

2.5 GLOBE OR ANGLE VALVES

A. Up to 2 Inches: Bronze body, bronze trim, rising stem and hand wheel, inside screw, renewable composition discs, screwed ends, with back seating capacity re-packable under pressure.

B. Over 2 Inches: Iron body, bronze trim, rising stem, hand wheel, OS&Y, plug-type disc, flanged ends, renewable seat and disc.

2.6 BUTTERFLY VALVES

A. UL 1091, bronze body, stainless steel disc, resilient replaceable seat, threaded ends, extended neck, hand wheel and gear drive and integral indicating device, and built-in tamper proof switch rated 1.0 amps at 24 volts DC.

B. Cast or ductile iron body, chrome plated ductile iron disc, resilient replaceable EPDM seat, wafer or lug ends, extended neck, hand wheel and gear drive and integral indicating device, and built-in tamper proof switch rated 1.0 amps at 24 volts DC.

2.7 CHECK VALVES

A. Up to and including 2 Inches: UL 312 or MSS SP-80, Class 150, bronze swing disc, screwed ends.

B. Over 2 Inches: UL 312, iron body, bronze trim, swing disc, renewable disc and seat, flanged ends.

C. Iron body, bronze trim, stainless steel spring, renewable composition disc, screwed, wafer or flanged ends.

2.8 FIRE DEPARTMENT HOSE VALVES

A. UL Listed, 300 psig minimum rating, brass construction. NPS 2-1/2 female inlet and fire hose threaded outlet that matches New Orleans Fire Department thread requirements; 90 degree angle pattern as indicated.

2.9 ALARM VALVES

A. The dry pipe valve shall be UL a positive latching clapper, differential type dry valve. Dry valve shall be U.L. listed and Factory Mutual approved. Air pressure to water pressure area differential shall be approximately a 6 to 1 ratio. Dry pipe valve trim shall be galvanized. Dry pipe valves shall be equipped with conventional and accelerator trim packages. Dry pipe valve shall be equal to Viking Corporation model E.

2.10 DOUBLE CHECK (BACKFLOW PREVENTER) ASSEMBLY - BUTTERFLY VALVES

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. Watts Model 757NDCDAOSY w/ by-pass meter
b. Ames C300 OSY w/ by-pass meter

B. Back flow preventer shall be factory assembled and tested. The unit shall consist of two independent Tri-Link Check modules located within a single housing ; a sleeve access port; four bronze body, nickel plated test cocks; and two drip tight, OS&Y gate shut off valves with tamper switches. The check valve modules must be removable and serviceable without the use of special tools. The unit’s housing shall be constructed of type 304 stainless steel schedule 40 pipe having grooved connections. The check valves shall have reversible EPDM elastomer discs and shall provide drip tight closure against reverse flow of liquids caused by back pressure or back siphonage. All pins, fasteners and springs shall be constructed of stainless steel. The by-pass assembly shall consist of a meter registering in gallons, a double check valve assembly and required test cocks. The unit shall be U.L. listed and Factory Mutual approved for installation in both the horizontal and vertical position and listed for sprinkler system service. The plumbing contractor shall remove the factory supplied by-pass meter and install a new by-pass meter to be supplied by the New Orleans Sewerage and Water

Board. The unit shall be certified by the plumbing contractor upon start up of the system.

2.11 DRAIN VALVES

A. Bronze compression stop with hose thread nipple and cap.

B. Brass ball valve with cap and chain, 3/4 inch hose thread.

2.12 TEST AND DRAIN VALVES

A. Up to 1-1/4 inches: Brass Ball Valve with lever handle, 3-position (Off-Test-Drain) with integral site glass, screwed ends, with ½" nominal test orifice.

2.13 WATER MOTOR GONG.

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. Tyco
b. Viking

B. U.L. 753, mechanical operation type with pelton-wheel operator with shaft length, bearings, and sleeve to suite wall construction; 10 inch diameter, cast aluminum gong with red enamel factory finish. Include 3/4'' inlet and 1" drain connections.

2.14 FIRE DEPARTMENT INLET CONNECTION (SPRINKLER SYSTEM)

A. Flush, wall mounted type with chrome plated finish, two 2-1/2" outlets threaded to suit local fire department standards. Provide caps and chains of matching material and finish and 3/4" automatic drip drain. Letter escutcheon plate to indicate “Auto-Sprinklers”.

2.15 FIRE DEPARTMENT INLET CONNECTION (STANDPIPE SYSTEM)

A. Flush, wall mounted type with chrome plated finish, two 2-1/2" outlets threaded to suit local fire department standards. Provide caps and chains of matching material and finish and 3/4" automatic drip drain. Letter escutcheon plate to indicate “Manual Standpipes”.

2.16 FLOW SWITCH

A. UL 347, vane type designed to detect a sustained flow of water exceeding 10 gpm. Switch body, base and housing shall be cast aluminum with vandal proof cover. Switch shall be provided with a built-in adjustable (0-90 seconds) pneumatic retard

device and two single pole, double throw switches with form “C” contacts rated for 2.5 amps at 24 volts DC.

2.17 TAMPER SWITCH

A. Provide UL 753 supervisory switches to monitor the open condition of all O.S.&Y. Valves. Provide two sets of single pole double throw contacts and necessary hardware to mount switch. Switch shall be rated for 2.5 amps at 24 volts DC.

2.18 WATER SUPPLY TESTING

A. Contractor shall test water supply to determine if the supply can contribute to microbiologically influenced corrosion (MIC).

B. Test shall be performed in accordance with and results analysis by an approved testing laboratory equal to “Bioindustrial Technologies, Inc. (BTI), 231 So. Clover Drive, Suites 1 & 2, Bayfield, CO 81122 (1-800-798-4650).

C. Contractor shall provide written report of the water analysis.

PART 3 - EXECUTION

3.1 GENERAL REQUIREMENTS

A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.

B. Remove scale and foreign material, from inside and outside, before assembly.

C. Prepare piping connections to equipment with flanges or unions.

D. The backflow preventer shall be tested and it’s operation certified by a licensed plumbing contractor certified in backflow preventer testing.

3.2 INSTALLATION

A. Install piping in accordance with NFPA 13 for sprinkler systems NFPA 14 for standpipe and hose systems and NFPA 24 for service mains.

B. Route piping in orderly manner, plumb and parallel to building structure. Maintain gradient.

C. Install piping to conserve building space, and not interfere with use of space and other work.

D. Group piping whenever practical at common elevations.

E. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.

F. Slope piping and arrange systems to drain at low points. Use eccentric reducers to maintain top of pipe level.

G. Prepare pipe, fittings, supports, and accessories for finish painting. Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc rich primer to welding. Refer to Division 9.

H. Do not penetrate building structural members unless indicated.

I. Provide UL Fire Rated Assembly System of sleeves when penetrating rated floors and walls. Seal pipe and sleeve penetrations to achieve fire resistance equivalent to fire separation required.

J. Die cut screw joints with full cut standard taper pipe threads with red lead and linseed oil or other non-toxic joint compound applied to male threads only.

K. Valves for general requirements for installing valves. Install fire protection specialty valves, trim, fittings, controls and specialties in accordance with NFPA 13 requirements and the manufacturer's written instructions. Install valves with stems upright or horizontal, not inverted. Remove protective coatings after installation.

L. Provide gate or butterfly valves for shut-off or isolating service.

M. Provide supervisory switches for all valves. Connect all alarm devices (flow and tamper switches) to the fire alarm system.

N. Provide drain valves at main shut-off valves, low points of piping and apparatus.

O. No welding shall be permitted on galvanized piping systems. The contractor shall "make-up" all galvanized piping systems by using mechanical rolled grooved tees, couplings and fittings. All mechanical (joint) tees shall be equal to Victaulic style 72 threaded outlet couplings. If Contractor wishes to use welded outlets, all piping shall be hot dip galvanized after welding is performed. Cold galvanized spray coatings will not be permitted.

P. Flush the entire system in accordance with NFPA 13 requirements.

END OF SECTION 15502

SECTION 15517 - SLEEVES AND SLEEVE SEALS FOR FIRE-SUPPRESSION PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Sleeves.
2. Stack-sleeve fittings.
3. Sleeve-seal systems.
4. Sleeve-seal fittings.
5. Grout.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

PART 2 - PRODUCTS

2.1 SLEEVES

A. Cast-Iron Wall Pipes: Cast or fabricated of cast or ductile iron and equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop unless otherwise indicated.

B. Galvanized-Steel Wall Pipes: ASTM A 53/A 53M, Schedule 40, with plain ends and welded steel collar; zinc coated.

C. Galvanized-Steel-Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, zinc coated, with plain ends.

D. PVC-Pipe Sleeves: ASTM D 1785, Schedule 40.

E. Galvanized-Steel-Sheet Sleeves: 0.0239-inch minimum thickness; round tube closed with welded longitudinal joint.

F. Molded-PE or -PP Sleeves: Removable, tapered-cup shaped, and smooth outer surface with nailing flange for attaching to wooden forms.

G. Molded-PVC Sleeves: With nailing flange for attaching to wooden forms.

2.2 STACK-SLEEVE FITTINGS

A. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

1. Smith, Jay R. Mfg. Co.
2. Zurn Specification Drainage Operation; Zurn Plumbing Products Group.
3. Other prior approved equal.

B. Description: Manufactured, cast-iron sleeve with integral clamping flange. Include clamping ring, bolts, and nuts for membrane flashing.

1. Underdeck Clamp: Clamping ring with setscrews.

2.3 SLEEVE-SEAL SYSTEMS

A. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

1. Advance Products & Systems, Inc.
2. CALPICO, Inc.
3. Metraflex Company (The).
4. Pipeline Seal and Insulator, Inc.
5. Proco Products, Inc.
6. Other prior approved equal.

B. Description: Modular sealing-element unit, designed for field assembly, for filling annular space between piping and sleeve.

1. Sealing Elements: EPDM-rubber or NBR interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe.
2. Pressure Plates: Stainless steel.
3. Connecting Bolts and Nuts: Stainless steel of length required to secure pressure plates to sealing elements.

2.4 SLEEVE-SEAL FITTINGS

A. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

1. Presealed Systems.
2. Other prior approved equal.

B. Description: Manufactured plastic, sleeve-type, waterstop assembly made for imbedding in concrete slab or wall. Unit has plastic or rubber waterstop collar with center opening to match piping OD.

2.5 GROUT

A. Standard: ASTM C 1107/C 1107M, Grade B, post-hardening and volume-adjusting, dry, hydraulic-cement grout.

B. Characteristics: Nonshrink; recommended for interior and exterior applications.

C. Design Mix: 5000-psi, 28-day compressive strength.

D. Packaging: Premixed and factory packaged.

PART 3 - EXECUTION

3.1 SLEEVE INSTALLATION

A. Install sleeves for piping passing through penetrations in floors, partitions, roofs, and walls.

B. For sleeves that will have sleeve-seal system installed, select sleeves of size large enough to provide 1-inch annular clear space between piping and concrete slabs and walls.

1. Sleeves are not required for core-drilled holes.

C. Install sleeves in concrete floors, concrete roof slabs, and concrete walls as new slabs and walls are constructed.

1. Permanent sleeves are not required for holes in slabs formed by molded-PE or -PP sleeves.
2. Cut sleeves to length for mounting flush with both surfaces.

a. Exception: Extend sleeves installed in floors of mechanical equipment areas or other wet areas 2 inches above finished floor level.

3. Using grout, seal the space outside of sleeves in slabs and walls without sleeve-seal system.

D. Install sleeves for pipes passing through interior partitions.

1. Cut sleeves to length for mounting flush with both surfaces.
2. Install sleeves that are large enough to provide 1/4-inch annular clear space between sleeve and pipe or pipe insulation.
3. Seal annular space between sleeve and piping or piping insulation; use joint sealants appropriate for size, depth, and location of joint. Comply with requirements for sealants specified in Division 07 Section "Joint Sealants."

E. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestop materials. Comply

with requirements for firestopping specified in Division 07 Section "Penetration Firestopping."

3.2 STACK-SLEEVE-FITTING INSTALLATION

A. Install stack-sleeve fittings in new slabs as slabs are constructed.

1. Install fittings that are large enough to provide 1/4-inch annular clear space between sleeve and pipe or pipe insulation.
2. Secure flashing between clamping flanges for pipes penetrating floors with membrane waterproofing. Comply with requirements for flashing specified in Division 07 Section "Sheet Metal Flashing and Trim."
3. Install section of cast-iron soil pipe to extend sleeve to 2 inches above finished floor level.
4. Extend cast-iron sleeve fittings below floor slab as required to secure clamping ring if ring is specified.
5. Using grout, seal the space around outside of stack-sleeve fittings.

B. Fire-Barrier Penetrations: Maintain indicated fire rating of floors at pipe penetrations. Seal pipe penetrations with firestop materials. Comply with requirements for firestopping specified in Division 07 Section "Penetration Firestopping."

3.3 SLEEVE-SEAL-SYSTEM INSTALLATION

A. Install sleeve-seal systems in sleeves in exterior concrete walls and slabs-on-grade at service piping entries into building.

B. Select type, size, and number of sealing elements required for piping material and size and for sleeve ID or hole size. Position piping in center of sleeve. Center piping in penetration, assemble sleeve-seal system components, and install in annular space between piping and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make a watertight seal.

3.4 SLEEVE-SEAL-FITTING INSTALLATION

A. Install sleeve-seal fittings in new walls and slabs as they are constructed.

B. Assemble fitting components of length to be flush with both surfaces of concrete slabs and walls. Position waterstop flange to be centered in concrete slab or wall.

C. Secure nailing flanges to concrete forms.

D. Using grout, seal the space around outside of sleeve-seal fittings.

3.5 SLEEVE AND SLEEVE-SEAL SCHEDULE

A. Use sleeves and sleeve seals for the following piping-penetration applications:

1. Exterior Concrete Walls above Grade:

    a. Piping Smaller Than NPS 6: Galvanized-steel wall sleeves or Galvanized-steel-pipe sleeves, Sleeve-seal fittings.
    b. Piping NPS 6 and Larger: Galvanized-steel wall sleeves or Galvanized-steel-pipe sleeves.

2. Exterior Concrete Walls below Grade:

    a. Piping Smaller Than NPS 6: Galvanized-steel wall sleeves with sleeve-seal system or Galvanized-steel-pipe sleeves with sleeve-seal system, Sleeve-seal fittings.

        1) Select sleeve size to allow for 1-inch annular clear space between piping and sleeve for installing sleeve-seal system.

    b. Piping NPS 6 and Larger: Galvanized-steel wall sleeves with sleeve-seal system or Galvanized-steel-pipe sleeves with sleeve-seal system.

        1) Select sleeve size to allow for 1-inch annular clear space between piping and sleeve for installing sleeve-seal system.

3. Concrete Slabs-on-Grade:

    a. Piping Smaller Than NPS 6: Galvanized-steel wall sleeves with sleeve-seal system or Galvanized-steel-pipe sleeves with sleeve-seal system, Sleeve-seal fittings.

        1) Select sleeve size to allow for 1-inch annular clear space between piping and sleeve for installing sleeve-seal system.

    b. Piping NPS 6 and Larger: Galvanized-steel wall sleeves with sleeve-seal system or Galvanized-steel-pipe sleeves with sleeve-seal system.

        1) Select sleeve size to allow for 1-inch annular clear space between piping and sleeve for installing sleeve-seal system.

4. Concrete Slabs above Grade:

    a. Piping Smaller Than NPS 6: Galvanized-steel-pipe sleeves or PVC-pipe sleeves, Stack-sleeve fittings.
    b. Piping NPS 6 and Larger: Galvanized-steel-pipe sleeves or PVC-pipe sleeves, Stack-sleeve fittings.

5. Interior Partitions:

    a. Piping Smaller Than NPS 6: Galvanized-steel-pipe sleeves or PVC-pipe sleeves.
    b. Piping NPS 6 and Larger: Galvanized-steel-sheet sleeves.

END OF SECTION 15517

SECTION 15548 - VIBRATION SUPPRESSION PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Isolation pads.
2. Isolation mounts.
3. Restrained elastomeric isolation mounts.
4. Restraining braces.

1.2 DEFINITIONS

A. IBC: International Building Code.

B. ICC-ES: ICC-Evaluation Service.

C. OSHPD: Office of Statewide Health Planning and Development for the State of California.

1.3 SUBMITTALS

A. Product Data: For each product indicated.

B. Delegated-Design Submittal: For vibration isolation and seismic-restraint calculations and details indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

C. Welding certificates.

D. Qualification Data: For professional engineer.

1.4 QUALITY ASSURANCE

A. Comply with seismic-restraint requirements in the IBC and NFPA 13 unless requirements in this Section are more stringent.

B. Welding: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

C. Seismic-restraint devices shall have horizontal and vertical load testing and analysis and shall bear anchorage preapproval OPA number from OSHPD, preapproval by ICC-ES, or preapproval by another agency acceptable to authorities having jurisdiction,

showing maximum seismic-restraint ratings. Ratings based on independent testing are preferred to ratings based on calculations. If preapproved ratings are not available, submittals based on independent testing are preferred. Calculations (including combining shear and tensile loads) to support seismic-restraint designs must be signed and sealed by a qualified professional engineer.

PART 2 - PRODUCTS

2.1 VIBRATION ISOLATORS

A. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:

1. Ace Mountings Co., Inc.
2. Amber/Booth Company, Inc.
3. California Dynamics Corporation.
4. Isolation Technology, Inc.
5. Kinetics Noise Control.
6. Mason Industries.
7. Vibration Eliminator Co., Inc.
8. Vibration Isolation.
9. Vibration Mountings & Controls, Inc.
10. Other prior approved equal.

B. Pads: Arranged in single or multiple layers of sufficient stiffness for uniform loading over pad area, molded with a nonslip pattern and galvanized-steel baseplates, and factory cut to sizes that match requirements of supported equipment.

1. Resilient Material: Oil- and water-resistant neoprene or rubber.

C. Mounts: Double-deflection type, with molded, oil-resistant rubber, hermetically sealed compressed fiberglass, or neoprene isolator elements with factory-drilled, encapsulated top plate for bolting to equipment and with baseplate for bolting to structure. Color-code or otherwise identify to indicate capacity range.

1. Materials: Cast-ductile-iron or welded steel housing containing two separate and opposing, oil-resistant rubber or neoprene elements that prevent central threaded element and attachment hardware from contacting the housing during normal operation.
2. Neoprene: Shock-absorbing materials compounded according to the standard for bridge-bearing neoprene as defined by AASHTO.

D. Restrained Mounts: All-directional mountings with seismic restraint.

1. Materials: Cast-ductile-iron or welded steel housing containing two separate and opposing, oil-resistant rubber or neoprene elements that prevent central threaded element and attachment hardware from contacting the housing during normal operation.

2. Neoprene: Shock-absorbing materials compounded according to the standard for bridge-bearing neoprene as defined by AASHTO.

2.2 SEISMIC-RESTRAINT DEVICES

A. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:

1. Amber/Booth Company, Inc.
2. California Dynamics Corporation.
3. Cooper B-Line, Inc.; a division of Cooper Industries.
4. Hilti, Inc.
5. Kinetics Noise Control.
6. Loos & Co.; Cableware Division.
7. Mason Industries.
8. TOLCO Incorporated; a brand of NIBCO INC.
9. Unistrut; Tyco International, Ltd.
10. Other prior approved equal.

B. General Requirements for Restraint Components: Rated strengths, features, and applications shall be as defined in reports by an evaluation service member of ICC-ES, OSHPD, or an agency acceptable to authorities having jurisdiction.

1. Structural Safety Factor: Allowable strength in tension, shear, and pullout force of components shall be at least four times the maximum seismic forces to which they will be subjected.

C. Channel Support System: MFMA-3, shop- or field-fabricated support assembly made of slotted steel channels with accessories for attachment to braced component at one end and to building structure at the other end and other matching components and with corrosion-resistant coating; and rated in tension, compression, and torsion forces.

D. Hanger Rod Stiffener: Steel tube or steel slotted-support-system sleeve with internally bolted connections or Reinforcing steel angle clamped to hanger rod.

E. Bushings for Floor-Mounted Equipment Anchor Bolts: Neoprene bushings designed for rigid equipment mountings, and matched to type and size of anchor bolts and studs.

F. Resilient Isolation Washers and Bushings: One-piece, molded, oil- and water-resistant neoprene, with a flat washer face.

G. Mechanical Anchor Bolts: Drilled-in and stud-wedge or female-wedge type in zinc-coated steel for interior applications and stainless steel for exterior applications. Select anchor bolts with strength required for anchor and as tested according to ASTM E 488. Minimum length of eight times diameter.

PART 3 - EXECUTION

3.1 VIBRATION-CONTROL AND SEISMIC-RESTRAINT DEVICE INSTALLATION

A. Equipment Restraints:

1. Install resilient bolt isolation washers on equipment anchor bolts where clearance between anchor and adjacent surface exceeds 0.125 inch.
2. Install seismic-restraint devices using methods approved by an evaluation service member of ICC-ES, OSHPD, or an agency acceptable to authorities having jurisdiction providing required submittals for component.

B. Piping Restraints:

1. Comply with requirements in MSS SP-127 and NFPA 13.
2. Space lateral supports a maximum of 40 feet o.c., and longitudinal supports a maximum of 80 feet o.c.
3. Brace a change of direction longer than 10 feet.

C. Install seismic-restraint devices using methods approved by an evaluation service member of ICC-ES, OSHPD, an agency acceptable to authorities having jurisdiction providing required submittals for component.

D. Install bushing assemblies for anchor bolts for floor-mounted equipment, arranged to provide resilient media between anchor bolt and mounting hole in concrete base.

E. Attachment to Structure: If specific attachment is not indicated, anchor bracing to structure at flanges of beams, at upper truss chords of bar joists, or at concrete members.

F. Drilled-in Anchors:

1. Identify position of reinforcing steel and other embedded items prior to drilling holes for anchors. Do not damage existing reinforcing or embedded items during coring or drilling. Notify the structural engineer if reinforcing steel or other embedded items are encountered during drilling. Locate and avoid prestressed tendons, electrical and telecommunications conduit, and gas lines.
2. Do not drill holes in concrete or masonry until concrete, mortar, or grout has achieved full design strength.
3. Wedge Anchors: Protect threads from damage during anchor installation. Heavy-duty sleeve anchors shall be installed with sleeve fully engaged in the structural element to which anchor is to be fastened.
4. Set anchors to manufacturer's recommended torque, using a torque wrench.
5. Install zinc-coated steel anchors for interior and stainless-steel anchors for exterior applications.

3.2 ACCOMMODATION OF DIFFERENTIAL SEISMIC MOTION

A. Install flexible connections in piping where they cross seismic joints, where adjacent sections or branches are supported by different structural elements, and where the connections terminate with connection to equipment that is anchored to a different structural element from the one supporting the connections as they approach equipment. Comply with requirements in Division 15 Section "Automatic Sprinkler System" for piping flexible connections.

END OF SECTION 15548

SECTION 15553 - IDENTIFICATION FOR FIRE-SUPPRESSION PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Equipment labels.
2. Warning signs and labels.
3. Pipe labels.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Equipment-Label Schedule: Include a listing of all equipment to be labeled and the proposed content for each label.

PART 2 - PRODUCTS

2.1 EQUIPMENT LABELS

A. Metal Labels for Equipment:

1. Material and Thickness: Brass, 0.032 inch thick, with predrilled holes for attachment hardware.
2. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.
3. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.
4. Fasteners: Stainless-steel rivets or self-tapping screws.
5. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

B. Plastic Labels for Equipment:

1. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/8 inch thick, with predrilled holes for attachment hardware.
2. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.
3. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately

larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.

4. Fasteners: Stainless-steel rivets or self-tapping screws.
5. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

C. Label Content: Include equipment's Drawing designation or unique equipment number, Drawing numbers where equipment is indicated (plans, details, and schedules), and the Specification Section number and title where equipment is specified.

D. Equipment-Label Schedule: For each item of equipment to be labeled, on 8-1/2-by-11-inch bond paper. Tabulate equipment identification number and identify Drawing numbers where equipment is indicated (plans, details, and schedules) and the Specification Section number and title where equipment is specified. Equipment schedule shall be included in operation and maintenance data.

2.2 WARNING SIGNS AND LABELS

A. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/8 inch thick, with predrilled holes for attachment hardware.

B. Letter Color: White.

C. Background Color: Black.

D. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.

E. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.

F. Fasteners: Stainless-steel rivets or self-tapping screws.

G. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

H. Label Content: Include caution and warning information, plus emergency notification instructions.

2.3 PIPE LABELS

A. General Requirements for Manufactured Pipe Labels: Preprinted, color-coded, with lettering indicating service and showing flow direction.

B. Pretensioned Pipe Labels: Precoiled, semirigid plastic formed to [partially cover] [cover full] circumference of pipe and to attach to pipe without fasteners or adhesive.

C. Self-Adhesive Pipe Labels: Printed plastic with contact-type, permanent-adhesive backing.

D. Pipe-Label Contents: Include identification of piping service using same designations or abbreviations as used on Drawings; pipe size; and an arrow indicating flow direction.

1. Flow-Direction Arrows: Integral with piping-system service lettering to accommodate both directions, or as separate unit on each pipe label to indicate flow direction.
2. Lettering Size: At least 1-1/2 inches high.

PART 3 - EXECUTION

3.1 PREPARATION

A. Clean piping and equipment surfaces of substances that could impair bond of identification devices, including dirt, oil, grease, release agents, and incompatible primers, paints, and encapsulants.

3.2 LABEL INSTALLATION

A. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.

B. Coordinate installation of identifying devices with locations of access panels and doors.

C. Install or permanently fasten labels on each major item of mechanical equipment.

D. Locate equipment labels where accessible and visible.

E. Piping Color-Coding: Painting of piping is specified in Division 09 Section "Interior Painting."

F. Pipe-Label Locations: Locate pipe labels where piping is exposed or above accessible ceilings in finished spaces; machine rooms; accessible maintenance spaces such as shafts, tunnels, and plenums; and exterior exposed locations as follows:

1. Near each valve and control device.
2. Near each branch connection excluding short takeoffs. Where flow pattern is not obvious, mark each pipe at branch.
3. Near penetrations through walls, floors, ceilings, and inaccessible enclosures.
4. At access doors, manholes, and similar access points that permit view of concealed piping.
5. Near major equipment items and other points of origination and termination.
6. Spaced at maximum intervals of 50 feet along each run. Reduce intervals to 25 feet in areas of congested piping and equipment.
7. On piping above removable acoustical ceilings. Omit intermediately spaced labels.

END OF SECTION 15553

SECTION 15732 -ROOFTOP AIR CONDITIONERS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following rooftop air conditioners:

1. Cooling and heating units.

1.2 SUBMITTALS

A. Product Data: For each model indicated.

B. Shop Drawings: Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection. Prepare the following by or under the supervision of a qualified professional engineer:

1. Design Calculations: Calculate requirements for selecting vibration isolators and for designing vibration isolation bases.
2. Detail mounting, securing, and flashing of roof curb to roof structure. Indicate coordinating requirements with roof membrane system.
3. Wiring Diagrams: Power, signal, and control wiring.

C. Field quality-control test reports.

D. Operation and maintenance data.

E. Warranties: Special warranties specified in this Section.

1.3 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

B. Fabricate and label refrigeration system to comply with ASHRAE 15, "Safety Code for Mechanical Refrigeration."

C. Energy-Efficiency Ratio: Equal to or greater than prescribed by ASHRAE 90.1, "Energy Efficient Design of New Buildings except Low-Rise Residential Buildings."

D. Coefficient of Performance: Equal to or greater than prescribed by ASHRAE 90.1, "Energy Efficient Design of New Buildings except Low-Rise Residential Buildings."

E. ARI Compliance for Units with Capacities Less Than 135,000 Btuh: Rate rooftop air-conditioner capacity according to ARI 210/240, "Unitary Air-Conditioning and Air-Source Heat Pump Equipment."

1. Sound Power Level Ratings: Comply with ARI 270, "Sound Rating of Outdoor Unitary Equipment."

F. ARI Compliance for Units with Capacities 135,000 Btuh and More: Rate rooftop air-conditioner capacity according to ARI 340/360, "Commercial and Industrial Unitary Air-Conditioning and Heat Pump Equipment."

1. Sound Power Level Ratings: Comply with ARI 270, "Sound Rating of Outdoor Unitary Equipment."

1.4 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to replace components of rooftop air conditioners that fail in materials or workmanship within specified warranty period.
1. Warranty Period for Compressors: Manufacturer's standard, but not less than five years from date of Substantial Completion.

PART 2 - PRODUCTS

1.1 MANUFACTURERS

A. In other Part 2 articles where subparagraph titles below introduce lists, the following requirements apply for product selection:
1. Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the manufacturers specified.

1.2 ROOFTOP AIR CONDITIONERS 6 TONS AND SMALLER

A. Manufacturers:

1. Carrier Corp.
2. Lennox Industries Inc.
3. McQuay International.
4. Trane Company (The); North American Commercial Group.
5. YORK International Corporation.

B. Description: Factory assembled and tested; designed for exterior installation; consisting of compressor, indoor and outside refrigerant coils, indoor fan and outside coil fan, refrigeration and temperature controls, filters, and dampers.

C. Casing: Galvanized-steel construction with enamel paint finish, removable panels or access doors with neoprene gaskets for inspection and access to internal parts, minimum 1/2-inch- thick thermal insulation, knockouts for electrical and piping connections, exterior condensate drain connection, and lifting lugs.

D. Indoor Fan: Forward curved, centrifugal, directly driven by multispeed motor.

E. Outside Coil Fan: Propeller type, directly driven by motor.

F. Condenser Coils: Aluminum-plate fin and seamless copper tube in steel casing. Provide louvered metal hail guard.

G. Refrigerant Coils: Aluminum-plate fin and seamless copper tube in steel casing with equalizing-type vertical distributor.

H. Compressor: Hermetic reciprocating or scroll compressor with integral vibration isolators, internal overcurrent and over temperature protection, internal pressure relief, and crankcase heater.

I. Refrigerant: R-410a

J. Refrigeration System:

1. Compressor.
2. Outside coil and fan.
3. Indoor coil and fan.
4. Four-way reversing valve and suction line accumulator.
5. Expansion valve with replaceable thermostatic element.
6. Refrigerant dryer.
7. High-pressure switch.
8. Low-pressure switch.
9. Thermostat for coil freeze-up protection during low-ambient temperature operation or loss of air.
10. Low-ambient switch.
11. Brass service valves installed in discharge and liquid lines.
12. Charge of refrigerant.

K. Filters: 2-inch- thick, fiberglass, MERV 7, pleated, throwaway filters in filter rack. Provide additional set of filters upon completion of project.

L. Supplemental Electric Heat: Helix-wound, nickel-chrome, electric-resistance elements, and factory wired for single-point wiring connection; with time delay for element staging, and overcurrent and overheat protective devices.

M. Outside-Air Damper: Linked damper blades, for 0 to 25 percent outside air, with manual slide and two position automatic damper motor and hood.

N. Power Connection: Provide for single connection of power to unit with unit-mounted disconnect switch accessible from outside unit and control-circuit transformer with built-in circuit breaker.

O. Duct Mounted Smoke Detectors: Provide duct mounted smoke detectors in supply and return ducts for units over 2000 CFM or nominal 5-tons or higher. Smoke detectors shall include a remote audio/visual alarm located in the occupied space. Smoke detector shall disable RTU and activate alarm upon detection of smoke.

P. Roof Curb: G90 galvanized steel, factory painted, gasketing, and factory-installed wood nailer; complying with NRCA standards; minimum height of 16 inches.

1.3 MOTORS

A. General requirements for motors are specified in Division 23 Section "Motors."

B. Motor Sizes: Minimum size as indicated; if not indicated, large enough so driven load will not require motor to operate in service factor range above 1.0.

C. Electrical devices and wiring are specified in Division 16 Sections.

PART 3 - EXECUTION

1.1 INSTALLATION

A. Install units level and plumb, maintaining manufacturer's recommended clearances

B. Curb Support: Install roof curb on roof structure, level and secure, according to NRCA's "Low-Slope Membrane Roofing Construction Details Manual," Illustration "Raised Curb Detail for Rooftop Air Handling Units and Ducts." Install and secure rooftop air conditioners on curbs and coordinate roof penetrations and flashing with roof construction. Secure units to curb support with anchor bolts.

C. Through bolt curbs to roof with angle iron backers at all corners of curb and in center where curb exceeds 6’ in length.

1.2 CONNECTIONS

A. Duct installation requirements are specified in other Division 15 Sections. Drawings indicate the general arrangement of ducts. The following are specific connection requirements:

1. Install ducts through roof curb to RTU penetration.
2. Remove roof decking only as required for passage of ducts. Do not cut out decking under entire roof curb.
3. Terminate supply and return-air duct with flange in RTU. Run through roof structure and insulate space between roof. Provide flexible connection.

B. Electrical System Connections: Comply with applicable requirements in Division 26 Sections for power wiring, switches, and motor controls.

C. Ground equipment according to Division 16 Section "Grounding and Bonding."

1.3 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including connections. Report results in writing.

B. Perform the following field quality-control tests and inspections and prepare test reports:
   1. After installing rooftop air conditioners and after electrical circuitry has been energized, test units for compliance with requirements.
   2. Inspect for and remove shipping bolts, blocks, and tie-down straps.
   3. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
   4. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

C. Remove malfunctioning units, replace with new units, and retest as specified above.

1.4 ADJUSTING

A. Adjust initial temperature and humidity set points.

B. Set field-adjustable switches and circuit-breaker trip ranges as indicated.

END OF SECTION 15732

SECTION 15738- SPLIT SYSTEM AIR CONDITIONING UNITS

1PART - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes split-system air-conditioning and heat pump units consisting of separate evaporator-fan and compressor-condenser components. Units are designed for exposed or concealed mounting, and may be connected to ducts.

1.3 DEFINITIONS

A. Evaporator-Fan Unit: The part of the split-system air-conditioning unit that contains a coil for cooling (heat rejection for heating operation in heat pump units) and a fan to circulate air to conditioned space.

B. Compressor-Condenser Unit: The part of the split-system air-conditioning unit that contains a refrigerant compressor and a coil for condensing refrigerant (evaporator for heating operation in heat pump units).

1.4 SUBMITTALS

A. Product Data: Include rated capacities; shipping, installed, and operating weights; furnished specialties; and accessories for each type of product indicated. Include performance data in terms of capacities, outlet velocities, static pressures, sound power characteristics, motor requirements, and electrical characteristics.

B. Shop Drawings: Diagram power, signal, and control wiring and differentiate between manufacturer-installed and field-installed wiring.

C. Samples for Initial Selection: Manufacturer's color charts consisting of units of sections of units showing the full range of colors available for units with factory-applied color finishes.

D. Maintenance Data: For split-system air-conditioning units to include in maintenance manuals specified in Division 1.

E. Warranties: Special warranties specified in this Section.

1.5 QUALITY ASSURANCE

A. Product Options: Drawings indicate size, profiles, and dimensional requirements of split-system units and are based on the specific system indicated. Other manufacturers' systems with equal performance characteristics may be considered. Refer to Division 1.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

1.6 COORDINATION

A. Coordinate size and location of concrete bases for units. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork are specified in Division 3.

B. Coordinate size, location, and connection details with roof curbs, equipment supports, and roof penetrations specified in Division 7.

1.7 WARRANTY

A. General Warranty: Special warranty specified in this article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.

B. Special Warranty: Written warranty, executed by manufacturer agreeing to repair or replace components of split-system air-conditioning units that fail in materials or workmanship within specified warranty period.

C. Warranty Period: Five years from date of substantial completion.

1.8 EXTRA MATERIALS

A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Filters: One set of filters for each unit.
2. Fan Belts: One set of belts for each unit.

2PART - PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Carrier Air Conditioning; Div. of Carrier Corp.
2. Lennox Industries Inc.
3. Trane Co. (The); Unitary Products Group.
4. York International Corp.

2.2 CONCEALED EVAPORATOR-FAN COMPONENTS

A. Chassis: Galvanized steel with flanged edges, removable panels for servicing, and insulation on back of panel.

1. Insulation: Faced, glass-fiber duct liner.
2. Drain Pans: Galvanized steel, with connection for drain; insulated.

B. Refrigerant Coil: Copper tube, with mechanically bonded aluminum fins, complying with ARI 210/240, and with thermal-expansion valve.

C. Electric Coil: Helical, nickel-chrome, resistance-wire heating elements with refractory ceramic support bushings; automatic-reset thermal cutout; built-in magnetic contactors; manual-reset thermal cutout; airflow proving device; and one-time fuses in terminal box for overcurrent protection.

D. Fan: Forward-curved, double-width wheel of galvanized steel; directly connected to motor.

E. Fan Motor: Multispeed, PSC type.

F. Disposable Filters: 1 inch thick pleated in fiberboard frames.

G. Wiring Terminations: Connect motor to chassis wiring with plug connection.

2.3 AIR-COOLED, COMPRESSOR-CONDENSER COMPONENTS

A. Casing: Steel, finished with baked enamel, with removable panels for access to controls, weep holes for water drainage, and mounting holes in base. Provide brass service valves, fittings, and gage ports on exterior of casing.

B. Compressor: Hermetically sealed with crankcase heater and mounted on vibration isolation. Compressor motor shall have thermal- and current-sensitive overload devices, start capacitor, relay, and contactor.

1. Compressor Type: Scroll

2. Two-speed compressor motor with manual-reset high-pressure switch and automatic-reset low-pressure switch.

C. Refrigerant Coil: Copper tube, with mechanically bonded aluminum fins, complying with ARI 210/240, and with liquid subcooler.

D. Fan: Aluminum-propeller type, directly connected to motor.

E. Motor: Permanently lubricated, with integral thermal-overload protection.

F. Low Ambient Kit: Permits operation down to 45 deg F. Refer to schedule for additional low ambient requirements.

2.4 ACCESSORIES

A. Automatic-reset timer to prevent rapid cycling of compressor.

B. Coil Wire Guard.

C. Provide phase monitoring relay on all 3-phase condensing units including phase loss, phase imbalance, phase reversal, and under/over voltage protection. All settings shall be user adjustable to prevent nuisance trips. Phase monitor shall be connected into control circuit to disable condensing unit when tripped. Unit shall have led indicator for specific fault trip auto reset capability with adjustable time delay. Macromatic Series PMP or equal.

3PART - EXECUTION

3.1 INSTALLATION

A. Install units level and plumb.

B. Install evaporator-fan components using manufacturer's standard mounting devices securely fastened to building structure.

C. Install roof-mounted compressor-condenser components on equipment supports specified in Division 7. Anchor units to supports with removable, cadmium-plated fasteners.

D. Install compressor-condenser components on restrained, spring isolators with a minimum static deflection of 1 inch. Refer to Division 15.

E. Connect refrigerant tubing to component's quick-connect fittings. Install tubing to allow access to unit.

3.2 CONNECTIONS

A. Piping installation requirements are specified in other Division 15 Sections. Drawings do not depict refrigerant piping routing. Contractor shall field verify refrigerant piping routing and size piping in strict accordance with factory recommendations.

B. Install piping adjacent to unit to allow service and maintenance.

C. Unless otherwise indicated, connect piping with unions and shutoff valves to allow units to be disconnected without draining piping. Refer to piping system Sections for specific valve and specialty arrangements.

D. Ground equipment.

1. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

E. Duct work. Unless noted otherwise on plans, connect new evaporator unit to existing duct work. Provide flexible connection at unit.

3.3 FIELD QUALITY CONTROL

A. Installation Inspection: Engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including piping and electrical connections, and to prepare a written report of inspection.

B. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.

C. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation. Remove malfunctioning units, replace with new components, and retest.

D. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

3.4 COMMISSIONING

A. Engage a factory-authorized service representative to perform startup service.

B. Verify that units are installed and connected according to the Contract Documents.

C. Lubricate bearings, adjust belt tension, and change filters.

D. Perform startup checks according to manufacturer's written instructions and do the following:

1. Fill out manufacturer's checklists.
2. Check for unobstructed airflow over coils.
3. Check operation of condenser capacity-control device.
4. Verify that vibration isolation devices and flexible connectors dampen vibration transmission to structure.

3.5 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain units.

1. Train Owner's maintenance personnel on procedures and schedules for starting and stopping, troubleshooting, servicing, and maintaining units.
2. Review data in maintenance manuals. Refer to Division 1 Section "Contract Closeout."
3. Review data in maintenance manuals. Refer to Division 1 Section "Operation and Maintenance Data."
4. Schedule training with Owner, through Architect, with at least seven days' advance notice.

END OF SECTION 15738

SECTION 15740 - 100% OUTSIDE AIR PACKAGED ROOFTOP UNITS

1PART - GENERAL

1.1 SUMMARY

A. This section includes the following 100% outside air rooftop air conditioners:

1. D/X cooling with hot gas reheat, energy recovery wheel, and electric strip heat.

1.2 SUBMITTALS

A. Product Data: For each model indicated.

B. Shop Drawings: Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection. Prepare the following by or under the supervision of a qualified professional engineer:

1. Design Calculations: Calculate requirements for selecting vibration isolators and for designing vibration isolation bases.
2. Detail mounting, securing, and flashing of roof curb to roof structure. Indicate coordinating requirements with roof membrane system.
3. Wiring Diagrams: Power, signal, and control wiring.

C. Field quality-control test reports.

D. Operation and maintenance data.

E. Warranties: Special warranties specified in this Section.

1.3 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

B. Fabricate and label refrigeration system to comply with ASHRAE 15, "Safety Code for Mechanical Refrigeration."

C. Energy-Efficiency Ratio: Equal to or greater than prescribed by ASHRAE 90.1, "Energy Efficient Design of New Buildings except Low-Rise Residential Buildings."

D. Coefficient of Performance: Equal to or greater than prescribed by ASHRAE 90.1, "Energy Efficient Design of New Buildings except Low-Rise Residential Buildings."

E. ARI Compliance for Units with Capacities 135,000 BTU/h and More: Rate rooftop air-conditioner capacity according to ARI 340/360, "Commercial and Industrial Unitary Air-Conditioning and Heat Pump Equipment."

F. Sound Power Level Ratings: Comply with ARI 270, "Sound Rating of Outdoor Unitary Equipment."

G. Furnish factory mounted and tested energy recovery wheel as specified. Sizes, arrangements, capacities and performance shall be as indicated on plans and schedules. Unit manufacturer shall be registered under ISO 9001. Cooling performance shall be rated in accordance with ARI standards. Unit shall be ETL or UL listed.

H. Packaged condensing units shall be factory pre-assembled, tested and shipped complete with all components necessary to maintain humidity and temperature control levels independent of load variations within design limits. Unit(s) shall be designed for year-round 24 hr/day service.

1.4 WARRANTY & START-UP

A. Manufacturer must warrant the enthalpy wheels to be free of defects in material and workmanship for a period of up to five years (pro-rated) from the purchase date.

B. Special Warranty: Manufacturer's standard form in which manufacturer agrees to replace components of rooftop air conditioners that fail in materials or workmanship within specified warranty period.

1. Warranty Period for Heat Exchangers: Manufacturer's standard, but not less than ten years from date of Substantial Completion.
2. Warranty Period for Control Boards: Manufacturer's standard, but not less than three years from date of Substantial Completion.
3. Warranty Period for Variable-Speed Fan Motors: Manufacturer's standard, but not less than three years from date of Substantial Completion.

C. Units shall be started-up by a factory certified technician from the equipment manufacturer. Completed start-up documentation shall be sent to the owner after the job is completed.

2PART - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. AAON, Inc.
2. Addison Products Company.
3. Trane
4. Carrier
5. Valent

B. Provide Energy Recovery Unit with this specification, drawing details and the corresponding Schedule of Performance and Schedule Notes. The Energy Recovery system shall be shop manufactured and assembled as specified.

C. Arrangement of all units shall be as shown on the Drawings. Performance shall be rated in accordance with ARI testing procedures. All units shall be factory assembled, internally wired, and 100% run tested to check operation, fan and blower rotation and control sequence (if applicable) before leaving the factory.

2.2 GENERAL DESCRIPTION

A. Packaged rooftop unit shall include compressors, evaporator coils, filters, supply blowers, dampers, condenser coils, condenser fans, water-cooled condensers, reheat coils, gas heaters, electric heaters, exhaust fans, and unit controls.

B. Unit shall be factory assembled and tested including helium leak testing of the coils, pressure testing of the refrigeration circuit, and run testing of the completed unit. Run test report shall be supplied with the unit in the controls compartment's literature pocket.

C. Unit shall have decals and tags to indicate lifting and rigging, service areas, and caution areas for safety and to assist service personnel.

D. Unit components shall be labeled, including pipe stub outs, refrigeration system components, and electrical and controls components.

E. Estimated sound power levels (dB) shall be shown on the unit ratings sheet.

F. Installation, Operation, and Maintenance manual shall be supplied within the unit.

G. Laminated color-coded wiring diagram shall match factory installed wiring and be provided in both point-to-point and ladder form and affixed to the interior of the control compartment's hinged access door.

H. Unit nameplate shall be provided in two locations on the unit, affixed to the exterior of the unit and affixed to the interior of the control compartment's hinged access door.

2.3 CONSTRUCTION

A. All cabinet walls, access doors and roof shall be fabricated of rigid, impact resistant, double wall, high performance composite panels with G90 galvanized steel on both sides and a closed cell polyurethane foam interior core.

B. Foam shall have a minimum density of 2 pounds/cubic foot and shall be tested in accordance with ASTM D-1929 for a minimum flash ignition temperature of 610°F.

C. Panel deflection shall not exceed L/240 ratio at 125% of design static pressure, maximum 8 inches of positive or negative static pressure. Deflection shall be measured at the midpoint of the panel height and width.

D. Cabinet leakage rate shall not exceed 1% when tested at 6 inches of static pressure.

E. Insulation shall have an R-value of 13.

F. All cabinet walls, access doors and roof shall have a thermal break with no metal path to inside to outside.

G. Units with cooling coils shall include double sloped 304 stainless steel drain pans and a factory provided p-trap, for field installation.

H. Roof of the air tunnel shall be sloped to provide complete drainage.

I. Unit shall have rain break overhangs above access doors.

J. Exterior paint finish shall be capable of withstanding at least 2500 hours, with no visible corrosive effects, when tested in a salt spray and fog atmosphere in accordance with ASTM B 117-95 test procedure.

K. Access to filters, dampers, economizers, cooling coils, power exhaust and return blowers, controls, compressors, and heaters shall be through hinged access doors with quarter turn, zinc cast, lockable handles. Full length stainless steel piano hinges shall be included on the doors.

L. All openings through the base pan of the unit shall have upturned flanges of at least 0.5 inches in height around the opening through the base pan.

M. Unit shall be mounted on a continuous base rail support suitable for mounting on structural point load supports.

N. Unit shall include lifting lugs on the top of the unit.

O. Options:

1. Unit shall include interior corrosion protection which shall be capable of withstanding at least 2500 hours, with no visible corrosive effects, when tested in a salt spray and fog atmosphere in accordance with ASTM B 117-95 test procedure. Air tunnel, blowers, dampers, and economizer shall all include the corrosion protection.
2. Unit base pan shall be provided with 1 inch thick, 1.5 pound/cubic foot fiberglass insulation.
3. Unit shall include factory wired, marine service lights.
4. Unit shall include factory installed, painted galvanized steel condenser coil guards on the face of the condenser coil.

2.4 ELECTRICAL

A. Unit shall be provided with factory installed and factory wired, non-fused disconnect switch in the unit control panel.

B. Unit shall be provided with factory installed and field wired 115V, 20 amp GFI outlet in the unit control panel.

C. Unit shall be provided with phase and brown out protection which shuts down all motors in the unit if the electrical phases are more that 10% out of balance on voltage, the voltage is more that 10% under design voltage, or on phase reversal.

2.5 BLOWERS

A. Fan assemblies shall be direct-drive without the use of belts or adjustable sheaves.

B. Manufacturer shall provide a variable frequency drive for each fan section.

C. Variable frequency drive shall be mounted, wired, and programmed by the manufacturer.

D. Variable frequency drive shall be located in an enclosed compartment outside of the supply or exhaust air stream.

E. Fan wheels shall have backward inclined blades constructed out of corrosion-resistant, fiber-reinforced polyamide or welded aluminum.

F. Fan wheel shall be tested in accordance to AMCA 210.

2.6 MOTORS

A. Fan motor shall be VFD rated, ODP type, EPACT compliant.

B. Fan motor shall be of premium efficiency (PE).

2.7 DIRECT EXPANSION (D/X) COOLING COILS

A. Coils shall be designed for use with R-410A refrigerant and constructed of copper tubes with copper fins mechanically bonded to the tubes and 304 stainless steel end casings. Fin design shall be sine wave rippled.

B. Coils shall have interlaced circuitry and shall be standard capacity.

C. Coils shall be helium leak tested.

D. Coil shall be furnished with a factory installed thermostatic expansion valve.

2.8 REFRIGERATION SYSTEM

A. Unit shall be factory charged with R-410A refrigerant.

B. Compressors shall be scroll type with thermal overload protection, independently circuited, and carry a 5 year non-prorated warranty.

C. Compressors shall be mounted in an isolated service compartment which can be accessed without affecting unit operation. Lockable hinged compressor access doors shall be fabricated of double wall, high performance composite panels with an R-value of 13 to prevent the transmission of noise outside the cabinet.

D. Compressors shall be isolated from the base pan with the compressor manufacturer's recommended rubber vibration isolators, to reduce any transmission of noise from the compressor into the building area.

E. Each refrigeration circuit shall be equipped with thermostatic expansion valve type refrigerant flow control.

F. Each refrigeration circuit shall be equipped with automatic reset low pressure and manual reset high pressure refrigerant safety controls, Schrader type service fittings on both the high pressure and low pressure sides, and factory installed liquid line filter driers.

G. Compressors shall be capable of minimum 10% of rated capacity.

H. Options:

1. Unit shall include a modulating capacity scroll compressor on the first refrigeration circuit which shall be capable of modulation from 10-100% of its capacity.
2. Each refrigeration circuit shall be provided with hot gas reheat coil, modulating valves, electronic controller, supply air temperature sensor and a control signal terminal which allow the unit to have a dehumidification mode of operation, which includes supply air temperature control to prevent supply air temperature swings and overcooling of the space.
3. Each refrigeration circuit shall be equipped with a liquid line sight glass.
4. Each refrigeration circuit shall be equipped with suction and discharge compressor isolation valves.
5. Each capacity stage shall be equipped with a 5 minute off, delay timer to prevent compressor short cycling.
6. Each capacity stage shall be equipped with an adjustable, 20 second delay timer to prevent multiple capacity stages from starting all at once.
7. All refrigeration circuits shall be provided with factory installed hot gas bypass for coil freeze protection and to prevent excessive compressor cycling.
8. All refrigeration circuits shall be provided with hot gas reheat coil and on/off control valves and a control signal terminal which allow the unit to have a dehumidification mode of operation. Dehumidification signal must be provided by unit controller or field installed humidistat.

2.9 AIR-COOLED CONDENSERS

A. Condenser fans shall be vertical discharge axial flow direct drive fans. First capacity stage shall be provided with variable speed condenser fan control for partial load control. Fan cycling control is not acceptable.

B. Coils shall be designed for use with R-410A refrigerant and constructed of copper tubes with copper fins mechanically bonded to the tubes and 304 stainless steel end casings. Fin design shall be sine wave rippled.

C. Options:
1. Coil shall have a flexible, epoxy polymer e-coat uniformly applied to all coil surface areas without material bridging between fins. Humidity and water immersion resistance shall be up to a minimum 1000 and 250 hours respectively (ASTM D2247-92 and ASTM D870-92). Corrosion durability shall be confirmed through testing to no less than 6000 hours salt spray per ASTM B117-90. Coated coils shall receive a spray-applied, UV-resistant polyurethane topcoat to prevent UV degradation of the e-coat.

2.10 ELECTRIC HEAT

A. Electrical Heating Coils, Controls, and Accessories: Only required where scheduled. Comply with UL 1995.

B. Casing Assembly: Flanged type with galvanized-steel frame.

C. Heating Elements: Coiled resistance wire of 80 percent nickel and 20 percent chromium surrounded by compacted magnesium-oxide powder in tubular-steel sheath; with spiral-wound, copper-plated, steel fins continuously brazed to sheath.

D. Provide SCR modulating control.

2.11 FILTERS

A. Unit shall include 2 inch thick, pleated panel filters with an ASHRAE efficiency of 30% and MERV rating of 7, upstream of the cooling coil.

B. Options:
1. Unit shall include a 2 inch thick, permanent filter frame with replaceable media, upstream of the cooling coil.
2. Unit shall include 5/16 inch lint screen pre filters upstream of the standard filters.
3. Unit shall include a clogged filter switch.
4. Units shall include a Magnehelic gauge mounted in the controls compartment.

2.12 INTAKE DAMPER

A. Unit shall include 100% motor operated outside air damper assembly constructed of extruded aluminum, hollow core, airfoil blades with rubber edge seals and aluminum end seals. Damper blades shall be gear driven and designed to have no more than 15 CFM of leakage per sq. ft. of damper area when subjected to 2 inches w.g. air pressure differential across the damper. Damper assembly shall be controlled by spring return, 2 position actuator. Unit shall include outside air opening bird screen and outside air hood with rain lip.

2.13 ENERGY RECOVERY

A. Unit shall contain a factory mounted and tested energy recovery wheel. The energy recovery wheel shall be mounted in a rigid frame containing the wheel drive motor, drive belt, wheel seals and bearings. Frame shall slide out for service and removal from the cabinet.

B. The energy recovery component shall incorporate a rotary wheel in an insulated cassette frame complete with seals, drive motor and drive belt.

C. Total energy recovery wheels shall be coated with silica gel desiccant permanently bonded by a process without the use of binders or adhesives, which may degrade desiccant performance. The substrate shall be lightweight polymer and shall not degrade nor require additional coatings for application in marine or coastal environments. Coated segments shall be washable with detergent or alkaline coil cleaner and water. Desiccant shall not dissolve nor deliquesce in the presence of water or high humidity.

D. The wheel shall be wound continuously with one flat and one structured layer in an ideal parallel plate geometry providing laminar flow and minimum pressure drop-to-efficiency ratios. The layers shall be effectively captured in stainless steel wheel frames or aluminum and stainless steel segment frames that provide a rigid and self-supporting matrix.

E. Wheels shall be provided with removable energy transfer matrix. Wheel frame construction shall be a welded hub, spoke and rim assembly of stainless, plated and/or coated steel and shall be self-supporting without matrix segments in place. Segments shall be removable without the use of tools to facilitate maintenance and cleaning. Wheel bearings shall be selected to provide an L-10 life in excess of 400,000 hours. Rim shall be continuous rolled stainless steel and the wheel shall be connected to the shaft by means of taper locks.

F. All diameter and perimeter seals shall be provided as part of the cassette assembly and shall be factory set. Drive belts of stretch urethane shall be provided for wheel rim drive without the need for external tensioners or adjustment.

G. The energy recovery cassette shall be an Underwriters Laboratories Recognized Component for electrical and fire safety. The wheel drive motor shall be an Underwriters Laboratory Recognized Component and shall be mounted in the cassette frame and supplied with a service connector or junction box. Thermal performance shall be certified by the manufacturer in accordance with ASHRAE Standard 84, Method of Testing Air-to-Air Heat Exchangers and ARI Standard 1060, Rating Air-to-Air Energy Recovery Ventilation Equipment. Cassettes shall be listed in the ARI Certified Product.

H. Units shall include 2 inch thick, pleated panel outside air and exhaust air filters with an ASHRAE efficiency of 30% and MERV rating of 7.

I. Provide wheel rotation alarm.

J. Hinged service access door shall allow access to the wheel(s).

2.14 DRAIN PANS

A. The drain pan is to be constructed of welded 304 SS and bolted in place. The cooling coil drain pan shall extend the entire length of the coil and extend a minimum of 4 inches beyond the air leaving side of the coil. The drain pan shall be a minimum of 2 inches deep and have a

minimum pitch of 1 inch. The drain pan shall be sloped to ensure zero standing water. Drain connection shall extend through unit base. Connection to be 1 inch male NPT.

2.15 CONTROLS

A. General: The unit shall have microprocessor control with a unit mounted operator interface/display and shall include BACnet MS/TP communications for integration into new building management system interface. Coordinate communication protocol with controls contractor prior to submittal process.

B. Microprocessor controller shall include a Web UI interface for remote web-based access.

C. Factory Installed and Factory Provided Controller

1. Unit controller shall be capable of controlling all features and options of the unit. Controller shall be factory installed in the unit controls compartment and factory tested. Unit controller shall provide visual display of all unit parameters including set points, monitored points, and alarms. At a minimum the panel shall display the following:

a. Entering air temperature, %Rh, and dew point.
b. Entering air dew point set point for dehumidification. Located downstream of energy recovery wheel and upstream of cooling coil.
c. Cooling and heating supply temperature set points. Dehumidification set point shall be same as cooling.
d. Unit operating mode cooling/heating/dehumidification.
e. Cooling coil supply air temperature and set point.
f. Compressor status and % activation.
g. Hot gas reheat status and % activation.
h. Electric reheat status and % activation.
i. Unit discharge temperature and %RH, alarm, and manual reset.
j. Factory alarm conditions (low pressure, high pressure, erv wheel, voltage, phase loss, etc.).

2. With modulating hot gas reheat option, an entering air humidity sensor, supply air temperature sensor, and a field installed space air temperature sensor shall be furnished to control the amount of reheat during dehumidification. All set points shall be adjustable at the unit.
3. Controller shall include non-volatile memory to retain all programmed values without the use of a battery, in the event of a power failure.
4. Controller shall contain diagnostics to indicate controller power, communications, unit alarms, and sensor failures.

2.16 SEQUENCE OF OPERATION

A. FAN/UNIT CONTROL

1. Occupied Mode:

a. OA Two-Position Damper rotates to 100% Open

b. EA Two Position Damper rotates to 100% Open
2. The Enthalpy Wheel will rotate anytime the OA unit is activated.
3. Fans shall be disabled and dampers close when unit is disabled during unoccupied mode.
4. Refer to plans and control specifications for automatic interlock requirements with other equipment.

B. DEHUMIDIFICATION MODE:

1. The controller will receive a signal from the Entering Air Temp/Humidity sensor located downstream of the enthalpy wheel. When the entering dew point is above set point (62 deg F adjustable) the controller will stage on compressors to maintain a cooling coil discharge air temperature set point (55 deg F adjustable).
2. The controller will receive a signal from the Supply Air Temp Sensor and will modulate the Hot Gas Bypass and electric reheat to maintain the supply air temperature set point (70 deg F adjustable). Unit shall be capable of activating supplemental compressor stages or electric reheat to provide supplemental heat when required to achieve supply air set point.
3. Dehumidification mode shall take precedence over cooling and heating modes of operation.

C. COOLING MODE:

1. Unit shall be capable of cooling anytime air temp downstream of ERV is above cooling supply temperature set point.
2. Controller will stage compressors to maintain cooling supply temperature set point.

D. HEATING MODE:

1. Unit shall be capable of heating anytime air temp downstream of ERV is below heating supply temperature set point.
2. Unit controller will modulate hot water heating control valve to maintain space temp set point (65 deg F adjustable).

2.17 ACCESSORIES

A. Options:

1. Unit shall be provided with smoke detectors sensing the outside air and exhaust air of the unit, wired to shut off the unit's control circuit in the event of smoke detection.

2.18 CONNECTIONS

A. Duct installation requirements are specified in other Division 15 Sections. Drawings indicate the general arrangement of ducts.

B. Electrical System Connections: Comply with applicable requirements in Division 16 Sections for power wiring, switches, and motor controls.

C. Ground equipment according to Division 16 Section "Grounding and Bonding."

END OF SECTION 15740

SECTION 15800 - HVAC FUNCTIONAL CHECK OUT

PART 1 - GENERAL

1.1 SUMMARY

A. This section includes the functional check out (FCO) of the HVAC systems to ensure proper operation and control in all modes of operation. HVAC systems installed under this contract are to be inspected, tested, signed off as complete and operational, and operated for functional check out agency verification as described in Part 3 of this Section. This includes, but is not necessarily limited to the work listed. The HVAC system will not be considered substantially complete until such time that the functional check out procedure is complete.

B. The intent of the FCO is to verify that the HVAC system is performing as intended and in no way is the FCO intended to supplant the contractor's responsibility of verifying that the HVAC system is complete and operable including all troubleshooting, T&B and control commissioning work.

C. The functional checkout services shall be performed by an independent test and balance agency or commissioning agent. The agencies services shall be included in the base contract.

D. Functional check out services are to be provided in four (4) phases: pre-construction, construction, acceptance, and post-acceptance as outlined in part 3 of this section.

1.2 QUALITY ASSURANCE

A. Agent Qualifications: Engage a testing, adjusting, and balancing agent certified by AABC or NEBB or a certified commissioning agent.

B. All procedures shall be in accordance with the AABC Commissioning Group Guidelines.

PART 2 - EXECUTION

2.1 FUNCTIONAL CHECK OUT AGENCY RESPONSIBILITIES:

A. General: The functional check out agency, hereafter referred to as the agency or agent, is responsible for coordinating all functional check out activities and maintaining written records. All records shall be submitted to the Engineer with copies distributed to the Architect and Contractor.

B. It is the Agency's responsibility to provide written verification that each phase of the FCO is complete before proceeding with the next phase.

C. During the preconstruction phase the functional checkout agent shall carry out the following scope of work:
   1. Review the design documents (drawings and specifications) to ensure inclusion of material covering the Contractor's responsibilities for functional check out; provide comments and suggestions for designer consideration.
   2. Prepare the construction-phase functional check out plan. The FCO plan shall include an itemized check sheet of all HVAC systems and the required verification data for those systems. At a minimum, the FCO plan shall address each sequence and set point for all HVAC systems including set points and system. The FCO plan shall also include a schedule for the FCO activities. Refer to documentation section for additional information on FCO plan. The FCO plan shall be submitted to the design team for review.
   3. Schedule a pre-construction meeting with the Architect, Engineer, Mechanical Subcontractor, and Contractor to review FCO plan and design document review comments.
   4. Provide a written report of pre-construction activities including the following:
      a. Proposed revisions or clarifications.
      b. List all required submittal and shop drawing data required for agent review.
      c. Approved FCO plan.

D. During the construction phase the agency shall carry out the following scope of work:
   1. Organize and direct the functional check out team in executing the FCO plan. The agency shall schedule and document all functional checkout activities.
   2. Review shop drawings and equipment submittals for information affecting the functional check out process. Provide a written review.
   3. Update the functional check out plan to reflect equipment and controls data from the submittals, and provide functional check out schedule information that the Contractor can integrate into the project schedule.
   4. Schedule and lead functional check out meetings.
   5. Establish and maintain a system for tracking issues needing resolution.
   6. Reviews the project schedule periodically to ensure functional check out activities are properly incorporated.
   7. Perform on-site observations during construction and provide written observation reports.
   8. Monitor correct component and equipment installation; including controls point-to-point checkouts. Document all observations.
   9. Witness equipment and system start-ups and review Contractor documentation of procedures.
   10. Provide written report of construction phase activities including all items required in the functional check out plan.

E. During the acceptance phase the agency shall carry out the following scope of work:
   1. Review the as-built documents and address any concerns in writing.
   2. Review the test and balance report and provide a written response identifying any issues or concerns. Field performance testing shall not commence until the testing and balancing process is substantially complete including Engineer review and acceptance of the final testing and balancing report.
   3. Coordinate functional performance testing of sub-systems, systems, and interactions between systems, leading to acceptance of the completed work. All HVAC systems shall be operated in every mode until such point that the system stabilizes. Document results on FCO check sheets.

4. Measure and record space, and equipment operating dry and wet bulb temperatures during functional tests and compare to control system set points and sensor readings.
5. Upon completion of the acceptance phase the agency shall schedule a final acceptance meeting to be attended by the Engineer, Contractor, and Subcontractors. The purpose of the meeting is to verify that all parties are in agreement that the acceptance phase is complete and all systems are performing as intended.

F. During the post-acceptance phase the agency shall carry out the following scope of work:
1. Conduct functional performance testing of sub-systems, systems, and interactions between systems that could not be carried out prior to acceptance.
2. Prepare and submit a final functional check out report. The report shall provide definitive acceptance or rejection of each HVAC system along with a detailed recount of any remaining deficiencies.
3. The agency shall attend and review the owner O&M training and documentation to ensure that the owner is provided with the practical knowledge required to operate and maintain the HVAC system.

2.2 CONTRACTOR RESPONSIBILITIES

A. This Section of the specifications defines the Contractor's responsibilities with respect to the functional check out process. The Contractor and Subcontractors shall review this Section, and shall include in their bids for carrying out the work described, as it applies to each Division and Section of these specifications, individually and collectively. The FCO is intended as an addition to the construction process and it remains the Contractor's sole responsibility to provide a complete and operable HVAC system.

B. The Contractor shall assign a representative to the FCO team, and submit the person's name to the FCO agency, within one (1) month of the award of the contract. The representative shall have the authority to make decisions on behalf of the Contractor as they relate to the organization and scheduling of HVAC FCO. The representative shall facilitate communications among all Contractors and suppliers and other team members, and shall foster the necessary cooperative action. One specific responsibility shall be to attend FCO meetings, and ensure action items arising from them are attended to as required to allow the FCO process to precede on schedule.

C. The Contractor, Mechanical Subcontractor, all Division 15 Subcontractors, and the Electrical Contractor shall be responsible for cooperating, and coordinating their work, with the Agency. They shall also be responsible for carrying out all the activities required for installation of components and systems, and operating them during the functional check out process as required in this Section.

D. In the event that any scheduled equipment or system start-ups or functional performance tests are terminated because the agency or designer discover deficient or incomplete work, or due to the non-attendance of required Contractor or supplier personnel, the Contractor or Subcontractor responsible for the termination shall also be responsible for paying reasonable costs of time and travel expenses of any or all of the

following representatives who were physically present for the purpose of witnessing the FCO activity: the agency, engineer, and the owner. The agent shall provide a statement to the Contractor identifying the specific activity that was terminated, the scheduled date, and a list of those in attendance, along with their reasonable time and travel expense costs.

E. During the preconstruction phase the Contractor shall carry out the following scope of work:
   1. Provide the functional checkout agency with a all mechanical shop drawings, equipment and control submittals and other pertinent information requested by the agency. It is the Contractor's responsibility to provide the Agency a copy of the approved shop drawings after review by the design team.
   2. Participate in the pre-construction meeting.
   3. Provide a written response to the Agency's pre-construction report identifying proposed changes that represent a change in scope requiring a change proposal. Failure to respond will be interpreted as acceptance of the Agency's proposed changes.
   4. Incorporate the agents FCO scheduling information into the construction schedule and provide scheduling information to the Agency for those milestones included in the FCO plan that are the responsibility of the Contractor (i.e. pressure tests, equipment start up, etc.).

F. During the construction phase the Contractor shall carry out the following scope of work:
   1. Cooperate and participate in FCO activities in accordance with FCO plan. Incorporate the FCO plan milestones into the project schedule. Keep the Agency abreast of any scope or schedule revisions that would impact the FCO plan and provide a minimum 2-week advance notice to the agency, engineer and owner for scheduled activities.
   2. Implement approved revisions proposed during pre-construction phase.
   3. Facilitate and document all tasks outlined in the construction phase FCO plan that are charged to the Contractor.
   4. Provide full start up of the HVAC and control systems to verify that the system is complete and operable prior to FCO acceptance phase.

G. During the acceptance phase the Contractor shall carry out the following scope of work:
   1. The Contractor shall perform basic HVAC functional tests to ensure that all equipment is functioning properly prior to the formal performance FCO.
   2. Perform the functional performance testing of sub-systems, systems, and interactions between systems to be witnessed and documented by the Agency. All HVAC systems shall be tested in every mode of operation such that the control, sequencing and capacity of the HVAC systems is proven to be stable and in accordance with the design intent. For the purpose of testing it may be necessary to modify the system set points to trigger the sequences of operation. The functional performance tests shall progress from the individual subsystems to the larger systems for ease of identifying potential problems.
   3. The Contractor shall involve the necessary Subcontractors including, but not limited to, HVAC, electrical, sheet metal, controls, and test and balancing. Each Subcontractor shall make available the necessary personnel to identify and

address any aspects of the HVAC system that require repair or adjustment during the functional check out.

4. The Contractor shall make whatever repairs or revisions are necessary to achieve system performance in accordance with the construction documents and subsequent approved revisions in a timely fashion and at no additional cost to the owner.

H. During the post-acceptance phase the agency shall carry out the following scope of work:
   1. Provide the FCO agent with a complete set of as-built documents including HVAC equipment, duct work and controls.
   2. Provide the owner with the required O&M training and documentation.

2.3 DOCUMENTATION

A. Functional Check Out Plan: The FCO plan shall list all scheduled activities, milestones and the requirements, time line and responsible party for each respective task. The FCO plan shall be developed by the agency with Engineer approval prior to release. At a minimum the plan shall include the following:
   1. Required meetings: At a minimum, the FCO team shall hold pre-construction, pre-control commissioning, pre-T&B, pre-verification and final verification meetings. Additional progress meetings shall be scheduled or called as required for coordination purposes.
   2. Milestones: Include all construction milestones and required documentation thereof including but not limited to duct pressure testing, hydronic system testing, mechanical equipment installation, T&B, controls commissioning and overall HVAC system performance verification.
   3. Required submittals and shop drawings: Include a complete list of all required submittals that the Contractor will supply to the agency.
   4. Functional check out report requirements: A FCO report form is required for each individual HVAC system. The report form shall outline the tasks in a format according to the AABC Commissioning Group System Verification and Start up check lists.
   5. Acceptance phase verification requirements: For each HVAC system identify the verification process for the modes of operation and the specific points to be verified during acceptance. Provide a written form for each HVAC system to be completed during the acceptance phase and included in the final report.

B. Status Reports: As Work progresses, prepare reports to describe completed procedures, procedures in progress, and scheduled procedures. Include a list of deficiencies and problems found in systems being tested.

C. Performance Test Report Data: Performance Test Report Data shall follow a Test and Balance report format showing the design, actual and control system readings for all control and input points. Separate reports shall be provided for each system under all modes of operation. The space conditions shall also be monitored (representative samples are acceptable for large systems) for each mode of operation.

D. Final Acceptance Report: The final acceptance report shall include final documentation of all items addressed in the FCO plan. The report shall not be submitted until the FCO process is complete and accepted by the agency.

END OF SECTION 15800

SECTION 15815 - METAL DUCT

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes metal, rectangular ducts and fittings for supply, return, outside, and exhaust air-distribution systems in pressure classes from minus 2- to plus 10-inch wg.

B. See Division 23 Section "Duct Accessories" for dampers, sound-control devices, duct-mounting access doors and panels, turning vanes, and flexible ducts.

1.2 SUBMITTALS

A. Shop Drawings: Show fabrication and installation details for metal ducts.
   1. Penetrations through fire-rated and other partitions.
   2. Duct accessories, including access doors and panels.

1.3 QUALITY ASSURANCE

A. NFPA Compliance:
   1. NFPA 90A, "Installation of Air Conditioning and Ventilating Systems."
   2. NFPA 90B, "Installation of Warm Air Heating and Air Conditioning Systems."

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
   1. Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers specified.
   2. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

2.2 SHEET METAL MATERIALS

A. Comply with SMACNA's "HVAC Duct Construction Standards--Metal and Flexible" for acceptable materials, material thicknesses, and duct construction methods, unless otherwise indicated. Sheet metal materials shall be free of pitting, seam marks, roller marks, stains, discolorations, and other imperfections.

B. Galvanized Sheet Steel: Lock-forming quality; complying with ASTM A 653/A 653M and having [G60] [G90] coating designation; ducts shall have mill-phosphatized finish for surfaces exposed to view.

C. Reinforcement Shapes and Plates: Galvanized-steel reinforcement where installed on galvanized sheet metal ducts.

D. Tie Rods: Galvanized steel, 1/4-inch minimum diameter for lengths 36 inches or less; 3/8-inch minimum diameter for lengths longer than 36 inches.

2.3 SEALANT MATERIALS

A. Joint and Seam Tape: 2 inches wide; glass-fiber-reinforced fabric.

B. Tape Sealing System: Woven-fiber tape impregnated with gypsum mineral compound and modified acrylic/silicone activator to react exothermically with tape to form hard, durable, airtight seal.

C. Water-Based Joint and Seam Sealant: Flexible, adhesive sealant, resistant to UV light when cured, UL 723 listed, and complying with NFPA requirements for Class 1 ducts.

D. Solvent-Based Joint and Seam Sealant: One-part, nonsag, solvent-release-curing, polymerized butyl sealant formulated with a minimum of 75 percent solids.

E. Flanged Joint Mastic: One-part, acid-curing, silicone, elastomeric joint sealant complying with ASTM C 920, Type S, Grade NS, Class 25, Use O.

F. Flange Gaskets: Butyl rubber or EPDM polymer with polyisobutylene plasticizer.

2.4 HANGERS AND SUPPORTS

A. Building Attachments: Concrete inserts, powder-actuated fasteners, or structural-steel fasteners appropriate for construction materials to which hangers are being attached.
   1. Use powder-actuated concrete fasteners for standard-weight aggregate concretes or for slabs more than 4 inches thick.
   2. Exception: Do not use powder-actuated concrete fasteners for lightweight-aggregate concretes or for slabs less than 4 inches thick.

B. Hanger Materials: Galvanized sheet steel or threaded steel rod.
   1. Hangers Installed in Corrosive Atmospheres: Electrogalvanized, all-thread rods or galvanized rods with threads painted with zinc-chromate primer after installation.
   2. Strap and Rod Sizes: Comply with SMACNA's "HVAC Duct Construction Standards--Metal and Flexible" for steel sheet width and thickness and for steel rod diameters.

C. Duct Attachments: Sheet metal screws, blind rivets, or self-tapping metal screws; compatible with duct materials.

D. Trapeze and Riser Supports: Galvanized-steel shapes and plates complying with ASTM A 36/A 36M.

2.5 RECTANGULAR DUCT FABRICATION

A. Fabricate ducts, elbows, transitions, offsets, branch connections, and other construction according to SMACNA's "HVAC Duct Construction Standards--Metal and Flexible" and complying with requirements for metal thickness, reinforcing types and intervals, tie-rod applications, and joint types and intervals.
   1. Lengths: Fabricate rectangular ducts in lengths appropriate to reinforcement and rigidity class required for pressure class.
   2. Deflection: Duct systems shall not exceed deflection limits according to SMACNA's "HVAC Duct Construction Standards--Metal and Flexible."

B. Transverse Joints: Prefabricated slide-on joints and components constructed using manufacturer's guidelines for material thickness, reinforcement size and spacing, and joint reinforcement.
   1. Manufacturers:
      a. Ductmate Industries, Inc.
      b. Nexus Inc.
      c. Ward Industries, Inc.

C. Formed-On Flanges: Construct according to SMACNA's "HVAC Duct Construction Standards--Metal and Flexible," Figure 1-4, using corner, bolt, cleat, and gasket details.
   1. Manufacturers:
      a. Ductmate Industries, Inc.
      b. Lockformer.
   2. Duct Size: Maximum 30 inches wide and up to 2-inch wg pressure class.
   3. Longitudinal Seams: Pittsburgh lock sealed with noncuring polymer sealant.

D. Cross Breaking or Cross Beading: Cross break or cross bead duct sides 19 inches and larger and 0.0359 inch thick or less, with more than 10 sq. ft. of nonbraced panel area unless ducts are lined.

PART 3 - EXECUTION

3.1 DUCT APPLICATIONS

A. Static-Pressure Classes: Unless otherwise indicated, construct ducts according to the following:
   1. Supply Ducts: 2-inch wg.
   2. Return Ducts (Negative Pressure): 1-inch wg. Round duct shall be longitudinal seam duct.
   3. Exhaust Ducts (Negative Pressure): 2-inch wg. Round duct shall be longitudinal seam duct.

3.2 DUCT INSTALLATION

A. Construct and install ducts according to SMACNA's "HVAC Duct Construction Standards--Metal and Flexible," unless otherwise indicated.

B. Install ducts with fewest possible joints.

C. Install fabricated fittings for changes in directions, size, and shape and for connections.

D. Install couplings tight to duct wall surface with a minimum of projections into duct. Secure couplings with sheet metal screws. Install screws at intervals of 12 inches, with a minimum of 3 screws in each coupling.

E. Install ducts, unless otherwise indicated, vertically and horizontally and parallel and perpendicular to building lines; avoid diagonal runs.

F. Install ducts close to walls, overhead construction, columns, and other structural and permanent enclosure elements of building.

G. Install ducts with a clearance of 1 inch, plus allowance for insulation thickness.

H. Conceal ducts from view in finished spaces. Do not encase horizontal runs in solid partitions unless specifically indicated.

I. Coordinate layout with suspended ceiling, fire- and smoke-control dampers, lighting layouts, and similar finished work.

J. Seal all joints and seams. Apply sealant to male end connectors before insertion, and afterward to cover entire joint and sheet metal screws.

K. Electrical Equipment Spaces: Route ducts to avoid passing through transformer vaults and electrical equipment spaces and enclosures.

L. Non-Fire-Rated Partition Penetrations: Where ducts pass through interior partitions and exterior walls and are exposed to view, conceal spaces between construction openings and ducts or duct insulation with sheet metal flanges of same metal thickness as ducts. Overlap openings on 4 sides by at least 1-1/2 inches.

M. Fire-Rated Partition Penetrations: Where ducts pass through interior partitions and exterior walls, install appropriately rated fire dampers, sleeves, and firestopping sealant. Fire and smoke dampers are specified in Division 15 Section "Duct Accessories." Firestopping materials and installation methods are specified in Division 7 Section "Through-Penetration Firestop Systems."

N. Protect duct interiors from the elements and foreign materials until building is enclosed. Follow SMACNA's "Duct Cleanliness for New Construction."

3.3 SEAM AND JOINT SEALING

A. Seal duct seams and joints according to SMACNA's "HVAC Duct Construction Standards--Metal and Flexible" for duct pressure class indicated.
   1. For pressure classes lower than 2-inch wg, seal all joints and seams.

B. Seal ducts before external insulation is applied.

3.4 HANGING AND SUPPORTING

A. Support horizontal ducts within 24 inches of each elbow and within 48 inches of each branch intersection.

B. Support vertical ducts at maximum intervals of 16 feet and at each floor.

C. Install upper attachments to structures with an allowable load not exceeding one-fourth of failure (proof-test) load.

D. Install concrete inserts before placing concrete.

E. Install powder-actuated concrete fasteners after concrete is placed and completely cured.
   1. Do not use powder-actuated concrete fasteners for lightweight-aggregate concretes or for slabs less than 4 inches thick.

3.5 FIELD QUALITY CONTROL

A. Perform the following field tests and inspections according to SMACNA's "HVAC Air Duct Leakage Test Manual" and prepare test reports:
   1. Disassemble, reassemble, and seal segments of systems to accommodate leakage testing and for compliance with test requirements.
   2. Conduct tests at static pressures equal to maximum design pressure of system or section being tested. If pressure classes are not indicated, test entire system at maximum system design pressure. Do not pressurize systems above maximum design operating pressure. Give seven days' advance notice for testing.
   3. Maximum Allowable Leakage: Comply with requirements for Leakage Class 3 for round and flat-oval ducts, Leakage Class 12 for rectangular ducts in pressure classes lower than and equal to 2-inch wg (both positive and negative pressures), and Leakage Class 6 for pressure classes from 2- to 10-inch wg.
   4. Remake leaking joints and retest until leakage is equal to or less than maximum allowable.

3.6 CONNECTIONS

A. Make connections to equipment with flexible connectors according to Division 15 Section "Duct Accessories."

B. Comply with SMACNA's "HVAC Duct Construction Standards--Metal and Flexible" for branch, outlet and inlet, and terminal unit connections.

C. Air terminal unit flexible duct connections shall be a maximum 3'-0" in length and shall not exceed 15 degrees in change of direction.

END OF SECTION 15815

SECTION 15829 - DUCT ACCESSIRIES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Backdraft dampers.
   2. Volume dampers.
   3. Fire dampers.
   4. Turning vanes.
   5. Duct-mounting access doors.
   6. Flexible connectors.
   7. Flexible ducts.
   8. Duct accessory hardware.

B. See Division 26 Section "Fire Alarm" for duct-mounting fire and smoke detectors.

C. See Division 23 Section "HVAC Instrumentation and Controls" for electric and pneumatic damper actuators.

1.2 SUBMITTALS

A. Product Data: For the following:
   1. Backdraft dampers.
   2. Volume dampers.
   3. Fire dampers.
   4. Turning vanes.
   5. Duct-mounting access doors.
   6. Flexible connectors.
   7. Flexible ducts.

B. Shop Drawings: Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
   1. Special fittings.
   2. Manual-volume damper installations.
   3. Fire-damper, smoke-damper, and combination fire- and smoke-damper installations, including sleeves and duct-mounting access doors.
   4. Wiring Diagrams: Power, signal, and control wiring.

1.3 QUALITY ASSURANCE

A. Comply with NFPA 90A, "Installation of Air Conditioning and Ventilating Systems," and NFPA 90B, "Installation of Warm Air Heating and Air Conditioning Systems."

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
   1. Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers specified.
   2. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

2.2 SHEET METAL MATERIALS

A. Comply with SMACNA's "HVAC Duct Construction Standards--Metal and Flexible" for acceptable materials, material thicknesses, and duct construction methods, unless otherwise indicated.

B. Galvanized Sheet Steel: Lock-forming quality; complying with ASTM A 653/A 653M and having G60 coating designation; ducts shall have mill-phosphatized finish for surfaces exposed to view.

C. Stainless Steel: ASTM A 480/A 480M.

D. Aluminum Sheets: ASTM B 209, alloy 3003, temper H14; with mill finish for concealed ducts and standard, 1-side bright finish for exposed ducts.

E. Extruded Aluminum: ASTM B 221, alloy 6063, temper T6.

F. Reinforcement Shapes and Plates: Galvanized-steel reinforcement where installed on galvanized sheet metal ducts; compatible materials for aluminum and stainless-steel ducts.

G. Tie Rods: Galvanized steel, 1/4-inch minimum diameter for lengths 36 inches or less; 3/8-inch minimum diameter for lengths longer than 36 inches.

2.3 BACKDRAFT DAMPERS

A. Manufacturers:
   1. Air Balance, Inc.
   2. American Warming and Ventilating.
   3. CESCO Products.
   4. Duro Dyne Corp.
   5. Greenheck.
   6. Penn Ventilation Company, Inc.
   7. Prefco Products, Inc.
   8. Ruskin Company.
   9. Vent Products Company, Inc.

B. Description: Multiple-blade, parallel action gravity balanced, with center-pivoted blades of maximum 6-inch width, with sealed edges, assembled in rattle-free manner with 90-degree stop, steel ball bearings, and axles; adjustment device to permit setting for varying differential static pressure.

C. Frame: 0.052-inch-thick, galvanized sheet steel, with welded corners and mounting flange.

D. Blades: 0.050-inch-thick aluminum sheet.

E. Blade Seals: [Felt] [Vinyl] [Neoprene].

F. Blade Axles: Galvanized steel.

G. Tie Bars and Brackets: Galvanized steel.

H. Return Spring: Adjustable tension.

2.4 VOLUME DAMPERS

A. Manufacturers:
1. Air Balance, Inc.
2. American Warming and Ventilating.
3. Flexmaster U.S.A., Inc.
4. McGill AirFlow Corporation.
5. METALAIRE, Inc.
6. Nailor Industries Inc.
7. Penn Ventilation Company, Inc.
8. Ruskin Company.
9. Vent Products Company, Inc.

B. General Description: Factory fabricated, with required hardware and accessories. Stiffen damper blades for stability. Include locking device to hold single-blade dampers in a fixed position without vibration. Close duct penetrations for damper components to seal duct consistent with pressure class.

C. Standard Volume Dampers: Multiple- or single-blade, parallel- or opposed-blade design as indicated, standard leakage rating, with linkage outside airstream, and suitable for horizontal or vertical applications.
1. Steel Frames: Hat-shaped, galvanized sheet steel channels, minimum of 0.064 inch thick, with mitered and welded corners; frames with flanges where indicated for attaching to walls and flangeless frames where indicated for installing in ducts.
2. Roll-Formed Steel Blades: 0.064-inch-thick, galvanized sheet steel.
3. Blade Axles: Galvanized steel.
4. Bearings: Oil-impregnated bronze.
5. Tie Bars and Brackets: Galvanized steel.

D. Jackshaft: 1-inch-diameter, galvanized-steel pipe rotating within pipe-bearing assembly mounted on supports at each mullion and at each end of multiple-damper assemblies.
   1. Length and Number of Mountings: Appropriate to connect linkage of each damper in multiple-damper assembly.

E. Damper Hardware: Zinc-plated, die-cast core with dial and handle made of 3/32-inch-thick zinc-plated steel, and a 3/4-inch hexagon locking nut. Include center hole to suit damper operating-rod size. Include elevated platform for insulated duct mounting.

2.5 FIRE DAMPERS

A. Manufacturers:
   1. Air Balance, Inc.
   2. CESCO Products.
   3. Greenheck.
   4. McGill AirFlow Corporation.
   5. METALAIRE, Inc.
   6. Nailor Industries Inc.
   7. Penn Ventilation Company, Inc.
   8. Prefco Products, Inc.
   9. Ruskin Company.
   10. Vent Products Company, Inc.
   11. Ward Industries, Inc.

B. Fire dampers shall be labeled according to UL 555.

C. Fire Rating: 1-1/2 hours.

D. Frame: Curtain type with blades inside airstream; fabricated with roll-formed, 0.034-inch-thick galvanized steel; with mitered and interlocking corners.

E. Mounting Sleeve: Factory- or field-installed, galvanized sheet steel.
   1. Minimum Thickness: 0.052 or 0.138 inch thick as indicated and of length to suit application.
   2. Exceptions: Omit sleeve where damper frame width permits direct attachment of perimeter mounting angles on each side of wall or floor, and thickness of damper frame complies with sleeve requirements.

F. Mounting Orientation: Vertical or horizontal as indicated.

G. Blades: Roll-formed, interlocking, 0.034-inch-thick, galvanized sheet steel. In place of interlocking blades, use full-length, 0.034-inch-thick, galvanized-steel blade connectors.

H. Horizontal Dampers: Include blade lock and stainless-steel closure spring.

I. Fusible Links: Replaceable, 165 deg F rated.

2.6 TURNING VANES

A. Fabricate to comply with SMACNA's "HVAC Duct Construction Standards--Metal and Flexible" for vanes and vane runners. Vane runners shall automatically align vanes.

B. Manufactured Turning Vanes: Fabricate 1-1/2-inch-wide, single-vane, curved blades of galvanized sheet steel set 3/4 inch o.c.; support with bars perpendicular to blades set into vane runners suitable for duct mounting.
   1. Manufacturers:
      a. Ductmate Industries, Inc.
      b. Duro Dyne Corp.
      c. METALAIRE, Inc.
      d. Ward Industries, Inc.

C. Acoustic Turning Vanes: Fabricate airfoil-shaped aluminum extrusions with perforated faces and fibrous-glass fill.

2.7 DUCT-MOUNTING ACCESS DOORS

A. General Description: Fabricate doors airtight and suitable for duct pressure class.

B. Door: Double wall, duct mounting, and rectangular; fabricated of galvanized sheet metal with insulation fill and thickness as indicated for duct pressure class. Include vision panel where indicated. Include 1-by-1-inch butt or piano hinge and cam latches.
   1. Manufacturers:
      a. American Warming and Ventilating.
      b. CESCO Products.
      c. Ductmate Industries, Inc.
      d. Flexmaster U.S.A., Inc.
      e. Greenheck.
      f. McGill AirFlow Corporation.
      g. Nailor Industries Inc.
      h. Ventfabrics, Inc.
      i. Ward Industries, Inc.
   2. Frame: Galvanized sheet steel, with bend-over tabs and foam gaskets.
   3. Provide number of hinges and locks as follows:
      a. Less Than 12 Inches Square: Secure with two sash locks.
      b. Up to 18 Inches Square: Two hinges and two sash locks.
      c. Up to 24 by 48 Inches: Three hinges and two compression latches with outside and inside handles.
      d. Sizes 24 by 48 Inches and Larger: One additional hinge.

C. Door: Double wall, duct mounting, and round; fabricated of galvanized sheet metal with insulation fill and 1-inch thickness. Include cam latches.
   1. Manufacturers:
      a. Flexmaster U.S.A., Inc.
   2. Frame: Galvanized sheet steel, with spin-in notched frame.

D. Seal around frame attachment to duct and door to frame with neoprene or foam rubber.

E. Insulation: 1-inch-thick, fibrous-glass or polystyrene-foam board.

2.8 FLEXIBLE CONNECTORS

A. Manufacturers:
   1. Duro Dyne Corp.
   2. Ventfabrics, Inc.
   3. Ward Industries, Inc.

B. General Description: Flame-retardant or noncombustible fabrics, coatings, and adhesives complying with UL 181, Class 1.

C. Flexible Connector Fabric: Glass fabric double coated with neoprene.
   1. Minimum Weight: 26 oz./sq. yd..
   2. Tensile Strength: 480 lbf/inch in the warp and 360 lbf/inch in the filling.
   3. Service Temperature: Minus 40 to plus 200 deg F.

2.9 FLEXIBLE DUCTS

A. Manufacturers:
   1. Ductmate Industries, Inc.
   2. Flexmaster U.S.A., Inc.
   3. Hart & Cooley, Inc.
   4. McGill AirFlow Corporation.

B. Noninsulated-Duct Connectors: UL 181, Class 1, multiple layers of aluminum laminate supported by helically wound, spring-steel wire.
   1. Pressure Rating: 10-inch wg positive and 1.0-inch wg negative.
   2. Maximum Air Velocity: 4000 fpm.
   3. Temperature Range: Minus 20 to plus 210 deg F.

C. Insulated-Duct Connectors: UL 181, Class 1, 2-ply vinyl film supported by helically wound, spring-steel wire; fibrous-glass insulation; polyethylene vapor barrier film.
   1. Pressure Rating: 10-inch wg positive and 1.0-inch wg negative.
   2. Maximum Air Velocity: 4000 fpm.
   3. Temperature Range: Minus 10 to plus 160 deg F.

D. Flexible Duct Clamps: Stainless-steel band with cadmium-plated hex screw to tighten band with a worm-gear action, in sizes 3 through 18 inches to suit duct size.

2.10 DUCT ACCESSORY HARDWARE

A. Instrument Test Holes: Cast iron or cast aluminum to suit duct material, including screw cap and gasket. Size to allow insertion of pitot tube and other testing instruments and of length to suit duct insulation thickness.

B. Adhesives: High strength, quick setting, neoprene based, waterproof, and resistant to gasoline and grease.

PART 3 - EXECUTION

3.1 APPLICATION AND INSTALLATION

A. Install duct accessories according to applicable details in SMACNA's "HVAC Duct Construction Standards--Metal and Flexible" for metal ducts and in NAIMA AH116, "Fibrous Glass Duct Construction Standards," for fibrous-glass ducts.

B. Provide duct accessories of materials suited to duct materials; use galvanized-steel accessories in galvanized-steel and fibrous-glass ducts, stainless-steel accessories in stainless-steel ducts, and aluminum accessories in aluminum ducts.

C. Install backdraft dampers on exhaust fans or exhaust ducts nearest to outside and where indicated.

D. Install volume dampers in ducts with liner; avoid damage to and erosion of duct liner.

E. Provide balancing dampers at points on supply, return, and exhaust systems where branches lead from larger ducts as required for air balancing. Install at a minimum of two duct widths from branch takeoff.

F. Provide test holes at fan inlets and outlets and elsewhere as indicated.

G. Install duct access doors to allow for inspecting, adjusting, and maintaining accessories and terminal units as follows:
   1. On both sides of duct coils.
   2. Downstream from volume dampers, turning vanes and equipment.
   3. Adjacent to fire or smoke dampers, providing access to reset or reinstall fusible links.
   4. To interior of ducts for cleaning; before and after each change in direction, at maximum 50-foot spacing.
   5. On sides of ducts where adequate clearance is available.

H. Install the following sizes for duct-mounting, rectangular access doors:
   1. One-Hand or Inspection Access: 8 by 5 inches.
   2. Two-Hand Access: 12 by 6 inches.
   3. Head and Hand Access: 18 by 10 inches.
   4. Head and Shoulders Access: 21 by 14 inches.
   5. Body Access: 25 by 14 inches.
   6. Body Plus Ladder Access: 25 by 17 inches.

I. Install the following sizes for duct-mounting, round access doors:
   1. One-Hand or Inspection Access: 8 inches in diameter.
   2. Two-Hand Access: 10 inches in diameter.
   3. Head and Hand Access: 12 inches in diameter.
   4. Head and Shoulders Access: 18 inches in diameter.
   5. Body Access: 24 inches in diameter.

J. Label access doors according to Division 15 Section "Mechanical Identification."

K. Install flexible connectors immediately adjacent to equipment in ducts associated with fans and motorized equipment supported by vibration isolators.

L. For fans developing static pressures of 5-inch wg and higher, cover flexible connectors with loaded vinyl sheet held in place with metal straps.

M. Connect diffusers or light troffer boots to low pressure ducts with maximum 60-inch lengths of flexible duct clamped or strapped in place.

N. Connect flexible ducts to metal ducts with draw bands.

O. Install duct test holes where indicated and required for testing and balancing purposes.

3.2 ADJUSTING

A. Adjust duct accessories for proper settings.

B. Final positioning of manual-volume dampers is specified in Division 15 Section "Testing, Adjusting, and Balancing."

END OF SECTION 15829

SECTION 15830 - DUCT INSULATION

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes semirigid and flexible duct, insulating cements, field-applied jackets, AND accessories and attachments.

1.2 SUBMITTALS

A. Product Data: Thermal conductivity, thickness, and jackets (both factory and field applied, if any), for each type of product indicated.

B. Shop Drawings: Shop fabrication and installation details for the following:
   1. Removable insulation sections at access panels.
   2. Application of field-applied jackets.
   3. Applications at linkages for control devices.

1.3 QUALITY ASSURANCE

A. Fire-Test-Response Characteristics: Provide products with flame-spread and smoke-developed indices of 25 and 50, respectively, according to ASTM E 84 by a testing agency acceptable to authorities having jurisdiction.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Mineral-Fiber Insulation:
      a. CertainTeed Manson.
      b. Knauf FiberGlass GmbH.
      c. Owens-Corning Fiberglas Corp.
      d. Schuller International, Inc.
   2. Flexible Elastomeric Thermal Insulation:
      a. Armstrong World Industries, Inc.
      b. Rubatex Corp.

2.2 INSULATION MATERIALS

A. Mineral-Fiber Board Thermal Insulation: Glass fibers bonded with a thermosetting resin. Comply with ASTM C 612, Type IB, without facing and with all-service jacket manufactured from kraft paper, reinforcing scrim, aluminum foil, and vinyl film.

B. Mineral-Fiber Blanket Thermal Insulation: Glass fibers bonded with a thermosetting resin. Comply with ASTM C 553, Type II, without facing and with all-service jacket manufactured from kraft paper, reinforcing scrim, aluminum foil, and vinyl film.

C. Flexible Elastomeric Thermal Insulation: Closed-cell, sponge- or expanded-rubber materials. Comply with ASTM C 534, Type II for sheet materials.
   1. Adhesive: As recommended by insulation material manufacturer.
   2. Ultraviolet-Protective Coating: As recommended by insulation manufacturer.

D. Field-Applied Jackets: ASTM C 921, Type 1, unless otherwise indicated.
   1. Foil and Paper Jacket: Laminated, glass-fiber-reinforced, flame-retardant kraft paper and aluminum foil.
   2. PVC Jacket: High-impact, ultraviolet-resistant PVC; 20 mils thick; roll stock ready for shop or field cutting and forming.

E. Accessories and Attachments:
   1. Glass Cloth and Tape: Comply with MIL-C-20079H, Type I for cloth and Type II for tape. Woven glass-fiber fabrics, plain weave, presized a minimum of 8 oz./sq. yd..
   2. Bands: Aluminum 3/4 inch wide.
   3. Wire: 0.080-inch, nickel-copper alloy; 0.062-inch, soft-annealed, stainless steel; or 0.062-inch, soft-annealed, galvanized steel.
   4. Weld-Attached Anchor Pins and Washers: Copper-coated steel pin for capacitor-discharge welding and galvanized speed washer. Pin length sufficient for insulation thickness indicated.
   5. Adhesive-Attached Anchor Pins and Speed Washers: Galvanized steel plate, pin, and washer manufactured for attachment to duct and plenum with adhesive. Pin length sufficient for insulation thickness indicated.

PART 3 - EXECUTION

3.1 GENERAL APPLICATION REQUIREMENTS

A. Surface Preparation: Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application including all dust, dirt and particulates.

B. Site Preparation: The installation area shall be enclosed and weather proof during and after installation to prevent moisture intrusion. If insulation is water damaged, all affected insulation shall be removed and replaced with new materials. The contractor shall report in writing any incident of water damage to the design professional.

C. Apply insulation materials, accessories, and finishes according to the manufacturer's written instructions; with smooth, straight, and even surfaces; and free of voids throughout the length of ducts and fittings.

D. Use accessories compatible with insulation materials and suitable for the service. Use accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.

E. Seal joints and seams with vapor-retarder mastic on insulation indicated to receive a vapor retarder.

F. Apply insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by the insulation material manufacturer.

G. Apply insulation with the least number of joints practical.

H. Apply insulation over fittings and specialties, with continuous thermal and vapor-retarder integrity, unless otherwise indicated.

I. Hangers and Anchors: Where vapor retarder is indicated, seal penetrations in insulation at hangers, supports, anchors, and other projections with vapor-retarder mastic. Apply insulation continuously through hangers and around anchor attachments.

J. Insulation Terminations: For insulation application where vapor retarders are indicated, seal ends with a compound recommended by the insulation material manufacturer to maintain vapor retarder.

K. Roof Penetrations: Apply insulation for interior applications to a point even with top of roof flashing.

L. Interior Wall and Partition Penetrations: Apply insulation continuously through walls and partitions, except fire-rated walls and partitions.

M. Fire-Rated Wall and Partition Penetrations: Terminate insulation at fire/smoke damper sleeves for fire-rated wall and partition penetrations.

N. Floor Penetrations: Terminate insulation at underside of floor assembly and at floor support at top of floor.

3.2 DUCT AND PLENUM APPLICATION SCHEDULE

A. Service: supply-air, return-air and exhaust-air ducts, concealed.
   1. Material: Externally wrapped Mineral-fiber board or Mineral-fiber blanket.
   2. Thickness: 2 inches.
   3. Number of Layers: One.
   4. Field-Applied Jacket: Foil and paper.
   5. Vapor Retarder Required: Yes.

B. Service: supply-air, return-air and exhaust-air ducts, exposed.

1. Material: Externally wrapped Mineral-fiber board.
2. Thickness: 2 inches.
3. Number of Layers: One.
4. Field-Applied Jacket: Foil and paper.
5. Vapor Retarder Required: Yes.

END OF SECTION 15830

SECTION 15855 - DIFFUSERS, REGISTERS AND GRILLES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes: General air device requirements. Refer to schedule for air device applications.

B. Related Sections:

1. Division 08 Section "Louvers and Vents" for fixed and adjustable louvers and wall vents, whether or not they are connected to ducts.
2. Division 23 Section "Air Duct Accessories" for fire and smoke dampers and volume-control dampers not integral to diffusers, registers, and grilles.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product indicated, include the following:

1. Data Sheet: Indicate materials of construction, finish, and mounting details; and performance data including throw and drop, static-pressure drop, and noise ratings.
2. Diffuser, Register, and Grille Schedule: Indicate drawing designation, room location, quantity, model number, size, and accessories furnished.

B. Samples: For each exposed product and for each color and texture specified.

PART 2 - PRODUCTS

2.1 AIR DEVICES

A. Insert number to complete drawing designation for each product required. Use these designations on Drawings to identify each product.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. Anemostat Products; a Mestek company.
b. Carnes.
c. Hart & Cooley Inc.
d. METALAIRE, Inc.
e. Nailor Industries Inc.
f. Price Industries.
g. Titus.

h. Tuttle & Bailey.

2.2 SOURCE QUALITY CONTROL

A. Verification of Performance: Rate diffusers, registers, and grilles according to ASHRAE 70, "Method of Testing for Rating the Performance of Air Outlets and Inlets."

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install diffusers, registers, and grilles level and plumb.

B. Ceiling-Mounted Outlets and Inlets: Drawings indicate general arrangement of ducts, fittings, and accessories. Air outlet and inlet locations have been indicated to achieve design requirements for air volume, noise criteria, airflow pattern, throw, and pressure drop. Make final locations where indicated, as much as practical. For units installed in lay-in ceiling panels, locate units in the center of panel. Where architectural features or other items conflict with installation, notify Architect for a determination of final location.

C. Install diffusers, registers, and grilles with airtight connections to ducts and to allow service and maintenance of dampers, air extractors, and fire dampers.

D. Refer to Division 15 “HVAC General Requirements” for HVAC system protection requirements during construction.

3.2 ADJUSTING

A. After installation, adjust diffusers, registers, and grilles to air patterns indicated, or as directed, before starting air balancing.

END OF SECTION 15855

SECTION 15870 - COMMERCIAL KITCHEN HOODS

1PART - GENERAL

1.1 SUMMARY

A. This Section includes Types I commercial kitchen hood(s) and dishwasher hood(s).

B. See Division 15 Section "Power Ventilators" for exhaust and make up air fans.

1.2 DEFINITIONS

A. Listed Hood: A hood tested according to UL 710 by a testing agency acceptable to authorities having jurisdiction.

B. Standard Hood: A hood that complies with design, construction, and performance criteria of applicable national and local codes.

C. Type I Hood: A hood designed for grease exhaust applications.

D. Dishwasher Hood.

1.3 SUBMITTALS

A. Product Data: For the following:

1. Hoods.
2. Grease removal devices.
3. Fire-suppression systems.
4. Lighting fixtures.

B. Shop Drawings: For the following:

1. Show plan view, elevation view, sections, roughing-in dimensions, service requirements, duct connection sizes, and attachments to other work.
2. Show cooking equipment plan and elevation to confirm minimum code-required overhang.
3. Indicate performance, exhaust and makeup air airflow and pressure loss, at actual Project-site elevation.
4. Indicate method of attaching hangers to building structure.
5. Show exhaust and makeup air ducts, and fittings connecting to hoods.
6. Show water-supply and drain piping.
7. Show control cabinets.
8. Show fire-protection piping, actuation devices, and manual control devices.
9. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
10. Wiring Diagrams: Power, signal, and control wiring.

C. Piping Diagrams: Detail fire-suppression piping and components and differentiate between manufacturer-installed and field-installed piping. Include roughing-in requirements for drain

connections. Show cooking equipment plan and elevation to illustrate fire-suppression nozzle locations.

D. Welding certificates.

E. Field quality-control test reports.

1.4 QUALITY ASSURANCE

A. Welding Standards: Qualify procedures and personnel according to AWS D1.1, "Structural Welding Code--Steel," for hangers and supports; and AWS D9.1, "Sheet Metal Welding Code," for joint and seam welding.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

C. NSF Compliance: Fabricate hood according to NSF 2, "Food Equipment."

1.5 EXTRA MATERIALS

A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Furnish one complete set of grease removal devices.

2PART - PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Hoods:

a. Captive-Aire Systems.
b. Duo-Aire, Inc.
c. Grease Master; Div. of Custom Industries Inc.
d. Greenheck.

2. Wet-Chemical Fire-Suppression Systems:

a. Ansul Incorporated; a Tyco International Ltd. Company.
b. Badger Fire Protection, Inc.
c. Fenwall Safety Systems, Inc.; Div. of Kidde Technologies, Inc.
d. Pyro Chem, Inc.

2.2 HOOD MATERIALS

A. Stainless-Steel Sheet: Type 430, #3 or #4 polish on all exposed surfaces.

1. Minimum Thickness: 0.03 inch.
2. General: Comply with SSINA's "Finishes for Stainless Steel" for recommendations for applying and designating finishes.
3. Remove tool and die marks and stretch lines or blend into finish. Grind and polish surfaces to produce uniform, directionally textured, polished finish indicated, free of cross scratches. Run grain with long dimension of each piece.
4. Concealed Stainless-Steel Surfaces: ASTM A 480/A 480M, No. 2B finish (bright, cold-rolled, unpolished finish).
5. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.

B. Sound Dampening: NSF-certified, nonabsorbent, hard-drying, sound-deadening compound for permanent adhesion to metal in minimum 1/8-inch thickness that does not chip, flake, or blister.

C. Gaskets: NSF certified for end-use application indicated; of resilient rubber, neoprene, or PVC that is nontoxic, stable, odorless, nonabsorbent, and unaffected by exposure to foods and cleaning compounds, and passes testing according to UL 710.

2.3 GENERAL HOOD FABRICATION

A. Welding: Use welding rod of same composition as metal being welded. Use methods that minimize distortion and develop strength and corrosion resistance of base metal. Make ductile welds free of mechanical imperfections such as gas holes, pits, or cracks.

1. Welded Butt Joints: Full-penetration welds for full-joint length. Make joints flat, continuous, and homogenous with sheet metal without relying on straps under seams, filling in with solder, or spot welding.
2. Grind exposed welded joints flush with adjoining material and polish to match adjoining surfaces.
3. Where fasteners are welded to underside of equipment, finish reverse side of weld smooth and flush.
4. Coat concealed stainless-steel welded joints with metallic-based paint to prevent corrosion.
5. After zinc-coated steel is welded, clean welds and abraded areas and apply SSPC-Paint 20, high-zinc-dust-content, galvanizing repair paint to comply with ASTM A 780/A 780M.

B. For metal butt joints, comply with SMACNA's "Kitchen Equipment Fabrication Guidelines."

C. Where stainless steel is joined to a dissimilar metal, use stainless-steel welding material or fastening devices.

D. Form metal with break bends that are not flaky, scaly, or cracked in appearance; where breaks mar uniform surface appearance of material, remove marks by grinding, polishing, and finishing.

E. Sheared Metal Edges: Finish free of burrs, fins, and irregular projections.

F. In food zones, as defined in NSF, fabricate surfaces free from exposed fasteners.

G. Cap exposed fastener threads, including those inside cabinets, with stainless-steel lock washers and stainless-steel cap (acorn) nuts.

H. Fabricate pipe slots on equipment with turned-up edges sized to accommodate service and utility lines and mechanical connections.

I. Fabricate enclosures, including panels, housings, and skirts, to conceal service lines, operating components, and mechanical and electrical devices including those inside cabinets, unless otherwise indicated.

J. Fabricate equipment edges and backsplashes according to SMACNA's "Kitchen Equipment Fabrication Guidelines."

2.4 TYPE I EXHAUST HOOD FABRICATION

A. Weld all joints exposed to grease with continuous welds and make grease removal devices and makeup air diffusers easily accessible for cleaning.

1. Hood(s) shall be listed and labeled, according to UL 710, by a testing agency acceptable to authorities having jurisdiction.
2. Include access panels as required for access to fire dampers and fusible links.
3. Fire Dampers: Labeled, according to UL 555, by a testing agency acceptable to authorities having jurisdiction.

a. Fire Rating: One and one-half hours.
b. Frame: SMACNA Type A, with blades in airstream; fabricated with roll-formed, 0.034-inch- thick galvanized steel; with mitered and interlocking corners.
c. Mounting Sleeve: Galvanized steel sheet, with a minimum thickness of 0.052 or 0.138 inch and length to suit application.
d. Mounting Orientation: horizontal as indicated.
e. Blades: Roll-formed, interlocking, 0.034-inch- thick, galvanized steel sheet. In place of interlocking blades, use full-length, 0.034-inch- thick, galvanized steel blade connectors.
f. Horizontal Dampers: Include a blade lock and stainless-steel negator closure spring.
g. Fusible Link: Replaceable, 165 or 212 deg F rated as indicated.

4. Exhaust-Duct Collars: Minimum 0.0625-inch- thick stainless steel at least 3 inches long, continuously welded to top of hood and at corners. At contractors option, provide welded flange for mechanical joint at duct connection to hood.

B. Hood Configuration: Exhaust and makeup air.

1. Makeup air shall be introduced through laminar-flow-type perforated metal panels on front of hood canopy.

C. Hood Style:

1. Back to back island, self compensating. Back to back canopy hoods shall include stainless finishing strip to conceal joint between hoods.
2. Wall mounted, self compensating. Single hood with stainless backer from floor to hood for full width of hood. Roll backer at top to cover 3" standoff.

D. Grease Removal Devices: Removable, stainless-steel, filter/baffle grease filters. Fabricate with a minimum of 0.0781-inch- thick stainless steel for filter frame and removable collection cup and

trough. Exposed surfaces shall be pitched to drain to collection cup. Filters/baffles shall comply with UL 1046, "Grease Filters for Exhaust Ducts."

E. Light Fixtures: UL-listed, surface-mounted, incandescent fixtures and lamps with lenses sealed vapor-tight. Wiring shall be installed in stainless-steel conduit on hood exterior. Number and location of fixtures shall provide a minimum of 70 fc on cooking surface below hood.

1. Switches shall be mounted on hood control panel..
2. Incandescent Lighting Fixtures: Comply with UL 1571.

F. Fire Extinguishing System

1. The fire extinguishing system shall be a pre-engineered distribution network engineered and provided by the hood manufacturer. The extinguishing agent shall be a low ph liquid non-corrosive type. The system shall be capable of automatic detection and activation or manual activation through a remote manual pull station. It is listed with underwriter laboratories, inc. The tank(s) shall be contained in a ul listed utility cabinet with a full-length removable door and center handle. The system shall be completely factory pre-piped by the trained personnel in accordance with UL 300, NFPA #96, #17, and #17A. All exposed fittings shall be chrome plated and exposed piping shall be covered with a heavy gauge stainless steel sleeving. System shall be capable of fuel shut down upon discharge. A mechanical or electrical gas valve shall be provided. A micro-switch shall be provided for the automatic start up of exhaust fans and shut down of supply air fans and shunt trip breakers serving equipment under the hood in the event of system discharge. Provide interface with existing fire alarm system to trigger alarm when discharge occurs. Field hookup and testing will be subcontracted to a qualified and insured fire system distributor and will be performed after hood installation.

2. The manufacturer shall provide suppression system calculations, engineered shop drawings, product information, installation manual, and sequence of operation for submittal to the state fire marshal. Include all associated fees and forms. Shop drawings shall include the actual hood layout including hood, cooking equipment, supply cylinders, nozzles, fusible links, etc. A cad generated drawing will be custom produced for each installation, indicating all drop locations and piping schematic in accordance with local requirements.

G. Steel Pipe, NPS 2 and Smaller: ASTM A 53/A 53M, Type S, Grade A, Schedule 40, plain ends.

1. Malleable-Iron Threaded Fittings: ASME B16.3, Classes 150 and 300.
2. Pipe Covers: Chrome-plated aluminum tubing.
3. Piping, fusible links and release mechanism, tank containing the suppression agent, and controls shall be factory installed. Controls shall be in stainless-steel control cabinet mounted on hood or wall. Furnish manual pull station for wall mounting adjacent to hood. Exposed piping shall be covered with stainless-steel sleeves. Exposed fittings shall be chrome plated.
4. Liquid Extinguishing Agent: Noncorrosive, low-pH liquid.
5. Furnish an electric-operated, gas shutoff valve with clearly marked open and closed indicator for field installation.
6. Fire-suppression system controls shall be integrated with controls for fans, lights, and fuel supply and located in a single cabinet for each group of hoods immediately adjacent.
7. Wiring shall have color-coded, numbered terminal blocks and grounding bar. Spare terminals for fire alarm, optional wiring to start fan with fire alarm, red pilot light to indicate fan operation, and control switches shall all be factory wired in control cabinet with relays or starters.

H. Hood Controls: Single, hood-mounted control cabinet shall control groups of adjacent hoods and shall be fabricated of stainless steel.

1. The electrical control package shall house the starters and overloads to control the exhaust and supply fans and be designed as a single point connection for the fans pre-wired where hood mounted, the electrical control package shall be mounted inside of UL listed 12" utility cabinet mounted as shown on plans.

2. Utility cabinets and electrical control packages shall be provided by the hood manufacturer.

3. Exhaust Hood: Single On-off switch shall start and stop the exhaust and supply fans. Interlock exhaust fan with makeup air supply fan to operate simultaneously. Interlock exhaust fan with fire-suppression system to operate fan(s) during fire-suppression-agent release and to remain in operation until manually stopped.

4. High-Temperature Control: Alarm shall sound and cooking equipment shall shut down before hood discharge temperature rises to actuation temperature of fire-suppression system.

5. Control cabinet shall include separate binary contacts for shunt trip output and automatic gas valve shut off.

2.5 DISHWASHER HOOD FABRICATION

A. Fabricate hood with 304 stainless steel.

B. Hood Configuration: dishwasher enclosure. Provide as dishwasher accessory or fabricate.

C. Hood Type: Heat and vapor removal.

D. Condensate Hood Baffles: Removable stainless-steel baffles to drain into a hood drain trough, and stainless-steel drain piping.

E. Dishwasher hood shall comply with dishwasher manufacturer requirements and recommendations.

F. Provide hood mounted fan switch.

3PART - EXECUTION

3.1 INSTALLATION

A. Complete field assembly of hoods, where required.

1. Make closed butt and contact joints that do not require filler.
2. Grind field welds on stainless-steel equipment smooth, and polish to match adjacent finish. Comply with welding requirements in Part 2 "General Hood Fabrication" Article.

B. Install hoods and associated services with clearances and access for maintaining, cleaning, and servicing hoods, grease removal devices, and fire-suppression systems according to manufacturer's written instructions and requirements of authorities having jurisdiction.

C. Make cutouts in hoods where required to run service lines and to make final connections.

D. Securely anchor and attach items and accessories to walls, floors, or bases with stainless-steel fasteners, unless otherwise indicated.

E. Install hoods to operate free from vibration.

F. Install trim strips and similar items requiring fasteners in a bed of sealant. Fasten with stainless-steel fasteners at 48 inches o.c. maximum.

G. Install sealant in joints between equipment and abutting surfaces with continuous joint backing, unless otherwise indicated. Provide airtight, watertight, vermin-proof, sanitary joints.

H. Install lamps, with maximum recommended wattage, in equipment with integral lighting.

3.2 CONNECTIONS

A. Install piping adjacent to machine with clearance to allow service and maintenance.

B. Duct Connections: Comply with applicable requirements in Division 15 Section "Duct Accessories" for flexible connectors on makeup air supply duct. Weld exhaust-duct connections.

C. Fire-Suppression Piping: Install piping connections for remote-mounted suppression systems per NFPA 17, "Wet Chemical Extinguishing Systems."

3.3 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including piping and electrical connections. Report results in writing.

1. Test each equipment item for proper operation. Repair or replace equipment that is defective, including units that operate below required capacity or that operate with excessive noise or vibration.
2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
3. Test motors and rotating equipment for proper rotation and lubricate moving parts according to manufacturer's written instructions.
4. Test liquid-carrying and water, drain, and gas components for leaks. Repair or replace leaking components.

B. Remove malfunctioning units, replace with new units, and retest.

3.4 ADJUSTING

A. Set initial temperatures, and calibrate sensors.

B. Set field-adjustable switches.

END OF SECTION 15870

SECTION 15923 - DIRECT DIGITAL CONTROLS

PART 1 - GENERAL

1.1 SCOPE

A. Facility Management System (FMS) Subcontractor shall provide:

1. A fully integrated Facility Management System (FMS), incorporating direct digital control (DDC) for control of all HVAC systems and other systems outlined herein.
2. All tubing, wiring, conduit, and panels for the Facility Management System and temperature controls equipment shall be by the this subcontractor. Line voltage wiring and control transformers for control power will be by this subcontractor from the control power disconnect provided by Division 26 or air terminal device manufacturer. Coordinate the control transformer voltage with the available power source provided by Division 26 or air terminal device.
3. All temperature control wiring and conduit and final electrical terminations to each sensor, transducer, application specific controller and main control panel shall be by the FMS subcontractor.
4. All software and hardware accessories required by balancing contractor for commissioning all air and water systems. Software and hardware may be provided on a temporary basis until job is completed. The balancing contractor is responsible for providing a laptop computer with modem port.
5. All isolation relays and wiring necessary to monitor and/or interlock systems provided by others, including but not limited to duct mounted smoke detectors, lighting control panels, utility meters, and mechanical equipment.

1.2 GENERAL PRODUCT DESCRIPTION

A. The Facility Management System shall provide HVAC equipment monitoring and control.

B. Furnish a totally native BACnet-based system. The operator's workstation, all building controllers, application controllers, and all input/output devices shall communicate using the protocols and network standards as defined by ANSI/ASHRAE Standard 135-2008, BACnet.

C. For this project, the Facility Management System shall consist of the following:

1. Standalone Control Panels.
2. Standalone application specific controllers (ASCs).
3. Graphical based PC operator control station.
4. Communication Network.

D. Provide a portable operator interface unit (handheld or laptop) which enables the operator to access all Network and application specific controllers via the local communications port. The portable unit shall enable the operator to interface to any ASC point data or programs.

E. The system shall be modular in nature and shall permit expansion of both capacity and functionality through the addition of sensors, actuators, controllers, application specific controllers and operator devices.

F. System architectural design shall eliminate dependence upon any single device for control execution. Each DDC controller and application specific controller shall operate independently. The failure of any single component or network connection shall not interrupt the execution of control strategies at other operational devices.

G. DDC controllers shall be able to access any data from, or send control commands to other controllers on the network without dependence upon a central processing device.

H. All panels, devices, controllers and other FMS equipment shall be installed in accordance with Division 26.

I. All hardware and controllers shall be mounted in fully closed panels in accordance with Division 26. Plastic covers are not allowed.

1.3 RELATED WORK:

A. Work of Other Sections: The following work related to this section shall be performed as follows:

B. Control valves, separable wells for immersion elements, and couplings for flow and pressure switches furnished by the FMS subcontractor shall be marked by the FMS subcontractor and installed by the mechanical subcontractor.

C. Automatic dampers furnished by FMS subcontractor shall be installed by the sheet metal subcontractor. Air Handling Unit mixing box dampers shall be furnished by the unit manufacture.

D. Power shall be provided to the point of disconnect by Division 16 as shown on the electrical drawings. Connection to and all work beyond this point is the responsibility of the FMS subcontractor.

E. Refer to Section “Testing and Balancing” for control requirements and coordination with Test and Balance contractor.

1.4 APPLICABLE PUBLICATIONS

A. The following publications of the issues listed below, but referred to thereafter by basic designation only, form a part of this specification to the extent indicated by the references thereto:

1. National Electrical Manufacturers Association
   a. NEMA 3R, Weather proof enclosures

2. National Fire Protection Association
   a. NFPA 70: National Electric Code (NEC), ‘96 Edition

3. Underwriters Laboratory (UL), Latest Edition
   a. UL 873: Temperature indicating and regulating equipment
   b. UL 916: Energy management equipment

1.5 QUALIFICATION CRITERIA:

A. The FMS subcontractor shall have been in the business of furnishing, installing and servicing the same product line for a minimum of five (5) years.

1.6 QUALITY ASSURANCE:

A. Materials and equipment shall be cataloged products of manufacturers regularly engaged in production and installation of Facility Management systems and shall be of the manufacturer's latest standard design. Single source responsibility of the supplier shall be the proper operation of the FMS. This shall include software debugging and proper calibration of each component. The FMS contractor shall coordinate with the mechanical equipment supplier to ensure that the all equipment is compatible with the controls to provide a complete and operable system. The FMS contractor is responsible for any ancillary items necessary for an operable system.

B. The FMS manufacturer shall have an in-place support facility within 75 miles of the site with technical staff, spare parts inventory and all necessary test and diagnostic equipment.

C. All FMS equipment shall conform to the requirements of FCC regulation, Part 15, Section 15 governing radio frequency electromagnetic interference.

D. The FMS shall comply with UL 916 and be so listed at the time of bid.

E. Design and build all system components to be fault-tolerant.

F. Satisfactory operation without damage at 110% and 85% of rated voltage.

G. Static, transient and short-circuit protection on all inputs and outputs.

H. Network-connected devices shall be A.C. coupled, or equivalent such that any single device failure does not disrupt network communication.

I. All real time clocks and data file RAM shall be battery-backed for a minimum seventy-two (72) hours.

1.7 DOCUMENTATION:

A. Submittal and FMS shop drawings: submit eight (8) sets of manufacturer's data on Facility Management system and components, and shop drawings.

B. Wiring diagrams: submit flow, signal, point to point and control wiring diagrams for Facility Management system using CAD generated drawings. Supply diskettes upon request.

C. Equipment operation instruction and maintenance manuals: furnish four (4) copies of written instructions on the proper operation and maintenance of all equipment and apparatus furnished under this section.

D. The FMS subcontractor shall furnish all of the foregoing to the Owner or his representative for his review as to the fulfillment of the specified requirements.

1.8 TRAINING:

A. The subcontractor shall provide competent instructors to give instructions to designated personnel in the operation and maintenance of the system as installed rather than a general training course. Instructors shall be thoroughly familiar with all aspects of the subject matter. All training shall be held during normal working hours of 8:00 A.M. to 5:00 P.M. weekdays.

B. Provide eight (8) hours of instructional training for Owner's operating personnel of up to four (4) operators per class. Training shall be provided in a minimum of two sessions coordinated with the owner’s schedule and addressing as a minimum:

C. Explanation of drawings, operations and maintenance manuals.

D. Walk-through of the job to locate control components.

E. Operator workstation and peripherals.

F. DDC controller and ASC operation/function.

G. Operator control functions, trends, alarm responses and data archiving.

H. Remote Web based access.

I. It is the contractor’s sole responsibility to document all training sessions in full. It is the contractor’s sole responsibility to initiate and schedule the formal training sessions. In order to qualify as a formal training session the contractor shall release written notification of the scheduled training session, obtain written acceptance from the authorized owner’s representative. The contractor shall document the training session including a list of attendees via sign in sheet and documenting the covered tasks. That documentation shall be distributed to the architect and owner.

1.9 WARRANTY:

A. Warranty shall include the adjustment and repair of the system including all personal computer equipment, printers, controllers, transmission equipment and all sensors and control devices. Warranty period shall be for a twelve (12) month period commencing on date of final acceptance or of beneficial use.

PART 2 - PRODUCTS

1.1 ACCEPTABLE MANUFACTURERS/INSTALLERS:

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering Facility Management Systems which may be incorporated in the work include, but are not limited to, the following:

1. Johnson Controls, Inc.
2. Invensys
3. Siemens Building Technologies
4. Trane

1.2 NETWORKING COMMUNICATIONS:

A. Inherent in the system's design shall be the ability to expand the system without the requirement of additional software or programming support.

B. The system shall be a completely native BACnet based system. The operator workstations, all building controllers, application controllers, and all input/output devices shall communicate using the protocols and network standards as defined by ANSI/ASHRAE Standard 135-2008, BACnet.

C. Building controller MS/TP module communications shall be though BACnet MS/TP LAN to all advanced application and application-specific controllers. MS/TP module shall also route messages to Ethernet - MS/TP module for communication over WAN. All communication with operator's workstation and all application controllers shall be through BACnet. Building controller Ethernet - MS/TP module shall incorporate as a minimum, the functions of a 2-way BACnet router. Controller shall route BACnet messages between the high-speed LAN (Ethernet 10/100MHz) and MS/TP LAN. Ethernet - MS/TP module shall also route messages from all other building controller modules onto the BACnet Ethernet network.

D. BACnet Conformance:

1. MS/TP module shall be approved by the BTL (BACnet Testing Laboratory) as meeting the BACnet Building Controller requirements. MS/TP module shall as a minimum support MS/TP BACnet LAN type. It shall communicate directly using this BACnet LAN as a native BACnet device and shall support simultaneous routing functions between all supported LAN types.
2. Standard BACnet object types supported shall include, as a minimum, Analog Value, Binary Value, Calendar, Device, File, Group, Notification Class, Program, and Schedule object types. All proprietary object types, if used in the system, shall be thoroughly documented and provided as part of the submittal data. All necessary tools shall be supplied for working with proprietary information.
3. For all system elements-operator's workstation(s), building controller(s), application controllers, routers, and repeaters-provide BACnet Protocol

Implementation Conformance Statements (PICS) as per ANSI/ASHRAE Standard 135-2001.

4. The system shall provide a means to scan, detect, interrogate, and edit 3rd party BACnet devices and BACnet objects within those devices.
5. DDC panel support: DDC panels shall directly reside on an industry standard high speed communications bus (Local Area Network) such that communications may be executed directly from DDC panel to DDC panel.
6. Access to system data shall not be restricted by the hardware configuration. The hardware configuration of the FMS network shall be totally transparent to the user. Application specific controllers shall be arranged on the bus(es) in a functional relationship manner with DDC controllers.

1.3 FACILITY MANAGEMENT SYSTEM HARDWARE:

A. The Facility Management System (FMS) shall be comprised of a network of various independent Mechanical System Digital Controllers and a Centralized Head End Station as specified, to provide centralized access and facility wide control functions. The DDC Controllers shall be interconnected in a communicating network to provide facility wide access and sharing of information.

B. The distributed communication network system shall consist of a multi-drop RS-485 bus architecture connecting DDC Controllers. The trunk shall consist of:

1. A twisted pair of wires (18 awg) run in metallic conduit if subject to physical damage, or a twisted shielded pair of wires (18awg) with the shield grounded in accordance with the manufacturer's wiring practices.
2. There shall be no power wiring, in excess of 30 Vacrmsvoltage, run in conduit with communications trunk wiring. In cases where power or signal wiring is run in conduit with trunk wiring, all communications trunk wiring and power wiring shall be run using separate twisted shielded pairs (18awg) with the shields grounded in accordance with the manufacturer's wiring practices.

C. The central head station shall consist of a PC operator workstation with 1.6 Ghz dual core Intel processor, 1GB RAM, 80 Gig Hard Drive, 48x CD ROM, 512MB graphics card, owner specified modem, owner specified network card, roll feed printer with continuos paper, 19 inch LCD monitor and the latest available windows operating system.

1.4 SYSTEM SOFTWARE FEATURES:

A. General

1. All necessary software to form a complete operating system, as described in this specification, shall be provided.
2. The software programs specified in this section shall be provided as an integral part of the Direct Digital Control Panels or Application Specific Controllers, and shall not be dependent upon any higher level mainframe or personal computer for execution.

3. Color graphics shall be developed for operator access to the system point data, schedules, alarm management, setpoint adjustments and written sequences of operation.

B. The FMS system shall permit an operator to create, modify and document all process control sequences including all DDC application software, energy management software, alarm processes, color graphics and links, and facilities maintenance programs provided in the DDC controllers including:

1. Time of Day Scheduling
2. Calendar based Scheduling
3. Holiday Scheduling
4. Optimal Start
5. Optimal Stop
6. Custom Application Programs
7. Trend Logs

C. Digital Panels shall be able to execute custom application programs defined by the user to automatically perform calculations and control routines.

D. Process Inputs and Variables: It shall be possible to use any of the following in a configured process:

1. Any system-measured point data or status
2. Any calculated data
3. Any results from other processes
4. Boolean logic operators (and, or, greater than, less than, etc.)

E. Data Access: A single process shall be able to incorporate measured or calculated data from any and all other ASCs or networked systems. In addition, a single process shall be able to issue commands to points in any and all other ASCs on the network.

F. All programs shall be executed automatically without the need for operator intervention, and shall be flexible enough to allow user customization. Programs shall be applied to building equipment described in Part III of this specification.

G. The DDC panel shall include a provision for limiting the number of times each piece of equipment may be cycled within any one-hour period.

H. The DDC panel shall provide powerfail motor restart. Upon the resumption of normal power, the DDC panel shall analyze the status of all controlled equipment, compare it with normal occupancy scheduling, and turn equipment on or off as necessary to resume normal operation.

I. Alarm reporting. The operator shall be able to determine the action to be taken in the event of an alarm (i.e. route alarm to the appropriate workstation, start programs, printed or display custom messages). The system shall dial out in the event of an alarm. Receivers shall include remote service PC workstations and alpha-numeric pagers. The alarm message shall include the name of the calling location, the device that generated the alarm and the alarm message itself.

J. Scheduling. The operator shall be able to schedule each piece of equipment independently including start/stop and occupied/unoccupied control.

1.5 WEB BROWSER CAPABILITIES

A. The system shall be capable of supporting an unlimited number of clients using a standard Web Browser such as Internet Explorer™ or Netscape Navigator™. Systems requiring additional software resident on the client machine or manufacture-specific browsers shall not be acceptable.

B. The Web Browser client shall support at a minimum, the following functions:

1. User log-on identification and password shall be required. If an unauthorized user attempts access, a blank web page shall be displayed. Security using Java authentication techniques to prevent unauthorized access shall be implemented.
2. Graphical screens developed for the GUI shall be the same screens used for the Web Browser client. Storage of the graphical screens shall be in the system, without requiring any graphics to be stored on the client machine. Systems that require graphics storage on each client are not acceptable.
3. Depending on user access privileges, the user shall be able to view data, modify and command objects such as start/stop, and adjust set points. In addition, users can be provided with the ability to view logs and view and acknowledge alarms.

C. The system shall provide the capability to specify a user's (as determined by the log-on user identification) home page. The capability to limit the user to just their home page shall be provided. From the home page, links to other views, or pages in the system shall be possible.

D. Graphic screens on the Web Browser client shall support hypertext links to other Web pages on other Internet or Intranet sites.

1.6 DIGITAL CONTROL PANEL(S):

A. General: Digital Control Panels shall be 16 bit microprocessor-based, multi-tasking, multi-user, dedicated digital control processors.

B. Memory: Each Digital Panel shall have sufficient memory (minimum 2 MB RAM, expandable via SIMM's) to support its own operating system and data FMS including, but not limited to:

1. Custom control processes
2. Energy Management Applications
3. Alarm Management
4. Trend Data
5. Maintenance Support Applications
6. Operator I/O

C. Expandability: The system shall be modular in nature, and shall permit easy expansion through the addition of field controllers, sensors, and actuators. Each digital panel shall be installed with a 10% expansion capacity for all point types (AO, DO, DI, AI) without the addition of expansion modules.

D. Serial Communication Ports: Digital Panels shall provide at least two RS-232C serial data communication ports for simultaneous operating of multiple operator I/O devices, such as laptop computers, Personal Computers, and alarm printers.

E. Integrated On-line Diagnostics: Each Digital Panel shall continuously perform self-diagnostics, communication diagnosis and diagnosis of all subsidiary equipment. Digital Panels shall provide both local and remote annunciation of any detected component failures, or repeated failure to establish communication. Indication of the diagnostic results shall be provided at each Digital Panel.

F. Surge and Transient Protection: Isolation shall be provided at all network terminations, as well as all field point terminations, to suppress induced voltage transients. Isolation levels shall be sufficiently high as to allow all signal wiring to be run in the same conduit as high voltage wiring where acceptable by electrical code.

G. Powerfail Restart: In the event of the loss of normal power, there shall be an orderly shutdown of the Digital Panel to prevent the loss of data FMS or operating system software. Non-volatile memory shall be incorporated for all critical controller configuration data, and battery backup shall be provided to support the real-time clock and all volatile memory for a minimum of 72 hours. Upon restoration of normal power, the Digital Panel shall automatically resume full operation without manual intervention. Should Digital Panel memory be lost for any reason, the user shall have the capability of reloading the Digital Panel via the local RS-232C port, Operator Workstation or telephone line dial-in. Provide modem at DDC panel to allow for dial-in from remote operator workstation(s). Phone line will be provided by the OWNER.

1.7 APPLICATION SPECIFIC CONTROLLERS:

A. Each standalone Digital Control Panel shall be able to extend its performance and capacity through the use of remote Application Specific Controllers (ASCs). An ASC shall be provided for each mechanical system (i.e. air handling unit, VAV box, etc.) Grouping multiple systems on one ASC is allowed povided that a minimum of 2 points of each type (i.e. binary input, digital output, etc...) remain unused for future expansion.

B. Each ASC shall operate as a standalone controller capable of performing its specified control responsibilities independently of other controllers in the network. Each ASC shall be a microprocessor-FMSed, multi-tasking, real-time digital control processor.

C. Each ASC shall have sufficient memory to support its own operating system and data FMS including:

1. Control Processes
2. Energy Management Applications
3. Time Programmed Start/Stop Software

D. All system setpoints, proportional bands, control algorithms, and any other programmable parameters shall be stored such that a power failure of any duration does not necessitate reprogramming the ASC. Any version of an ASC using RAM memory shall be provided with a battery and battery charger capable of holding all programs in memory during a power failure of seventy-two (72) hours duration. Install a label on each VAV box placed near the ASC that lists the design minimum and maximum airflows.

E. All control outputs for air handling unit control valves and mixing dampers shall be analog type O-10VDC or 4-20mA.

1.8 DDC FIELD DEVICES:

A. Provide the following instrumentation as required by the monitoring, control and optimization functions:

1. Temperature Sensors:

a. Liquid immersion temperature RTD: Temperature monitoring range 0/200 F, minimum, Output signal- Changing resistance, Factory calibration point+70 F @ 1000 Ù, Accuracy at calibration point 0.34 F.

b. Space/Duct temperature RTD: Temperature monitoring range 0/150 F minimum, Output signal - Changing resistance, Factory calibration point 70 F (21 C), Accuracy at calibration point±0.34 F. Duct sensors located in the mixed air and coil discharge sections shall be the averaging type with a minimum 5'-0" length.

c. Outside air temperature RTD: Temperature monitoring range-20/+120 minimum, Factory calibration point 70 F @ 1000 Ù, Accuracy at calibration point 0.34 degrees F,

2. Space Temperature Sensor/Controller: Each temperature sensor/controller shall be capable of adjusting the temperature ± 3 deg F from the programmed set points during occupied periods. The controller shall be capable of providing temporary override during normally unoccupied periods.
3. Differential Pressure Switch: Unit for fluid flow proof, Minimum differential pressure 0 psi, Maximum differential pressure 50 psi, Maximum pressure 325 psi.
4. Relays: Control relays shall be dust tight with minimum DPDT contacts and shall be rated for 125% of anticipated load. Relays shall consist of relay and separable FMS with screw terminals. Relays shall be UL listed for the application.
5. Current Sensing Relays: Current sensing relays shall be fully solid state and shall feature adjustable trip point, power LED and trip LED. Units shall be UL listed. Utilize current sensing relays for all FMS fan and pump status indication.
6. Pressure Transducers: Furnish and install pressure and differential pressure transducers as shown on the plans. Each unit shall be furnished with a lever operated gauge cocks and shall have snubbers installed between the gauge cocks and the transducer to eliminate pulsations. The range on the pressure transducers shall be 0-150 psig with a maximum pressure of 250 psig. The

range on the differential pressure transducers shall be 0-25 dpsig with a maximum operating pressure of 250 psig. Transducers shall have a minimum accuracy of 1% of the operating range.

a. Transducers installed outdoors shall be encased in NEMA 3R enclosures. Transducers and static piping installed outdoors shall be charged with non-toxic antifreeze.
b. Acceptable Manufacturers: Triad Technologies, Veris Industries, Foxboro.

7. Air Flow Measuring Station: Air flow stations shall utilize thermal based air measurement. The sensor accuracy shall read airflow rates within ±2% of reading with ±2% repeatability and temperature within ±0.15 deg F. Ebtron Gold series or approved equal.

1.9 TEMPERATURE CONTROL EQUIPMENT:

A. Control Dampers

1. Automatic control and smoke dampers shall be of sizes as indicated on Plans. Damper frames shall not be less than 13 gauge galvanized steel formed for extra strength with mounting holes for flange and enclosed duct mounting.

2. All damper blades shall not be less than 16 gauge galvanized steel roll formed for high velocity performance. Blades on all dampers shall be 6" wide or less. Blade bearings shall be nylon standard with ½" zinc plated steel shafts. All blade linkage hardware shall be of corrosion-resistant finish and readily accessible for maintenance after installation.

3. Neoprene reinforced blade edge seals and spring loaded stainless steel side seals shall be provided to insure leakage of not more than 1% at 1500 fpm approach velocity at 4" static closing to torque. Dampers and seals shall be suitable for temperature ranges of -40 to 200 degrees F.

4. Dampers shall be minimum leakage type for all applications. Temperature control contractor shall submit leakage and flow characteristics for all control dampers. Dampers shall be rated for dynamic conditions.

B. Damper Actuators

1. Units shall be electronic and shall be smooth and quiet in operation. If specified in the sequence of operation in the event of power failure, actuators shall be provided with spring return so that they will "fail safe" in either normally open or normally closed position. Size all actuators to operate control items to which they are connected with 20% spare capacity. Actuators shall be housed in NEMA 3R enclosures and shall be listed under UL 916 and UL 873. Actuators mounted outdoors shall have a NEMA 4X enclosure.

C. Low Limit Thermostats

1. Low limit thermostats shall be automatic reset type with bellows actuated switch. The sensing element shall have a minimum length of 20 feet and shall be such that if any point on the element senses the set point it will react.

D. High Limit Thermostats (Firestats)

1. Safety high limit thermostats shall be furnished and installed where shown. High limits shall be interlocked to stop fan when temperature in excess of 125°F is sensed.

E. Networked Thermostat/Humidistat

1. The Networked Thermostat shall be capable of controlling a two pipe fan coil, cabinet unit heater or other similar equipment with single-speed or modulating-speed fan control.
2. The TEC shall communicate over the Field Controller Bus using BACnet Standard MS/TP Bus Protocol ASHRAE SSPC-135, Clause 9.
3. The TEC shall be BACnet Testing Labs (BTL) certified and carry the BTL Label.
4. The Networked Thermostat shall communicate over the FC Bus using BACnet Standard protocol SSPC-135, Clause 9.
5. The Networked Thermostat shall be capable of remote read/write and parameter adjustment from the web based User Interface (UI) through an NAE.
6. The Networked Thermostat shall include an intuitive UI providing plain text messages.
7. The Networked Thermostat shall employ nonvolatile electrically erasable programmable read-only memory (EEPROM) for all adjustable parameters.

1.10 SEQUENCES OF OPERATION AND POINTS LIST:

A. This summary is provided to establish a minimum guide for FMS configuration. The FMS subcontractor shall be required to provide and install any additional points required to meet the FMS system and Sequences of Operation specified herein. The contractor shall provide all supplemental control devices and sequences recommended by the manufacturer for all equipment controlled by the FMS.

B. The sequences of operation and points list shall be provided according to the following unless noted otherwise. Refer to drawings for counts of items listed as “Varies.”

C. The listed sequences of operation are for comfort control only and do not list required safety controls. All required safety controls, including but not limited to, smoke detectors, firestats, smoke dampers and fire alarm interlock shall be installed in accordance to NFPA 96 and applicable codes. Manual or automatic cycling off of any electrical heating device shall disconnect all legs.

D. Refer to the equipment specifications including, but not limited to, chillers, boilers, air handling units, vfd’s and fire alarm for required integration to factory mounted panels. Where integrated controls are specified, the contractor is solely responsible for

providing all FMS integration panels and programming required to communicate with factory mounted integrators provided by others.

E. System Control Summary - Single Zone, DX split, electric heat.

1. Description: Constant Volume, DX cooling, Electric reheat.

2. AHU Control: All of the typical sensors are required including start/stop, status, temporary override, space temp, space relative humidity and discharge air temp. The fan shall run continuously when unit is enabled via temperature sensor in space providing an adjustable offset temperature control. Controls shall be configured such that separate cooling and heating setpoints can be programmed. Provide factory recommended dead bands, proportional bands, and integration time and adjust to suit application. Upon calling for cooling the unit shall enable the staged cooling to maintain space setpoint (adjustable). Upon calling for heating unit air handler and electric heating coil will energize to maintain thermostat setpoint (adjustable). During unoccupied periods the unit shall control unoccupied heating and cooling set points, which shall be independent of one another. Provide local override capability which returns the unit to occupied mode for a period of 2 hours (adjustable). Unit shall be automatically enabled if space temperature falls below 45 deg F (adjustable) to provide freeze protection.

3. Point List:

Qty.	Description	Type	Field Device
1	Start/Stop	BO	Relay
1	Status	BI	Current Sensing Relay
1/stage	Cooling stage	BO/AO	Relay or Direct Analog
1/stage	Heating stage	BO/AO	Relay or Direct Analog
1	Supply Air Temp	AI	RTD Sensor
1	Space Temp	AI	RTD Sensor/Thermostat
1	Space RH	AI	RH Sensor

Note: Coordinate binary versus analog output to equipment staging with equipment manufacturer.

F. System Control Summary - Electric Heaters

1. Description: Electric Heat

2. Electric Unit Heater Control: All of the typical sensors are required including start/stop, status, temporary override, space temperature. The fan and electric strip heat will energize when unit is enabled based on adjustable setpoint. Unit shall be automatically enabled if space temperature falls below 35 deg F (adjustable) to provide freeze protection and shall remain operable in unoccupied mode until the space temperature reaches 10 deg F above the freeze protection set point. A single space temperature sensor is acceptable for multiple heaters where serving a common space. Provide single outside air temperature lockout (adjustable) to disable all electric heaters.

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3. Point List:

Quantity	Description	Type	Field Device
1	Start/Stop	BO	Relay
1	Status	BI	Current Sensing Relay
1	Space Temp	AI	RTD Sensor
1	OA Temp	AI	RTD Sensor

G. System Control Summary - 100% Outside Air Unit

1. Description: packaged rooftop unit with d/x cooling and electric reheat.
2. Control: EMS control shall be limited to start/stop control, and discharge air sensors and alarm. All equipment control shall be provided by factory mounted controls as specified with the equipment and interfaced to the DDC system via a Lon communication card. The DDC system shall map available points selected by engineer for monitoring via DDC. Provide a discharge condition alarm at operator workstation if temperature or humidity fall outside of acceptable range. Acceptable range is defined as within 5 deg F of temperature control set point range and lower than 65% RH.

3. Point List:

Quantity	Description	Type	Field Device
1	Start/Stop	BO	Relay
1	Alarm	BI	Current Sensing Relay
1	Discharge Air Temp.	AI	RTD Sensor
1	Discharge RH	AI	RH Sensor
1	Alarm	BO	Relan

H. System Control Summary – Rooftop Air Unit

1. Description: packaged 100% outside air unit with d/x cooling, modulating hot gas reheat on all cooling stages to achieve full humidity control, and electric reheat. RTU is equipped with ERV and exhaust fan.
2. RTU Control: All of the typical sensors are required including start/stop, status, temporary override, space temp, space relative humidity and discharge air temp. The fan shall run continuously when unit is enabled via temperature sensor in space providing an adjustable offset temperature control. Controls shall be configured such that separate cooling and heating setpoints can be programmed. Provide factory recommended dead bands, proportional bands, and integration time and adjust to suit application. Upon calling for cooling the unit shall enable

the staged cooling to maintain space setpoint (adjustable). Upon calling for heating unit air handler and electric heating coil will energize to maintain thermostat setpoint (adjustable). During unoccupied periods the unit shall control unoccupied heating and cooling set points, which shall be independent of one another. Provide local override capability which returns the unit to occupied mode for a period of 2 hours (adjustable). Unit shall be automatically enabled if space temperature falls below 45 deg F (adjustable) to provide freeze protection.

3. Point List:

Quantity	Description	Type	Field Device
1	Start/Stop	BO	Relay
1	Status	BI	Current Sensing Relay
1/stage	Cooling stage	BO/AO	Relay or Direct Analog
1/stage	Heating stage	BO/AO	Relay or Direct Analog
1	Supply Air Temp	AI	RTD Sensor
1	Space Temp	AI	RTD Sensor/Thermostat
1	Space RH	AI	RH Sensor

PART 3 - EXECUTION

A. Electrical work shall include furnishing and installing conduit and wire, mounting electric/electronic system components, and final connections at pneumatic-electric control system components, contactors, motor starters and numbered terminals on packaged air conditioning units, and electric heating coils. Connection to the control power circuits shall be work of this division.

B. The controls contractor is responsible for control voltage wiring between fire alarm devices and HVAC equipment.

C. The wiring of the temperature controls and interlocks shall be in strict accordance with all governing codes and with the requirements of Division 16. All control wiring exposed in equipment rooms, outdoors or located where mechanical damage to the wire could occur shall be run in conduit. Conduit shall be as specified in the electrical section of these Specification. All indication wire shall be No. 18 minimum size and all interlock wire shall be No. 12 minimum size. All wire shall have type THHN insulation. Wiring within the ceiling space shall be plenum rated.

D. Maximum voltage for the temperature control and interlock wiring shall be 120V. All starters shall be supplied with 120V holding coils, integral control transformers, hand-off-automatic switches and two extra auxiliary contacts.

E. The electrical contractor shall provide all power wiring to the starters and from the starters to the motors.

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F. Thermostats or sensors mounted on outside walls shall be mounted on 1" minimum thickness rigid fiberglass (or equal) insulating bases with solar guards. Thermostats or sensors with set point adjustments shall be mounted in compliance with ADA requirements (48” above finished floor).

G. All controllers and devices shall be fully commissioned prior to testing and balancing.

END OF SECTION 15923

SECTION 15990 - TESTING, ADJUSTING & BALANCING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes testing, adjusting, and balancing HVAC systems to produce design objectives, including the following:
   1. Balancing airflow within distribution systems, including submains, branches, and terminals, to indicated quantities according to specified tolerances.
   2. Adjusting total HVAC systems to provide indicated quantities.
   3. Measuring electrical performance of HVAC equipment.
   4. Setting quantitative performance of HVAC equipment.
   5. Verifying that automatic control devices are functioning properly.
   6. Measuring sound and vibration.
   7. Reporting results of activities and procedures specified in this Section.

1.2 DEFINITIONS

A. AABC: Associated Air Balance Council.

B. AMCA: Air Movement and Control Association.

C. NEBB: National Environmental Balancing Bureau.

D. SMACNA: Sheet Metal and Air Conditioning Contractors' National Association.

1.3 SUBMITTALS

A. Strategies and Procedures Plan: Testing, adjusting, and balancing strategies and step-by-step procedures. Include a complete set of report forms intended for use on this Project.

B. Certified Testing, Adjusting, and Balancing Reports: Prepared on approved forms certified by the testing, adjusting, and balancing Agent.

1.4 QUALITY ASSURANCE

A. Agent Qualifications: Engage a testing, adjusting, and balancing agent certified by AABC or NEBB.

B. Certification of Testing, Adjusting, and Balancing Reports: Certify testing, adjusting, and balancing field data reports. This certification includes the following:
   1. Review field data reports to validate accuracy of data and to prepare certified testing, adjusting, and balancing reports.

2. Certify that testing, adjusting, and balancing team complied with approved testing, adjusting, and balancing plan and procedures specified and referenced in this Specification.
3. Testing, Adjusting, and Balancing Reports: Use standard forms from AABC's "National Standards for Testing, Adjusting, and Balancing," or NEBB's "Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems."

C. Instrumentation Type, Quantity, and Accuracy: As described in AABC national standards or NEBB's "Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems," Section II, "Required Instrumentation for NEBB Certification."

D. Instrumentation Calibration: Calibrate instruments at least every six months or more frequently if required by the instrument manufacturer.

1.5 PROJECT CONDITIONS

A. Full Owner Occupancy: The Owner will occupy the site and existing building during the entire testing, adjusting, and balancing period. Cooperate with the Owner during testing, adjusting, and balancing operations to minimize conflicts with the Owner's operations.

B. Partial Owner Occupancy: The Owner may occupy completed areas of the building before Substantial Completion. Cooperate with the Owner during testing, adjusting, and balancing operations to minimize conflicts with the Owner's operations.

1.6 COORDINATION

A. Coordinate efforts of factory-authorized service representatives for systems and equipment, HVAC controls installers, and other mechanics to operate HVAC systems and equipment to support and assist testing, adjusting, and balancing activities.

B. Perform testing, adjusting, and balancing after leakage and pressure tests on air and water distribution systems have been satisfactorily completed.

1.7 WARRANTY

A. National Project Performance Guarantee: Provide a guarantee on AABC'S "National Standards" forms stating that AABC will assist in completing the requirements of the Contract Documents if the testing, adjusting, and balancing Agent fails to comply with the Contract Documents. Guarantee includes the following provisions:

B. Special Guarantee: Provide a guarantee on NEBB forms stating that NEBB will assist in completing the requirements of the Contract Documents if the testing, adjusting, and balancing Agent fails to comply with the Contract Documents. Guarantee includes the following provisions:
1. The certified Agent has tested and balanced systems according to the Contract Documents.

2. Systems are balanced to optimum performance capabilities within design and installation limits.

PART 2 - EXECUTION

2.1 EXAMINATION

A. Examine the Contract Documents to become familiar with project requirements and to discover conditions in systems' designs that may preclude proper testing, adjusting, and balancing of systems and equipment.
   1. Verify that balancing devices, such as test ports, gage cocks, thermometer wells, flow-control devices, balancing valves and fittings, and manual volume dampers, are required by the Contract Documents. Verify that quantities and locations of these balancing devices are accessible and appropriate for effective balancing and for efficient system and equipment operation.

B. Examine approved submittal data of HVAC systems and equipment.

C. Examine Project Record Documents described in Division 1 Section "Project Record Documents."

D. Examine equipment performance data, including fan and pump curves. Relate performance data to Project conditions and requirements, including system effects that can create undesired or unpredicted conditions that cause reduced capacities in all or part of a system. Calculate system effect factors to reduce performance ratings of HVAC equipment when installed under conditions different from those presented when equipment was performance tested at the factory. To calculate system effects for air systems, use tables and charts found in AMCA 201, "Fans and Systems," Sections 7 through 10; or in SMACNA's "HVAC Systems--Duct Design," Sections 5 and 6. Compare this data with design data and installed conditions.

E. Examine system and equipment installations to verify that they are complete and that testing, cleaning, adjusting, and commissioning specified in individual Specification Sections have been performed.

F. Examine system and equipment test reports.

G. Examine HVAC system and equipment installations to verify that indicated balancing devices, such as test ports, gage cocks, thermometer wells, flow-control devices, balancing valves and fittings, and manual volume dampers, are properly installed, and their locations are accessible and appropriate for effective balancing and for efficient system and equipment operation.

H. Examine systems for functional deficiencies that cannot be corrected by adjusting and balancing.

I. Examine air-handling equipment to ensure clean filters have been installed, bearings are greased, belts are aligned and tight, and equipment with functioning controls is ready for operation.

J. Examine strainers for clean screens and proper perforations.

K. Examine heat-transfer coils for correct piping connections and for clean and straight fins.

L. Examine equipment for installation and for properly operating safety interlocks and controls.

M. Examine automatic temperature system components to verify the following:
   1. Dampers and other controlled devices operate by the intended controller.
   2. Dampers are in the position indicated by the controller.
   3. Integrity of dampers for free and full operation and for tightness of fully closed and fully open positions.
   4. Thermostats and humidistats are located to avoid adverse effects of sunlight, drafts, and cold walls.
   5. Sensors are located to sense only intended conditions.
   6. Sequence of operation for control modes is according to the Contract Documents.
   7. Controller set points are set at design values. Observe and record system reactions to changes in conditions. Record default set points if different from design values.
   8. Interlocked systems are operating.
   9. Changeover from heating to cooling mode occurs according to design values.

N. Report deficiencies discovered before and during performance of testing, adjusting, and balancing procedures.

2.2 PREPARATION

A. Prepare a testing, adjusting, and balancing plan that includes strategies and step-by-step procedures.

B. Complete system readiness checks and prepare system readiness reports. Verify the following:
   1. Permanent electrical power wiring is complete.
   2. Automatic temperature-control systems are operational.
   3. Equipment and duct access doors are securely closed.
   4. Balance, smoke, and fire dampers are open.
   5. Ceilings are installed in critical areas where air-pattern adjustments are required and access to balancing devices is provided.
   6. Windows and doors can be closed so design conditions for system operations can be met.

2.3 TESTING AND BALANCING PROCEDURES

A. Perform testing and balancing procedures on each system according to procedures contained in AABC national standards or NEBB's "Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems."

B. Cut insulation, ducts, pipes, and equipment cabinets for installation of test probes to the minimum extent necessary to allow adequate performance of procedures. After testing and balancing, close probe holes and patch insulation with new materials identical to those removed. Restore vapor barrier and finish according to the insulation Specifications for this Project.

C. Mark equipment settings with paint or other suitable, permanent identification material, including damper-control positions, valve indicators, fan-speed-control levers, and similar controls and devices, to show final settings.

D. As a part of the work of this contract, the Contractor shall make any adjustments and/or replacement of the pulleys, belts, and dampers (or the addition of dampers required for correct balance) as recommended by the Air Balance and Testing Agency, at no additional cost to the Owner.
   1. For fan motors 5 HP and above:
      a. At no additional cost to the Owner, install variable pitch pulleys on the fan motors, to facilitate fan speed adjustments, during the balancing period only.
      b. Upon completion of the testing and before final inspection, install fixed drive and driven pulleys and belts of the required size, as determined during the testing period.
   2. For fan motors smaller than 5 HP:
      a. Upon completion of the testing and before final inspection, install variable pitch drive and driven pulleys and belts of the required size, as determined during the testing period.
   3. The pulleys and belts supplied with the fan may or may not be the right size. In no case, reduce the manufacturer required number of belts.
   4. All belt driven fans shall have their speeds adjusted and drives changed where necessary so that the fans deliver design CFM at actual static pressure developed by the installed system.
   5. For fan motors with variable speed drives on constant air flow systems, such as factional horsepower exhaust fans, using the variable speed controller supplied with the fan, adjust the fan speed as required to obtain the design CFM against the actual system static pressure developed by the installed system.
   6. For fans with variable frequency drives (V.F.D.'s), using the V.F.D. adjust the fan speed as required to obtain the maximum design CFM against the actual system static pressure developed by the installed system. If the fan V.F.D. is running at less than 55 hertz, change the fan drive where necessary so that the fan delivers design CFM at the actual static pressure developed by the installed system, with the V.F.D. running at 60 hertz.

2.4 TOLERANCES

A. Set HVAC system airflow and water flow rates within the following tolerances:
   1. Set HVAC system airflow rates within the following tolerances:
   2. Supply and Return Fans: Minus 5 to plus 5 percent.
   3. Exhaust Fans: 0 to minus 5 percent.
   4. Supply and Return Air Outlets and Inlets: Minus 10 to plus 10 percent
   5. Exhaust Air Outlets and Inlets: 0 to minus 10 percent

2.5 REPORTS

A. Status Reports: As Work progresses, prepare reports to describe completed procedures, procedures in progress, and scheduled procedures. Include a list of deficiencies and problems found in systems being tested and balanced. Prepare a separate report for each system and each building floor for systems serving multiple floors.

B. Final Report: Typewritten, or computer printout in letter-quality font, on standard bond paper, bound in three-ring, loose-leaf binder, and tabulated and divided into sections by tested and balanced systems.
   1. Include a certification sheet in front of binder signed and sealed by the certified testing and balancing agent.
   2. Include a list of instruments used for procedures, along with proof of calibration.
   3. Final Report Contents: In addition to certified field report data, include the following:
      a. Fan curves.
      b. Manufacturers' test data.
      c. Field quality-control test reports prepared by system and equipment installers.
      d. Other information relative to equipment performance, but do not include approved Shop Drawings and Product Data.
   4. General Report Data: In addition to form titles and entries, include the following data in the final report, as applicable:
      a. Title page.
      b. Name and address of testing, adjusting, and balancing Agent.
      c. Project name.
      d. Project location.
      e. Architect's name and address.
      f. Engineer's name and address.
      g. Contractor's name and address.
      h. Report date.
      i. Signature of testing, adjusting, and balancing Agent who certifies the report.
      j. Summary of contents, including the following:
         1) Design versus final performance.
         2) Notable characteristics of systems.
         3) Description of system operation sequence if it varies from the Contract Documents.
      k. Nomenclature sheets for each item of equipment.
      l. Data for terminal units, including manufacturer, type size, and fittings.
      m. Notes to explain why certain final data in the body of reports vary from design values.
      n. Test conditions for fans and pump performance forms, including the following:
         1) Settings for outside-, return-, and exhaust-air dampers.
         2) Conditions of filters.
         3) Cooling coil, wet- and dry-bulb conditions.
         4) Fan drive settings, including settings and percentage of maximum pitch diameter.
         5) Settings for supply-air, static-pressure controller.

6) Other system operating conditions that affect performance.

5. System Diagrams: Include schematic layouts of air distribution systems. Present with single-line diagrams and include the following:
   a. Quantities of outside, supply, return, and exhaust airflows.
   b. Duct, outlet, and inlet sizes.
   c. Balancing stations.

END OF SECTION 15990

DIVISION 16

SECTION 16010 - ELECTRICAL GENERAL PROVISIONS

PART 1 - GENERAL

1.1 SCOPE

A. This specification is for electrical and related work particular to Young Women's Christian Association (YWCA) Facility at 601-605 South Jefferson Davis Parkway New Orleans Louisana. Coordinate with other plans and specifications sections.

1.2 RELATED DOCUMENTS

A. The general provisions of the Contract, including Contract Requirements, and other Division 1 Specification sections, apply to this Section. Sections included in DIVISION 16 of the Project Manual are as follows:

SECTION 16010 - ELECTRICAL GENERAL PROVISIONS
SECTION 16051 - ELECTRICAL RELATED WORK
SECTION 16055 - OVERCURRENT PROTECTIVE DEVICE COORDINATION
SECTION 16060 - GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS
SECTION 16075 - IDENTIFICATION FOR ELECTRICAL SYSTEMS
SECTION 16120 - LOW VOLTAGE POWER CONDUCTORS AND CABLES
SECTION 16130 - RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS
SECTION 16140 - WIRING DEVICES
SECTION 16145 - LIGHTING CONTROL DEVICES
SECTION 16410 - ENCLOSED SWITCHES AND CIRCUIT BREAKERS
SECTION 16415 - LOW VOLTAGE TRANSFORMERS
SECTION 16442 - PANELBOARDS
SECTION 16491 - FUSES
SECTION 16511 - INTERIOR LIGHTING
SECTION 16521 - EXTERIOR LIGHTING
SECTION 16571 - RELAY-BASED LIGHTING CONTROLS
SECTION 16721 - DIGITAL, ADDRESSABLE FIRE ALARM SYSTEM

1.3 DESCRIPTION OF WORK

A. This Section specifies several categories of provisions for electrical work, including: (1) Certain adaptive expansions of requirements specified in DIVISION 1, (2) General performance requirements within the electrical systems as a whole, and (3) General work to be performed as electrical work because of its close association.

B. This Project Manual and accompanying Drawings are intended to describe complete workable systems of the various types. Items of materials, work, or equipment not mentioned but normally necessary for the proper execution of this work, shall be provided as if specifically called for, at no additional cost to the Owner.

1.4 SUMMARY OF ELECTRICAL WORK

A. Drawings:

1. Refer to the Electrical Drawings for graphic representations, schedules and notations showing electrical work.
2. The Drawings show approximate locations only of feeders, branch circuits, outlets, etc., except where specific routing or dimensions are indicated. The Architect reserves the right to make reasonable changes in locations indicated before roughing-in without additional cost to the Owner.
3. Because of the small scale of the Drawings, it is not possible to indicate all of the offsets, fittings, and accessories required. The Contractor shall investigate the structural and finish conditions affecting his work and shall arrange such work accordingly, furnishing fittings, bends, junction boxes, pull boxes, access panels, and accessories required to meet such conditions.

B. Project Manual:
1. Refer to the DIVISION 16 Sections for the primary technical Sections of electrical work.
2. General Outline: This section of the Project Manual covers furnishing materials, equipment, constant competent supervision, special tools, test equipment, technicians, and labor necessary for installation of a complete working electrical system, all as indicated on the plans of in this Project Manual.

C. Scope:
1. Under this DIVISION of work, electrical services, distribution, lighting, fire alarm, security rough-ins, and communication rough-ins will be provide for a new 2-story building.
2. The work shall include but not necessarily be limited to the following:
   a. Power distribution systems - feeder & branch circuits, panels, wiring, transformers, devices, etc.
   b. Power wiring and connections of mechanical equipment.
   c. Service systems.
   d. Grounding systems.
   e. Raceway systems.
   f. Lighting systems-fixtures/lamps/auxiliaries wiring/connections/etc.
   g. Emergency lighting systems.
   h. Telephone and data system raceways.
   i. Fire alarm system.
   j. Lighting control systems.
   k. All required sleeves, thimbles, anchors, hangers, bolts, miscellaneous structural steel, cutting, etc., for the complete installation of the electrical systems serving the building.
   l. Temporary electrical services for construction.

1.5 COORDINATION OF ELECTRICAL WORK

A. General: Refer to the DIVISION 1 sections for general coordination requirements applicable to the entire work. It is recognized that the contract documents are diagrammatic in showing certain physical relationships which must be established within the electrical work, and in its interface with other work including utilities and mechanical work, and that such establishment is the exclusive responsibility of the Contractor.

B. Arrange electrical work in a neat, well organized manner with exposed conduit and similar services running parallel with primary lines of the building construction, and with a minimum of 8'-0" overhead clearance or as directed by the Architect.

C. Advise other trades of openings required in their work for the subsequent move-in of large units of electrical work (equipment).

D. Verify final locations for rough-ins with field measurements and with the requirements of the actual equipment to be connected.

E. Verify all dimensions by field measurements.

F. Arrange for chases, slots, and openings in other building components to allow for electrical installations.

G. Coordinate the installation of required supporting devices to be set in poured in place concrete and other structural components, as they are constructed.

H. Sequence, coordinate, and integrate installations of electrical materials and equipment for efficient flow of the work. Give particular attention to large equipment requiring positioning prior to closing-in the building.

I. Coordinate the cutting and patching of building components to accommodate the installation of electrical equipment and materials.

J. Where mounting heights are not detailed or dimensioned, install electrical services and overhead equipment to provide the maximum headroom possible.

K. Install electrical equipment to facilitate maintenance and repair or replacement of equipment components. As much as practical, connect equipment for ease of disconnecting, with minimum of interference with other installations.

L. Coordinate the installation of electrical materials and equipment above ceilings with suspension system, mechanical equipment and systems, and structural components.

M. Coordinate connection of electrical systems with exterior underground utilities and services. Comply with requirements of governing regulations, franchised service companies, and controlling agencies. Provide required connection for each service.

1.6 TEMPORARY ELECTRICITY

A. Furnish and install all necessary temporary power, metering, lighting or wiring that is required to insure quality workmanship everywhere.

B. Furnish and install area distribution boxes with ground fault protection so located that the individual trades may use their own construction-type extension cords to obtain proper power and artificial lighting at all points where required by inspectors and for safety.

1.7 QUALITY ASSURANCE, STANDARDS

A. General: In addition to standards specified in individual work sections, the following standards are imposed, as applicable to the work in each instance:
   1. NFPA 70, National Electrical Code
      a. The electrical installation shall conform to the requirements of the latest edition of the National Electrical Code (NEC-NFPA 70).
   2. NEMA/ANSI/ASTM
      a. Electrical material shall be built and tested in accordance with the applicable standards of the National Electrical Manufacturer's Association (NEMA); the American National Standards Institute (ANSI); and the American Society of Testing and Materials (ASTM).

3. Underwriters' Laboratories (UL)
   a. Electrical materials shall be new and unused and shall be listed, inspected, approved and labeled by Underwriters' Laboratories, Inc., where such labeling service is available.
4. NFPA-101, Life Safety Code
   a. OSHA Code of Federal Regulations (for construction practices)
   b. Applicable state and local codes/ordinances.
5. International Building Code

1.8 ELECTRICAL SUBMITTALS:

A. Refer to the Division 1 Section 01630 for submittal definitions, requirements, and procedures.

B. Submittal of shop drawings, product data, and samples will be accepted only when submitted by the Contractor. Data submitted from subcontractors and material suppliers directly to the Architect will not be processed.

1.9 SUBSTITUTIONS/PRIOR APPROVALS

A. Substitutions/Prior Approvals shall be submitted in accordance with Section 01630 and provisions thereof.

B. Only firms regularly engaged in manufacture of electrical products of types required, whose products have been in satisfactory use in similar service for not less than 3 years, shall be utilized.

C. Any item not specified herein but submitted for approval as a substitute for the specified item shall be accompanied by manufacturer's documentation stating/illustrating the following applicable information in addition to the specific information requested in other sections:
   1. Dimensions/weight.
   2. Electrical ratings-voltage, amperage, short circuit capability, etc.
   3. Construction - gauge of steel/aluminum, paint finish/application method, color, NEMA type, etc.
   4. Warranty.
   5. Local manufacturer's representative or nearest stocking distributor.
   6. Length of time the product has been available to the public.

D. Shop Drawings: Submit complete descriptive and dimensional data on the following materials which Contractor proposes to use:
   1. Panelboards
   2. Lighting Fixtures
   3. Transformers
   4. Poles
   5. Safety Switches
   6. Circuit Breakers
   7. Wiring Devices
   8. Lighting Controls
   9. Conductors
   10. Fire Alarm System

E. Corrections or comments made on shop drawings during the review do not relieve the Contractor from compliance with requirements of the Contract Documents, Plans and Project Manual. Shop Drawings will be checked for general conformance with the design concept of

the project and general compliance with information given in the contract documents. Review of Shop Drawings shall not relieve the Contractor from responsibility for confirming and correlating all quantities and dimensions, coordinating work with that of all other trades, and performing work in a safe and satisfactory manner. Review of shop drawings shall not permit any deviation from Plans and Project Manual. Shop Drawings must be accompanied by signed statement from contractor, stating that he has reviewed the submittal and checked it for compliance.

F. See Section 01330, for number of copies of shop drawings and product data to be submitted.

1.10 DELIVERY, STORAGE AND HANDLING:

A. Deliver products to project properly identified with names, model numbers, types, grades, compliance labels, and similar information needed for distinct identifications, adequately packaged and protected to prevent damage during shipment, storage, and handling.

B. Store equipment and materials at the site, unless off-site storage is authorized in writing. Protect stored equipment and materials from damage.

C. Coordinate deliveries of electrical materials and equipment to minimize construction site congestion.

1.11 RECORD DOCUMENTS:

A. Refer to the Division 1 Section 01781 for requirements.

1.12 OPERATION AND MAINTENANCE DATA:

A. Refer to the Division 1 Section 01782 for procedures and requirements for preparation and submittal of maintenance manuals.

1.13 WARRANTIES:

A. Refer to the Division 1 Section 01770 for procedures and submittal requirements for warranties. Refer to individual equipment Sections for warranty requirements.

1.14 CLEANING

A. Refer to the Division 1 Section 01770 for general requirements for final cleaning.

B. Clean and restore to original finish all equipment prior to final acceptance.

1.15 GUARANTEE:

A. The work installed shall be kept in perfect working order for one year from date of substantial completion Guarantee shall be based upon defective materials and/or workmanship. Furnish free of cost to the Owner materials and labor necessary to comply with this guarantee.

1.16 WIRING FOR EQUIPMENT BY OTHERS:

A. Electrical service for all equipment furnished under this Project manual shall be roughed-in and connected under this Section. It is the responsibility of the Contractor to obtain correct roughing-in dimensions and requirements for this equipment.

B. Under other DIVISIONS, unless otherwise noted, equipment will be furnished such as: motors and magnetic motor starters (except when part of motor control centers). Connection/interconnection of that equipment shall be part of DIVISION 16 and shall comply with other DIVISION 16 Sections.

C. Apparatus required for controls and firestats will be furnished as specified under DIVISION -15 Mechanical Work. Control wiring shall be furnished and installed as work under DIVISION 15 - Mechanical.

1.17 TESTS AND BALANCING

A. The contractor shall conduct operating tests to demonstrate that the electrical systems are installed and will operate properly and in accordance with the requirements of this Project Manual. Tests shall be performed in the presence of the Architect's representative. The Contractor shall furnish instruments and personnel required for such tests.

B. Contractor shall perform tests in the presence of the Architect to show that the power and lighting loads are equally divided among phases of feeders serving each piece of equipment and each panelboard.

C. Any work and materials tested and found varying from the requirements of the Drawings and Project Manual shall be replaced by the Contractor without additional cost to the Owner.

D. This requirement is in addition to specific tests such as high-potential tests, meggar test, phasing tests, generator testing, etc. which may be called for in other sections.

1.18 WORKMANSHIP

A. Install all materials and electrical components of the work in accordance with instructions of manufacturer following the best modern construction practices and conforming with the Contract Documents. Workmanship shall be first class, in both function and appearance, whether finally concealed or exposed and shall be performed by experienced workmen skilled in the type of work. As practicable, the lines of all components of the system shall be perpendicular or parallel. In general, workmanship shall conform to guidelines set forth in N.E.C.A. manuals.

1.19 MOUNTING HEIGHTS:

A. Unless otherwise noted on the Drawings or required by the Architect, the following mounting heights shall apply.

B. Upon approval of the Architect, mounting heights may be adjusted.

C. Heights of Outlets - all heights measured from finish floor to bottom of device.

1.	Wall Switches	44"
2.	Receptacle Outlet	16"
3.	Telephone Outlet	16"
4.	Fire Alarm Station	44"
5.	Fire Alarm Notification Appliance	80"(per ADA Requirements)

6. Wall Mounted PIR Occupancy Sensors 44"

D. Heights of Disconnect Switches, Protective Devices, Controllers, etc.: The mounting height of disconnect switches, circuit breakers, motor controllers, push button stations, and other similar devices and equipment will vary depending upon location and whether individually or group mounted. For convenience and safety operating levers, handles or buttons shall be mounted no more than 78 inches above the finish floor line.

E. Panelboards shall be located so that the highest overcurrent protective device is a maximum of 72" above the floor.

1.20 SAFETY

A. It shall be the Contractor's responsibility to do all things necessary in the pursuit of the installation or testing to provide safe conditions in which to work.

1.21 FIRESTOPPING

A. Firestopping of all openings in fire-rated floors, walls, and ceilings accommodating penetrating items such as cables, bus ducts, wireways, conduits, etc. shall be required as part of DIVISION 16 work. Provide Firestop installation as required to meet ratings equal to the floor or wall being penetrated.

B. Fire stop materials shall be manufactured for that purpose and shall be installed in accordance with the manufacturer's recommendation in order to provide a U.L. listed fire stop at all openings equal to or exceeding the rated floor, wall or ceiling.

C. Plastic sleeves/pipe shall not be used within the building when penetrating a fire-resistant-rated wall, ceiling, partition, or floor.

PART 2 - PRODUCTS

PART 3 - EXECUTION

END OF SECTION 16010

SECTION 16051 - ELECTRICAL RELATED WORK

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specifications sections, apply to work of this section.

1.2 DESCRIPTION OF WORK

A. Extent of electrical related work required by this section is indicated on drawings and/or specified in other Division 16 sections.

B. Types of electrical related work specified in this section include the following:

1. Hangers and supports for electrical equipment and systems.
2. Access to Electrical Work:
    a. Access doors in walls, ceilings, and floors.
    b. Removable cover plates in walls, ceilings, and floors.
3. Excavating, Trenching and Backfill for Electrical Work.
4. Cutting and patching.
5. Painting.
6. Concrete for Electrical Work:
    a. Encasement of electrical work.
    b. Electrical equipment foundations and mounting pads.
    c. Rough grouting in and around electrical work.
    d. Patching concrete which has been cut to accommodate electrical work.
    e. Foundations for light poles.

1.3 PROJECT CONDITIONS

A. Existing Utilities: Locate and protect existing utilities and other underground work in a manner which will ensure that no damage to personnel or property or service interruption will result from excavating and backfilling.

B. Protect property from damage which might result from excavating and backfilling.

C. Protect persons from injury at excavations by barricades, warnings and illumination.

D. Coordinate excavations with weather conditions, to minimize possibility of washouts, settlements and other damages and hazards.

1.4 PERFORMANCE REQUIREMENTS FOR HANGERS AND SUPPORTS

A. Design supports for multiple raceways capable of supporting combined weight of supported systems and its contents.

B. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.

C. Rated Strength: Adequate in tension, shear, and pullout force to resist maximum loads calculated or imposed for this Project, with a minimum structural safety factor of five times the applied force.

PART 2 - PRODUCTS

2.1 SUPPORT, ANCHORAGE, AND ATTACHMENT COMPONENTS

A. Steel Slotted Support Systems: Comply with MFMA-4, factory-fabricated components for field assembly.

1. Metallic Coatings: Hot-dip galvanized after fabrication and applied according to MFMA-4.
2. Painted Coatings: Manufacturer's standard painted coating applied according to MFMA-4.
3. Channel Dimensions: Selected for applicable load criteria.

B. Raceway and Cable Supports: As described in NECA 1 and NECA 101.

C. Conduit and Cable Support Devices: Steel and malleable-iron hangers, clamps, and associated fittings, designed for types and sizes of raceway or cable to be supported.

D. Support for Conductors in Vertical Conduit: Factory-fabricated assembly consisting of threaded body and insulating wedging plug or plugs for non-armored electrical conductors or cables in riser conduits. Plugs shall have number, size, and shape of conductor gripping pieces as required to suit individual conductors or cables supported.

E. Structural Steel for Fabricated Supports and Restraints: ASTM A 36/A 36M, steel plates, shapes, and bars; black and galvanized.

F. Mounting, Anchoring, and Attachment Components: Items for fastening electrical items or their supports to building surfaces include the following:

1. Mechanical-Expansion Anchors: Insert-wedge-type, zinc-coated steel, for use in hardened portland cement concrete with tension, shear, and pullout capacities appropriate for supported loads and building materials in which used.
2. Concrete Inserts: Steel or malleable-iron, slotted support system units similar to MSS Type 18; complying with MFMA-4 or MSS SP-58.
3. Clamps for Attachment to Steel Structural Elements: MSS SP-58, type suitable for attached structural element.
4. Through Bolts: Structural type, hex head, and high strength. Comply with ASTM A 325.
5. Toggle Bolts: All-steel springhead type.
6. Hanger Rods: Threaded steel

2.2 ACCESS TO ELECTRICAL WORK

A. General: Where switches, control devices pull boxes and similar elements of electrical work are located within or behind wall, ceiling or floor construction of finishes, or below grade, provide removable access plates of types and sizes needed for access requirements. Provide manufacturer's complete units with anchorages, fasteners and standard factory-applied finishes. Hinged access doors shall comply with Section 08305.

2.3 EXCAVATING FOR ELECTRICAL WORK

A. Trench Materials:

1. Subbase Material: A graded mixture of gravel, sand, crushed stone or crushed slag.
2. Backfill Material: Soil material suitable for compacting to required densities, and complying with AASHTO Designation M 145. Group A-1, A-2-4, A-2-5, or A-3.
3. Drainage Fill Material: Washed and uniformly graded gravel, crushed stone or crushed slab, with 100% passing a 1-1/2" sieve and not more than 5% passing a No. 4 sieve.

2.4 MATERIALS OF CONCRETE WORK

A. Encasement of conduits, ductbanks, etc. shall utilize 2500 PSI class mix. Red dye shall be mixed with concrete when encasing conduits utilizing conductors with voltage over 150 volts to ground unless the encasement is poured as part of a foundation slab or under a slab. (The dye shall be incorporated as an additive to the mix and shall be utilized for the entire encasement.).

B. Light pole foundations and equipment pads shall utilize 3000 PSI class mix.

PART 3 - EXECUTION

3.1 HANGER AND SUPPORT APPLICATION

A. Comply with NECA 1 and NECA 101 for application of hangers and supports for electrical equipment and systems except if requirements in this Section are stricter.

B. Maximum Support Spacing and Minimum Hanger Rod Size for Raceway: Space supports for EMT and RGS as required by NFPA 70. Minimum rod size shall be 1/4 inch in diameter.

C. Multiple Raceways: Install trapeze-type supports fabricated with steelsupport system, sized so capacity can be increased by at least 25 percent in future without exceeding specified design load limits.

1. Secure raceways to these supports with two-bolt conduit clamps.

3.2 SUPPORT INSTALLATION

A. Comply with NECA 1 and NECA 101 for installation requirements except as specified in this Article.

B. Strength of Support Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static loads within specified loading limits. Minimum static design load used for strength determination shall be weight of supported components plus 200 lb.

C. Mounting and Anchorage of Surface-Mounted Equipment and Components: Anchor and fasten electrical items and their supports to building structural elements by the following methods unless otherwise indicated by code:

1. To New Concrete: Bolt to concrete inserts.

2. To Masonry: Approved toggle-type bolts on hollow masonry units and expansion anchor fasteners on solid masonry units.
3. To Steel: Welded threaded studs complying with AWS D1.1/D1.1M, with lock washers and nuts.
4. To Light Steel: Sheet metal screws.
5. Items Mounted on Hollow Walls and Nonstructural Building Surfaces: Mount cabinets, panelboards, disconnect switches, control enclosures, pull and junction boxes, transformers, and other devices on slotted-channel racks attached to substrate.

D. Drill holes for expansion anchors in concrete at locations and to depths that avoid reinforcing bars.

3.3 EXCAVATION, TRENCHING AND BACKFILLING

A. Perform all excavation of every description and of whatever substances encountered to the depths indicated on the Drawings or as otherwise specified. During excavation, material suitable for backfilling shall be piled in an orderly manner a sufficient distance from the banks of the trench to avoid overloading and to prevent slides or cave-ins. All excavated materials not required or not suitable for backfill shall be removed and wasted or removed from jobsite as indicated on the drawings or as directed by Architect, at no additional cost to Owner.

B. Sheeting and shoring shall be done as necessary for the protection of the work and for the safety of personnel. Provide necessary pumping at all times to maintain a dry working condition in all trenches. Unless otherwise indicated, excavations shall be by open cut except that short sections of a trench may be tunneled if, in the opinion of the Architect, the conduit can be safely and properly installed and backfill can be properly tamped in such tunneled sections.

C. No excavation or trenches shall be cut near or under footings without first consulting Architect.

D. Bottom of trench shall be shaped to give substantially uniform circumferential support to lower third of each pipe. Each pipe shall be laid true to line and grade and in such manner as to form a close concentric joint with adjoining pipe and to prevent sudden offset to flow line. As work progresses, interior of pipe shall be cleared of dirt and superfluous materials of every description.

E. Wherever wet or otherwise unstable soil that is incapable of properly supporting the pipe, as determined by the Architect, is encountered in the bottom of the trench, such soil shall be removed to the depth required and the trench backfilled to the proper grade with coarse sand, fine gravel, or other suitable material, as approved by the Architect.

F. Trenches for utilities shall be of a depth that will provide the following minimum depth of cover from existing grade or from indicated finish grade, whichever is lower, unless otherwise specifically shown:

24-Inch Minimum Cover - Electrical Conduit under 600 volts.

G. Backfill shall be installed in layers 6" deep, adequately wetted (if approved by Architect) and tamped using materials as noted above. The surfaces shall be graded to a reasonable uniformity and the mounting over trenches left in a uniform and neat condition as approved by the Architect.

H. Restore all hard finished surfaces such as roadway, sidewalks, grass, shrubbery, etc., removed for installation of utilities (and not shown on Drawings or specified to be reworked under other sections of the work) to their original condition using the same type as original materials.

I. Carefully plan all work to avoid existing utilities and other interferences. Architect has not attempted to indicate all existing underground utilities. Existing utility lines to be retained that are shown on the Drawings or the locations of which are made known to the Contractor prior to excavation, as well as all utility lines uncovered during excavation operations, shall be protected from damage during excavation and backfilling and, if damaged, shall be repaired by the Contractor at his expense. Prior to doing any excavation with power tools, carefully investigate and locate any existing conduit, pipes, and other lines, so as to avoid them during excavation.

3.4 CUTTING AND PATCHING

A. This Article specifies the cutting and patching of electrical equipment components, and materials to include removal and legal disposal of selected materials, components, and equipment.

B. Do not endanger or damage installed work through procedures and processes of cutting and patching.

C. Arrange for repairs required to restore other work, because of damage caused as a result of electrical installation.

D. No additional compensation will be authorized for cutting and patching work that is necessitated by ill-timed, defective, or non-conforming installations.

E. Perform cutting, fitting, and patching of electrical equipment and materials required to:

1. Uncover work to provide for installation of ill-timed work;
2. Remove and replace defective work not conforming to requirements of the Contract Documents;
3. Install equipment and materials in existing structures;
4. Upon written instructions from the Architect uncover and restore work to provide for Architect's observation of concealed work.

F. Cut, remove and legally dispose of selected electrical equipment, components, and materials as indicated, including, but not limited to removal of electrical items indicated to be removed and items made obsolete by the new work.

G. Protect the structure, furnishings, finishes, and adjacent materials not indicated or scheduled to be removed.

H. Locate, identify, and protect electrical services passing through remodeling or demolition area and serving other areas required to be maintained operational. When service must be interrupted, provide temporary services for the affected areas and notify the Owner prior to changeover.

3.5 CONCRETE BASES

A. Construct concrete bases of dimensions not less than4-inches high and 4 inches larger in both directions than supported unit, and so anchors will be a minimum of 10 bolt diameters from edge of the base.

B. Anchor equipment to concrete base.

1. Place and secure anchorage devices. Use supported equipment manufacturer's setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
2. Install anchor bolts to elevations required for proper attachment to supported equipment.
3. Install anchor bolts according to anchor-bolt manufacturer's written instructions.

3.6 PAINTING

A. Exposed conduits, supports, pull boxes, etc., shall be painted as described under other Divisions of these Specifications. The Contractor shall be responsible for having electrical items painted to the finish called for on the Drawings. Factory painted equipment shall have finish restored to Manufacturer's finish if scratched or damaged before acceptance or use by Owner.

B. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

C. Touchup: Comply with requirements in Division 9 for cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint on miscellaneous metal.

END OF SECTION 16051

SECTION 16055 - OVERCURRENT PROTECTIVE DEVICE COORDINATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes computer-based, fault-current, arc-flash, and overcurrent protective device coordination studies, and the setting of these devices. The work of this section is to be performed by a Louisiana registered professional Electrical Engineer having a minimum of 3 years experience in coordinated power system and arc flash hazard studies. Work of this section also includes gathering of all necessary data for preparation of the studies specified herein.

B. Short Circuit Fault Current Analysis: Perform analysis as specified and verify equipment ratings exceed available fault currents

C. Arc-Flash Hazard Analysis: Perform analysis as specified and provide proper warnings on equipment.

D. Distribution System Coordination Study and Device Settings: Provide study as specified and set protective devices accordingly

1.3 SUBMITTALS

A. Qualification Data: For coordination-study specialist.

B. Other Action Submittals:

1. Coordination-study input data, including completed computer program input data sheets.
2. Coordination-study report.
3. Equipment evaluation report.
4. Setting report.
5. Acr Flash Hazard Report.
6. Arc Flash Hazard Labels.

C. An "as-built" system analysis report shall be submitted concurrently with the closeout documents. This report shall document the system as installed and shall indicate actual device settings.

D. Complete documentation specified herein shall be submitted at the same time as the distribution equipment product data and shop drawings for concurrent approval. Submittal of distribution equipment product data or shop drawings without these reports will be rejected.

E. No time extensions or similar contact modifications will be granted for work arising out of the requirements for these studies. Approval of distribution equipment and protective devices proposed will be based on recommendations of these studies. The Owner shall not be held responsible for any changes to equipment, device ratings, settings, or additional labor for installation of equipment or devices ordered and/or procured prior to approval of these studies.

1.4 QUALITY ASSURANCE

A. Studies shall use computer programs that are distributed nationally and are in wide use. Software algorithms shall comply with requirements of standards and guides specified in this Section. Manual calculations are not acceptable.

B. System Study Engineer Qualifications: A Louisiana licenced professional engineer experienced in the application of computer software used for studies, having performed successful studies of similar magnitude on electrical distribution systems using similar devices.

C. Field Commissioning Technician: A manufacturer trained and authorized service technician, employed by the manufacturer of the equipment to be set, with a minimum of 5 years experience in setting protective devices.

D. Comply with IEEE 399 for general study procedures.

E. Comply with IEEE 242 for short-circuit currents and coordination time intervals.

PART 2 - PRODUCTS

2.1 COMPUTER SOFTWARE DEVELOPERS

A. Available Computer Software Developers: Subject to compliance with requirements, companies offering computer software programs that may be used in the Work include, but are not limited to, the following:

B. Computer Software Developers: Subject to compliance with requirements, provide computer software programs developed by one of the following:

1. CYME International, Inc.
2. EDSA Micro Corporation.
3. Electrical Systems Analysis, Inc.
4. SKM Systems Analysis, Inc.

2.2 COMPUTER SOFTWARE PROGRAM REQUIREMENTS

A. Comply with IEEE 399.

B. Analytical features of fault-current-study computer software program shall include "mandatory," "very desirable," and "desirable" features as listed in IEEE 399, Table 7-4.

C. Computer software program shall be capable of plotting and diagramming time-current-characteristic curves as part of its output. Computer software program shall report device settings and ratings of all overcurrent protective devices.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine Project overcurrent protective device submittals for compliance with electrical distribution system coordination requirements and other conditions affecting performance.

B. Proceed with coordination study only after relevant equipment submittals have been assembled. Overcurrent protective devices not submitted for approval with coordination study may not be used in study.

3.2 STUDY / REPORT REQUIREMENTS

A. Reports shall include a narrative describing the analyses performed; the bases and methods used; and the desired method of coordinated protection of the power system.

B. The reports shall include descriptive and technical data for protective devices proposed. The data shall include manufacturers published data, nameplate data, and definition of the fixed or adjustable features of the existing or new protective devices.

C. The reports shall document utility company data including system voltages, fault MVA, system X/R ratio, and time-current characteristic curves.

D. The reports shall contain fully coordinated composite time-current characteristics curves for each bus in the system, as required to ensure coordinated power system protection between protective devices or equipment.

E. The reports shall include recommended ratings and settings of all protective devices in tabulated form.

F. The reports shall provide the calculation performed for the analyses, including computer analysis programs utilized. The name of the software package, developer, and version number shall be provided.

G. The final as built report documentation shall include an electronic copy of the short circuit computer modeling file.

H. Studies shall address all available power sources that can be connected to the system.

3.3 FAULT-CURRENT STUDY

A. General: Perform a short circuit study to verify equipment ratings and to check the adequacy and correct application of protective devices and system components. Calculate momentary and interrupting duties on the basis of maximum available fault current.

B. Method: The fault current analysis shall be performed in accordance with the methods described in IEEE Std 242, and IEEE Std 399.

C. Assumptions: Assume source impedance as an infinite bus on primary side of utility transformer. For fault contribution from motors, assume that all motors are operating during the maximum demand condition.

D. Provide the following in tabular form:

1. The available fault current at each bus.
2. The momentary and interrupting rating of each protective device.
3. The adequacy of the electrical protective devices to withstand the maximum available fault at the terminals of the equipment.
4. Confirmation that the equipment and each protective device is rated no less than the available fault current.

E. Fault Current Availability: Balanced three-phase fault, bolted line-to-line fault, and line-to-ground fault current values shall be provided at each voltage transformation point and at each power distribution bus. The maximum and minimum values of fault available at each location shall be shown in tabular form on the diagram or in the report.

F. Equipment Evaluation Report: Prepare a report on the adequacy of overcurrent protective devices and conductors by comparing fault-current ratings of these devices with calculated fault-current momentary and interrupting duties. Calculations to verify interrupting ratings of overcurrent protective devices shall comply with the following:

1. Low-Voltage Circuit Breakers: IEEE 1015 and IEEE C37.50.
2. Low-Voltage Fuses: IEEE C37.46.
3. Circuit Breakers: IEEE C37.13.

3.4 ARC-FLASH HAZARD ANALYSIS

A. The System Study Engineer shall analyze the available arc-flash potential and shall provide the appropriate arc flash hazard labels / signs to the Contractor for installation on the equipment. Labels shall be provided for each bus and protecting device.

B. Perform arc flash analysis using the system models of utility source and utility standby generator source and unique settings recommended for each configuration. The arc flash study shall be made in accordance with the latest edition of IEEE Std 1584-2002and referenced in NFPA 70E, 2009.

C. Calculations shall assume maximum available fault current from motors (all motors operating at the time of the fault).

D. Provide software output report listings for each bus, and protecting line side values in tabular form. Report shall include a minimum of the following:

1. Bus ID
2. Bus Voltage.
3. Bolted Fault Current.
4. Arcing Fault Current.
5. Breaker Operating Time.
6. Incident Energy.
7. PPE Category.

3.5 COORDINATION STUDY

A. Perform both preliminary and final as built coordination studies in accordance with ANSI Standards C37.010 and C37. 13 to determine device settings for selective coordination. Selective coordination is considered to be no less than 0.3 sec coordination time interval between devices in series between the source and faulted bus. The study shall address all possible system power sources that can be connected at any single time

B. The study shall demonstrate that the maximum possible degree of selectivity has been obtained between devices specified, consistent with protection of equipment and conductors from damage from overloads and fault conditions. The study shall include a description of the coordination of the protective devices in this project. A written narrative shall be provided describing: which devices may operate in the event of a fault at each bus; the logic used to arrive at device ratings and settings; situations where system coordination is not achievable due

to device limitations (an analysis of any device curves which overlap); coordination between upstream and downstream devices; and device settings. Recommendations to improve or enhance system reliability, and details of where such changes would involve additions or modifications to the contract (addition or reduction) shall be provided. Composite coordination plots shall be provided on log-log graph paper

C. The study shall result in recommended settings of all new, adjustable protective devices

D. Gather and tabulate the following input data to support coordination study:

1. Product Data for overcurrent protective devices. Use equipment designation tags that are consistent with electrical distribution system diagrams, overcurrent protective device submittals, input and output data, and recommended device settings.
2. Impedance of utility service entrance.
3. Electrical distribution system diagram showing the following:

    a. Load current that is the basis for sizing continuous ratings of circuits for cables and equipment.
    b. Circuit-breaker and fuse-current ratings and types.
    c. Transformer kilovolt amperes, primary and secondary voltages, connection type, impedance, and X/R ratios.
    d. Cables. Indicate conduit material, sizes of conductors, conductor insulation, and length.
    e. Motor horsepower and code letter designation according to NEMA MG 1.

4. Data sheets to supplement electrical distribution system diagram, cross-referenced with tag numbers on diagram:

    a. Special load considerations, including starting inrush currents and frequent starting and stopping.
    b. Magnetic inrush current overload capabilities of transformers.
    c. Motor full-load current, locked rotor current, service factor, starting time, type of start, and thermal-damage curve.
    d. Ratings, types, and settings of utility company's overcurrent protective devices.
    e. Special overcurrent protective device settings or types stipulated by utility company.
    f. Time-current-characteristic curves of devices to be coordinated.
    g. Manufacturer, frame size, interrupting rating in amperes rms symmetrical, ampere or current sensor rating, long-time adjustment range, short-time adjustment range, and instantaneous adjustment range for adjustable circuit breakers.
    h. Manufacturer and type, ampere-tap adjustment range, time-delay adjustment range, instantaneous attachment adjustment range, and current transformer ratio for overcurrent relays.
    i. Panelboards, ampacity, and interrupting rating in amperes rms symmetrical.

E. Perform coordination study and prepare a written report using the results of fault-current study and approved computer software program. Comply with IEEE 399.

F. Comply with NFPA 70 for overcurrent protection of circuit elements and devices.

G. Transformer Primary Overcurrent Protective Devices:

1. Device shall not operate in response to the following:

    a. Self-cooled, full-load current or forced-air-cooled, full-load current, whichever is specified for that transformer.

b. Permissible transformer overloads according to IEEE C57.96 if required by unusual loading or emergency conditions.

2. Device shall protect transformer according to IEEE C57.12.00, for fault currents.

H. Conductor Protection: Protect cables against damage from fault currents according to ICEA P-32-382, ICEA P-45-482, and conductor melting curves in IEEE 242. Verify adequacy of phase conductors at maximum three-phase bolted fault currents, equipment grounding conductors, and grounding electrode conductors at maximum ground-fault currents.

I. Coordination-Study Report: Prepare a written report indicating the following results of coordination study:

1. Tabular Format of Settings Selected for Overcurrent Protective Devices:

a. Device tag.
b. Relay-current transformer ratios; and tap, time-dial, and instantaneous-pickup values.
c. Circuit-breaker sensor rating; and long-time, short-time, and instantaneous settings.
d. Fuse-current rating and type.
e. Ground-fault relay-pickup and time-delay settings.

2. Coordination Curves: Prepared to determine settings of overcurrent protective devices to achieve selective coordination. Graphically illustrate that adequate time separation exists between devices. Show the following specific information:

a. Device tag.
b. Voltage and current ratio for curves.
c. Three-phase and single-phase damage points for each transformer.
d. No damage, melting, and clearing curves for fuses.
e. Cable damage curves.
f. Transformer inrush points.
g. Maximum fault-current cutoff point.

3. Completed data sheets for setting of overcurrent protective devices.

3.6 OVERCURRENT PROTECTIVE DEVICE SETTING

A. Manufacturer's Field Service: Engage a factory-authorized service representative, of electrical distribution equipment being set and adjusted, to set overcurrent protective devices within equipment.

D. Testing: Perform the following device setting and prepare reports:

1. After installing overcurrent protective devices and during energizing process of electrical distribution system, perform the following:

a. Verify that overcurrent protective devices meet parameters used in studies.
b. Adjust devices to values listed in study results.

2. Adjust devices according to recommendations in Chapter 7, "Inspection and Test Procedures," and Tables 10.7 and 10.8 in NETA ATS.

END OF SECTION 16055

SECTION 16060- GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes grounding and bonding systems and equipment.

1.3 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

1.4 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Comply with UL 467 for grounding and bonding materials and equipment.

PART 2 - PRODUCTS

2.1 SYSTEM DESCRIPTION

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Comply with UL 467 for grounding and bonding materials and equipment.

2.2 CONDUCTORS

A. Insulated Conductors: Tinned-copper wire or cable insulated for 600 V unless otherwise required by applicable Code or authorities having jurisdiction.

B. Bare Copper Conductors:

1. Solid Conductors: ASTM B 3.
2. Stranded Conductors: ASTM B 8.
3. Tinned Conductors: ASTM B 33.
4. Bonding Cable: 28 kcmil, 14 strands of No. 17 AWG conductor, 1/4 inch in diameter.
5. Bonding Conductor: No. 4 or No. 6 AWG, stranded conductor.

6. Bonding Jumper: Copper tape, braided conductors terminated with copper ferrules; 1-5/8 inches wide and 1/16 inch thick.
7. Tinned Bonding Jumper: Tinned-copper tape, braided conductors terminated with copper ferrules; 1-5/8 inches wide and 1/16 inch thick.

2.3 CONNECTORS

A. Listed and labeled by an NRTL acceptable to authorities having jurisdiction for applications in which used and for specific types, sizes, and combinations of conductors and other items connected.

B. Bolted Connectors for Conductors and Pipes: Copper or copper alloy.

C. Welded Connectors: Exothermic-welding kits of types recommended by kit manufacturer for materials being joined and installation conditions.

D. Bus-Bar Connectors: Mechanical type, cast silicon bronze, solderless compression-type wire terminals, and long-barrel, two-bolt connection to ground bus bar.

2.4 GROUNDING ELECTRODES

A. Ground Rods: Copper-clad steel; 3/4 inch by 10 feet.

PART 3 - EXECUTION

3.1 APPLICATIONS

A. Conductors: Install solid conductor for No. 8AWG and smaller, and stranded conductors for No. 6 AWG and larger unless otherwise indicated.

B. Grounding Bus: Install in electrical equipment rooms, in rooms housing service equipment, and elsewhere as indicated.

C. Conductor Terminations and Connections:

1. Pipe and Equipment Grounding Conductor Terminations: Bolted connectors.
2. Underground Connections: Welded connectors.
3. Connections to Structural Steel: Welded connectors.

3.2 GROUNDING AT THE SERVICE

A. Equipment grounding conductors and grounding electrode conductors shall be connected to the ground bus. Install a main bonding jumper between the neutral and ground buses.

3.3 EQUIPMENT GROUNDING

A. Install insulated equipment grounding conductors with all feeders and branch circuits.

B. Air-Duct Equipment Circuits: Install insulated equipment grounding conductor to duct-mounted electrical devices operating at 120 V and more, including air cleaners, heaters, dampers, humidifiers, and other duct electrical equipment. Bond conductor to each unit and to air duct and connected metallic piping.

C. Water Heater: Install a separate insulated equipment grounding conductor to each electric water heater. Bond conductor to heater units, piping, connected equipment, and components.

D. Poles Supporting Outdoor Lighting Fixtures: Install grounding electrode and a separate insulated equipment grounding conductor in addition to grounding conductor installed with branch-circuit conductors.

3.4 INSTALLATION

A. Grounding Conductors: Route along shortest and straightest paths possible unless otherwise indicated or required by Code. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage.

B. Ground Rods: Drive rods until tops are 2 inches below finished floor or final grade unless otherwise indicated.

1. Interconnect ground rods with grounding electrode conductor below grade and as otherwise indicated. Make connections without exposing steel or damaging coating if any.
2. For grounding electrode system, install at least three rods spaced at least one-rod length from each other and located at least the same distance from other grounding electrodes, and connect to the service grounding electrode conductor.

C. Bonding Straps and Jumpers: Install in locations accessible for inspection and maintenance except where routed through short lengths of conduit.

1. Bonding to Structure: Bond straps directly to basic structure, taking care not to penetrate any adjacent parts.
2. Bonding to Equipment Mounted on Vibration Isolation Hangers and Supports: Install bonding so vibration is not transmitted to rigidly mounted equipment.
3. Use exothermic-welded connectors for outdoor locations; if a disconnect-type connection is required, use a bolted clamp.

D. Grounding and Bonding for Piping:

1. Metal Water Service Pipe: Install insulated copper grounding conductors, in conduit, from building's main service equipment, or grounding bus, to main metal water service entrances to building. Connect grounding conductors to main metal water service pipes; use a bolted clamp connector or bolt a lug-type connector to a pipe flange by using one of the lug bolts of the flange. Where a dielectric main water fitting is installed, connect grounding conductor on street side of fitting. Bond metal grounding conductor conduit or sleeve to conductor at each end.
2. Water Meter Piping: Use braided-type bonding jumpers to electrically bypass water meters. Connect to pipe with a bolted connector.
3. Gas Piping: Bond each aboveground portion of gas piping system downstream from equipment shutoff valve.

E. Bonding Interior Metal Ducts: Bond metal air ducts to equipment grounding conductors of associated fans, blowers, electric heaters, and air cleaners. Install bonding jumper to bond across flexible duct connections to achieve continuity.

3.5 FIELD QUALITY CONTROL

A. Perform tests and inspections.

B. Tests and Inspections:

1. After installing grounding system but before permanent electrical circuits have been energized, test for compliance with requirements.
2. Inspect physical and mechanical condition. Verify tightness of accessible, bolted, electrical connections with a calibrated torque wrench according to manufacturer's written instructions.
3. Test completed grounding system at service disconnect enclosure grounding terminal and at individual ground rods. Make tests at ground rods before any conductors are connected.

    a. Measure ground resistance no fewer than two full days after last trace of precipitation and without soil being moistened by any means other than natural drainage or seepage and without chemical treatment or other artificial means of reducing natural ground resistance.
    b. Perform tests by fall-of-potential method according to IEEE 81.

C. Grounding system will be considered defective if it does not pass tests and inspections.

D. Prepare test and inspection reports.

E. Report measured ground resistances that exceed 5 ohms.

F. Excessive Ground Resistance: If resistance to ground exceeds specified value, notify Architect promptly and include recommendations to reduce ground resistance.

END OF SECTION 16060

SECTION 16075- IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Identification for raceways.
2. Identification of power and control cables.
3. Identification for conductors.
4. Underground-line warning tape.
5. Warning labels and signs.
6. Instruction signs.
7. Equipment identification labels.
8. Miscellaneous identification products.

1.3 QUALITY ASSURANCE

A. Comply with ANSI A13.1 and IEEE C2.

B. Comply with NFPA 70.

C. Comply with 29 CFR 1910.144 and 29 CFR 1910.145.

D. Comply with ANSI Z535.4 for safety signs and labels.

E. Adhesive-attached labeling materials, including label stocks, laminating adhesives, and inks used by label printers, shall comply with UL 969.

1.4 COORDINATION

A. Coordinate identification names, abbreviations, colors, and other features with requirements in other Sections requiring identification applications, Drawings, Shop Drawings, manufacturer's wiring diagrams, and the Operation and Maintenance Manual; and with those required by codes, standards, and 29 CFR 1910.145. Use consistent designations throughout Project.

B. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.

C. Coordinate installation of identifying devices with location of access panels and doors.

D. Install identifying devices before installing acoustical ceilings and similar concealment.

PART 2 - PRODUCTS

2.1 POWER AND CONTROL CABLE IDENTIFICATION MATERIALS

A. Comply with ANSI A13.1 for minimum size of letters for legend and for minimum length of color field for each cable size.

B. Vinyl Labels: Preprinted, flexible label laminated with a clear, weather- and chemical-resistant coating and matching wraparound clear adhesive tape for securing ends of legend label.

C. Self-Adhesive, Self-Laminating Polyester Labels: Preprinted, 3-mil- thick flexible label with acrylic pressure-sensitive adhesive that provides a clear, weather- and chemical-resistant, self-laminating, protective shield over the legend. Labels sized to fit the cable diameter such that the clear shield overlaps the entire printed legend.

2.2 CONDUCTOR IDENTIFICATION MATERIALS

A. Color-Coding Conductor Tape: Colored, self-adhesive vinyl tape not less than 3 mils thick by 1 to 2 inches wide.

2.3 UNDERGROUND-LINE WARNING TAPE

A. Tape:

1. Recommended by manufacturer for the method of installation and suitable to identify and locate underground electrical and communications utility lines.
2. Printing on tape shall be permanent and shall not be damaged by burial operations.
3. Tape material and ink shall be chemically inert, and not subject to degrading when exposed to acids, alkalis, and other destructive substances commonly found in soils.

B. Color and Printing:

1. Comply with ANSI Z535.1 through ANSI Z535.5.
2. Inscriptions for Red-Colored Tapes: ELECTRIC LINE, HIGH VOLTAGE .
3. Inscriptions for Orange-Colored Tapes: TELEPHONE CABLE, CATV CABLE, COMMUNICATIONS CABLE, OPTICAL FIBER CABLE.

2.4 WARNING LABELS AND SIGNS

A. Comply with NFPA 70 and 29 CFR 1910.145.

B. Self-Adhesive Warning Labels: Factory-printed, multicolor, pressure-sensitive adhesive labels, configured for display on front cover, door, or other access to equipment unless otherwise indicated.

2.5 INSTRUCTION SIGNS

A. Engraved, laminated acrylic or melamine plastic, minimum 1/16 inch thick for signs up to 20 sq. inches and 1/8 inch thick for larger sizes.

1. Engraved legend with black letters on white face.
2. Punched or drilled for mechanical fasteners.
3. Framed with mitered acrylic molding and arranged for attachment at applicable equipment.

2.6 EQUIPMENT IDENTIFICATION LABELS

A. Engraved, Laminated Acrylic or Melamine Label: Punched or drilled for screw mounting. White letters on a dark-gray background. Minimum letter height shall be 3/8 inch.

2.7 MISCELLANEOUS IDENTIFICATION PRODUCTS

A. Paint: Comply with requirements in painting Sections for paint materials and application requirements. Select paint system applicable for surface material and location (exterior or interior).

B. Fasteners for Labels and Signs: Self-tapping, stainless-steel screws or stainless-steel machine screws with nuts and flat and lock washers.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Verify identity of each item before installing identification products.

B. Location: Install identification materials and devices at locations for most convenient viewing without interference with operation and maintenance of equipment.

C. Apply identification devices to surfaces that require finish after completing finish work.

D. Self-Adhesive Identification Products: Clean surfaces before application, using materials and methods recommended by manufacturer of identification device.

E. Attach signs and plastic labels that are not self-adhesive type with mechanical fasteners appropriate to the location and substrate.

F. Underground-Line Warning Tape: During backfilling of trenches install continuous underground-line warning tape directly above line at 12 inches below finished grade. Use multiple tapes where width of multiple lines installed in a common trench or concrete envelope exceeds 16 inches overall.

G. Painted Identification: Comply with requirements in painting Sections for surface preparation and paint application.

3.2 IDENTIFICATION SCHEDULE

A. Accessible Raceways and Cables within Buildings: Identify the covers of each junction and pull box of the following systems with self-adhesive vinyl labels with the wiring system legend and system voltage. Also indicated the panelboard and circuit number in each junction box.

B. Power-Circuit Conductor Identification, 600 V or Less: For conductors in pull and junction boxes, use color-coding conductor tape to identify the phase.

1. Color-Coding for Phase and Voltage Level Identification, 600 V or Less: Use colors listed below for ungrounded service feeder and branch-circuit conductors.

a. Colors for 208/120-V Circuits:

1) Phase A: Black.
2) Phase B: Red.
3) Phase C: Blue.

b. Colors for 480/277-V Circuits:

1) Phase A: Brown.
2) Phase B: Orange.
3) Phase C: Yellow.

c. Field-Applied, Color-Coding Conductor Tape: Apply in half-lapped turns for a minimum distance of 6 inches from terminal points and in boxes where splices or taps are made. Apply last two turns of tape with no tension to prevent possible unwinding. Locate bands to avoid obscuring factory cable markings.

C. Locations of Underground Lines: Identify with underground-line warning tape for power, lighting, communication, and control wiring.

D. Warning Labels for Indoor Cabinets, Boxes, and Enclosures for Power and Lighting: Self-adhesive warning labels.

1. Comply with 29 CFR 1910.145.
2. Identify system voltage with black letters on an orange background.
3. Apply to exterior of door, cover, or other access.

E. Operating Instruction Signs: Install instruction signs to facilitate proper operation and maintenance of electrical systems and items to which they connect. Install instruction signs with approved legend where instructions are needed for system or equipment operation.

F. Arc-Flash Labels: Install arc-flash warning labels on all distribution equipment.

G. Equipment Identification Labels: On each unit of equipment, install unique designation label that is consistent with wiring diagrams, schedules, and the Operation and Maintenance Manual. Apply labels to disconnect switches and protection equipment, central or master units, control panels, control stations, terminal cabinets, and racks of each system. Systems include power, lighting, control, communication, signal, monitoring, and alarm systems unless equipment is provided with its own identification.

1. Labeling Instructions:

a. Indoor Equipment: Engraved, laminated acrylic or melamine label. Unless otherwise indicated, provide a single line of text with 1/2-inch- high letters on 1-1/2-inch- high label; where two lines of text are required, use labels 2 inches high.
b. Outdoor Equipment: Engraved, laminated acrylic or melamine label .
c. Elevated Components: Increase sizes of labels and letters to those appropriate for viewing from the floor.

d. Unless provided with self-adhesive means of attachment, fasten labels with appropriate mechanical fasteners that do not change the NEMA or NRTL rating of the enclosure.

2. Equipment to Be Labeled:

a. Panelboards: Typewritten directory of circuits in the location provided by panelboard manufacturer. Panelboard identification shall be engraved, laminated acrylic or melamine label.
b. Enclosures and electrical cabinets.
c. Access doors and panels for concealed electrical items.
d. Transformers: Label that includes tag designation shown on Drawings for the transformer, feeder, and panelboards or equipment supplied by the secondary.
e. Enclosed switches.
f. Enclosed circuit breakers.
g. Enclosed controllers.
h. Variable-speed controllers.
i. Lighting Control Panels

END OF SECTION 16075

SECTION 16120 - LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Building wires and cables rated 600 V and less.
2. Connectors, splices, and terminations rated 600 V and less.

1.3 DEFINITIONS

A. VFC: Variable frequency controller.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.5 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

PART 2 - PRODUCTS

2.1 CONDUCTORS AND CABLES

A. Copper Conductors: Comply with NEMA WC 70/ICEA S-95-658.

B. Conductor Insulation: Comply with NEMA WC 70/ICEA S-95-658 for Type THHN-2-THWN-2.

C. Multi-conductor Cable: Comply with NEMA WC 70/ICEA S-95-658 for metal-clad cable, Type MC with ground wire.

2.2 CONNECTORS AND SPLICES

A. Description: Factory-fabricated connectors and splices of size, ampacity rating, material, type, and class for application and service indicated.

PART 3 - EXECUTION

3.1 CONDUCTOR MATERIAL APPLICATIONS

A. Feeders: Copper. Solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.

B. Branch Circuits: Copper. Solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.

3.2 CONDUCTOR INSULATION AND MULTICONDUCTOR CABLE APPLICATIONS AND WIRING METHODS

A. Service Entrance: Type THHN-2-THWN-2, single conductors in raceway.

B. Exposed Feeders: Type THHN-2-THWN-2, single conductors in raceway.

C. Feeders Concealed in Ceilings, Walls, Partitions, and Crawlspaces: Type THHN-2-THWN-2, single conductors in raceway.

D. Feeders Concealed in Concrete, below Slabs-on-Grade, and Underground: Type THHN-2-THWN-2, single conductors in raceway.

E. Feeders Installed below Raised Flooring: Type THHN-2-THWN-2, single conductors in raceway.

F. Exposed Branch Circuits, Including in Crawlspaces: Type THHN-2-THWN-2, single conductors in raceway.

G. Branch Circuits Concealed in Ceilings, Walls, and Partitions: Metal-clad cable, Type MC.

H. Branch Circuits Concealed in Concrete, below Slabs-on-Grade, and Underground: Type THHN-2-THWN-2, single conductors in raceway.

I. Cord Drops and Portable Appliance Connections: Type SO, hard service cord with stainless-steel, wire-mesh, strain relief device at terminations to suit application.

3.3 INSTALLATION OF CONDUCTORS AND CABLES

A. Conceal cables in finished walls, ceilings, and floors unless otherwise indicated.

B. Complete raceway installation between conductor and cable termination points according to Section 16130 "Raceways and Boxes for Electrical Systems" prior to pulling conductors and cables.

C. Use manufacturer-approved pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.

D. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips, that will not damage cables or raceway.

E. Install exposed cables parallel and perpendicular to surfaces of exposed structural members, and follow surface contours where possible.

F. Support cables according to Section 16051 "Electrical Related Work."

3.4 CONNECTIONS

A. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A.

B. Make splices, terminations, and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings than unspliced conductors.

C. Wiring at Outlets: Install conductor at each outlet, with at least 6 inches of slack.

3.5 IDENTIFICATION

A. Identify and color-code conductors and cables according to Section "Identification for Electrical Systems."

B. Identify each spare conductor at each end with identity number and location of other end of conductor, and identify as spare conductor.

3.6 FIELD QUALITY CONTROL

A. Perform the following tests and inspections:

1. After installing conductors and cables and before electrical circuitry has been energized, test service entrance and feeder conductors for compliance with requirements.
2. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.

B. Test and Inspection Reports: Prepare a written report to record the following:

1. Procedures used.
2. Results that comply with requirements.
3. Results that do not comply with requirements and corrective action taken to achieve compliance with requirements.

C. Cables will be considered defective if they do not pass tests and inspections.

END OF SECTION 16120

SECTION 16130 - RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Metal conduits, tubing, and fittings.
2. Nonmetal conduits, tubing, and fittings.
3. Metal wireways and auxiliary gutters.
4. Boxes, enclosures, and cabinets.

PART 2 - PRODUCTS

2.1 METAL CONDUITS, TUBING, AND FITTINGS

A. Listing and Labeling: Metal conduits, tubing, and fittings shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Rigid, Galvanized Steel Conduit (RGS): Comply with ANSI C80.1 and UL 6.

C. Electric Metallic Tubing (EMT): Comply with ANSI C80.3 and UL 797.

D. Liquidtight, Flexible Metallic Conduit (LFMC): Flexible steel conduit with PVC jacket and complying with UL 360.

E. Fittings for Metal Conduit: Comply with NEMA FB 1 and UL 514B.

1. Fittings for EMT:

a. Material: Steel.
b. Type: Setscrew or compression.

2. Expansion Fittings: PVC or steel to match conduit type, complying with UL 651, rated for environmental conditions where installed, and including flexible external bonding jumper.

F. Joint Compound for RGS: Approved, as defined in NFPA 70, by authorities having jurisdiction for use in conduit assemblies, and compounded for use to lubricate and protect threaded conduit joints from corrosion and to enhance their conductivity.

2.2 NONMETALLIC CONDUITS, TUBING, AND FITTINGS

A. Listing and Labeling: Nonmetallic conduits, tubing, and fittings shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Rigid, Non-metallic Conduit (RNC): Type EPC-40-PVC and Type EPC-80-PVC, complying with NEMA TC 2 and UL 651 unless otherwise indicated.

C. Fittings for RNC: Comply with NEMA TC 3; match to conduit or tubing type and material.

2.3 METAL WIREWAYS AND AUXILIARY GUTTERS

A. Description: Sheet metal, complying with UL 870 and NEMA 250, Type 3R for exterior and Type 12 for interior unless otherwise indicated, and sized according to NFPA 70.

1. Metal wireways installed outdoors shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Fittings and Accessories: Include covers, couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings to match and mate with wireways as required for complete system.

C. Wireway Covers: Screw-cover type unless otherwise indicated.

D. Finish: Manufacturer's standard enamel finish.

2.4 BOXES, ENCLOSURES, AND CABINETS

A. General Requirements for Boxes, Enclosures, and Cabinets: Boxes, enclosures, and cabinets installed in wet locations shall be listed for use in wet locations.

B. Sheet Metal Outlet and Device Boxes: Comply with NEMA OS 1 and UL 514A.

C. Cast-Metal Outlet and Device Boxes: Comply with NEMA FB 1, ferrous alloy, Type FD, with gasketed cover.

D. Luminaire Outlet Boxes: Nonadjustable, designed for attachment of luminaire weighing 50 lb. Outlet boxes designed for attachment of luminaires weighing more than 50 lb shall be listed and marked for the maximum allowable weight.

E. Small Sheet Metal Pull and Junction Boxes: NEMA OS 1.

F. Box extensions used to accommodate new building finishes shall be of same material as recessed box.

G. Device Box Dimensions: 4 inches square by 2-1/8 inches deep.

H. Gangable boxes are allowed.

PART 3 - EXECUTION

3.1 RACEWAY APPLICATION

A. Outdoors: Apply raceway products as specified below unless otherwise indicated:

1. Exposed Conduit: RGS.
2. Concealed Conduit, Aboveground: RGS.
3. Underground Conduit: Concrete-encased RNC, Type EPC-40-PVC and RGS where not encased.
4. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): LFMC .
5. Boxes and Enclosures, Aboveground: NEMA 250, Type 3R .

B. Indoors: Apply raceway products as specified below unless otherwise indicated:

1. Exposed,: RGS.

2. Concealed in Ceilings and Interior Walls and Partitions: EMT.
3. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): LFMC.
4. Damp or Wet Locations: RGS.
5. Boxes and Enclosures: Unless noted otherwise, NEMA 250, Type 1,.

C. Raceway Fittings: Compatible with raceways and suitable for use and location.

1. RGS: Use threaded rigid steel conduit fittings unless otherwise indicated. Comply with NEMA FB 2.10.
2. EMT: Use set-screw or compression, steel fittings. Comply with NEMA FB 2.10.
3. Flexible Conduit: Use only fittings listed for use with flexible conduit. Comply with NEMA FB 2.20.

3.2 INSTALLATION

A. Comply with NECA 1 and NECA 101 for installation requirements except where requirements on Drawings or in this article are stricter. Comply with NFPA 70 limitations for types of raceways allowed in specific occupancies and number of floors.

B. Keep raceways at least 6 inches away from parallel runs of flues and steam or hot-water pipes. Install horizontal raceway runs above water and steam piping.

C. Complete raceway installation before starting conductor installation.

D. Arrange stub-ups so curved portions of bends are not visible above finished slab.

E. Install no more than the equivalent of three 90-degree bends in any conduit run except for control wiring conduits, for which fewer bends are allowed. Support within 12 inches of changes in direction.

F. Conceal conduit within finished walls, ceilings, and floors unless otherwise indicated. Install conduits parallel or perpendicular to building lines.

G. Support conduit within 12 inches of enclosures to which attached.

H. Raceways Embedded in Slabs: Only conduits to recessed floor boxes shall be embedded in slabs.

1. Run conduit larger than 1-inch trade size, parallel or at right angles to main reinforcement. Where at right angles to reinforcement, place conduit close to slab support. Secure raceways to reinforcement at maximum 10-footintervals.
2. Arrange raceways to cross building expansion joints at right angles with expansion fittings.
3. Arrange raceways to keep a minimum 2 inches of concrete cover in all directions.
4. Change from RNC, Type EPC-40-PVC, to RGS before rising above floor.

I. Stub-ups to Above Recessed Ceilings:

1. Use EMT for raceways.
2. Use a conduit bushing or insulated fitting to terminate stub-ups not terminated in hubs or in an enclosure.

J. Threaded Conduit Joints, Exposed to Wet, Damp, Corrosive, or Outdoor Conditions: Apply listed compound to threads of raceway and fittings before making up joints. Follow compound manufacturer's written instructions.

K. Coat field-cut threads on PVC-coated raceway with a corrosion-preventing conductive compound prior to assembly.

L. Raceway Terminations at Locations Subject to Moisture or Vibration: Use insulating bushings to protect conductors including conductors smaller than No. 4 AWG.

M. Terminate threaded conduits into threaded hubs or with locknuts on inside and outside of boxes or cabinets. Install bushings on conduits up to 1-1/4-inch trade size and insulated throat metal bushings on 1-1/2-inch trade size and larger conduits terminated with locknuts. Install insulated throat metal grounding bushings on service conduits.

N. Install raceways square to the enclosure and terminate at enclosures with locknuts. Install locknuts hand tight plus 1/4 turn more.

O. Do not rely on locknuts to penetrate nonconductive coatings on enclosures. Remove coatings in the locknut area prior to assembling conduit to enclosure to assure a continuous ground path.

P. Cut conduit perpendicular to the length. For conduits 2-inch trade size and larger, use roll cutter or a guide to make cut straight and perpendicular to the length.

Q. Install pull wires in empty raceways. Use polypropylene or monofilament plastic line with not less than 200-lb tensile strength. Leave at least 12 inches of slack at each end of pull wire. Cap underground raceways designated as spare above grade alongside raceways in use.

R. Install devices to seal raceway interiors at accessible locations. Locate seals so no fittings or boxes are between the seal and the following changes of environments. Seal the interior of all raceways at the following points:

1. Where conduits pass from warm to cold locations, such as boundaries of refrigerated spaces.
2. Where an underground raceway enters a building or structure.
3. Where otherwise required by NFPA 70.

S. Comply with manufacturer's written instructions for solvent welding RNC and fittings.

T. Expansion-Joint Fittings:

1. Install in each run of aboveground RNC that is located where environmental temperature change may exceed 30 deg F and that has straight-run length that exceeds 25 feet. Install in each run of aboveground RMC and EMT conduit that is located where environmental temperature change may exceed 100 deg F and that has straight-run length that exceeds 100 feet.
2. Install type and quantity of fittings that accommodate temperature change listed for each of the following locations:

    a. Outdoor Locations Not Exposed to Direct Sunlight: 125 deg F temperature change.
    b. Outdoor Locations Exposed to Direct Sunlight: 155 deg F temperature change.
    c. Indoor Spaces Connected with Outdoors without Physical Separation: 125 deg F temperature change.
    d. Attics: 135 deg F temperature change.

3. Install fitting(s) that provide expansion and contraction for at least 0.00041 inch per foot of length of straight run per deg F of temperature change for PVC conduits. Install fitting(s) that provide expansion and contraction for at least 0.000078 inch per foot of length of straight run per deg F of temperature change for metal conduits.
4. Install expansion fittings at all locations where conduits cross building or structure expansion joints.
5. Install each expansion-joint fitting with position, mounting, and piston setting selected according to manufacturer's written instructions for conditions at specific location at time of installation. Install conduit supports to allow for expansion movement.

U. Flexible Conduit Connections: Comply with NEMA RV 3. Use a maximum of 72 inches of LFMC for recessed and semi-recessed luminaires, equipment subject to vibration, noise transmission, or movement; and for transformers and motors.

V. Mount boxes at heights indicated on Drawings. If mounting heights of boxes are not individually indicated, give priority to ADA requirements. Install boxes with height measured to bottom of box unless otherwise indicated.

W. Recessed Boxes in Masonry Walls: Saw-cut opening for box in center of cell of masonry block, and install box flush with surface of wall. Prepare block surfaces to provide a flat surface for a raintight connection between box and cover plate or supported equipment and box.

X. Horizontally separate boxes mounted on opposite sides of walls so they are not in the same vertical channel.

Y. Locate boxes so that cover or plate will not span different building finishes.

Z. Support boxes of three gangs or more from more than one side by spanning two framing members or mounting on brackets specifically designed for the purpose.

AA. Fasten junction and pull boxes to or support from building structure. Do not support boxes by conduits.

3.3 INSTALLATION OF UNDERGROUND CONDUIT

A. Direct-Buried Conduit:

1. Excavate trench bottom to provide firm and uniform support for conduit. Prepare trench bottom as specified in Section "Earth Moving" for pipe less than 6 inches in nominal diameter.
2. Install backfill as specified."
3. After installing conduit, backfill and compact. Start at tie-in point, and work toward end of conduit run, leaving conduit at end of run free to move with expansion and contraction as temperature changes during this process. Firmly hand tamp backfill around conduit to provide maximum supporting strength. After placing controlled backfill to within 12 inches of finished grade, make final conduit connection at end of run and complete backfilling with normal compaction.
4. Install manufactured duct elbows for stub-ups at poles and equipment and at building entrances through floor unless otherwise indicated. Encase elbows for stub-up ducts throughout length of elbow.
5. Install manufactured rigid steel conduit elbows for stub-ups at poles and equipment and at building entrances through floor.

    a. Couple steel conduits to ducts with adapters designed for this purpose, and encase coupling with 3 inches of concrete for a minimum of 12 inches on each side of the coupling.
    b. For stub-ups at equipment mounted on outdoor concrete bases and where conduits penetrate building foundations, extend steel conduit horizontally a minimum of 60 inches from edge of foundation or equipment base. Install insulated grounding bushings on terminations at equipment.
6. Underground Warning Tape: Comply with requirements in Section 16075 "Identification for Electrical Systems."

3.4 SLEEVE AND SLEEVE-SEAL INSTALLATION FOR ELECTRICAL PENETRATIONS

A. Install sleeves and sleeve seals at penetrations of exterior floor and wall assemblies.

3.5 FIRESTOPPING

A. Install firestopping at penetrations of fire-rated floor and wall assemblies. Comply with requirements in Section "Penetration Firestopping."

3.6 PROTECTION

A. Protect coatings, finishes, and cabinets from damage and deterioration.

1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
2. Repair damage to PVC coatings or paint finishes with matching touchup coating recommended by manufacturer.

END OF SECTION 16130

SECTION 16140 - WIRING DEVICES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Receptacles, receptacles with integral GFCI, and associated device plates.
2. Tamper-resistant receptacles.
3. Weather-resistant receptacles.
4. Snap switches and wall-box dimmers.
5. Floor service outlets and poke-through assemblies.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: List of legends and description of materials and process used for premarking wall plates.

1.4 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For wiring devices to include in all manufacturers' packing-label warnings and instruction manuals that include labeling conditions.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers' Names: Shortened versions (shown in parentheses) of the following manufacturers' names are used in other Part 2 articles:

1. Cooper Wiring Devices; Division of Cooper Industries, Inc. (Cooper).
2. Hubbell Incorporated; Wiring Device-Kellems (Hubbell).
3. Leviton Mfg. Company Inc. (Leviton).
4. Pass & Seymour/Legrand (Pass & Seymour).

B. Source Limitations: Obtain each type of wiring device and associated wall plate from single source from single manufacturer.

2.2 GENERAL WIRING-DEVICE REQUIREMENTS

A. Wiring Devices, Components, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Comply with NFPA 70.

2.3 STRAIGHT-BLADE RECEPTACLES

A. Convenience Receptacles, 125 V, 20 A: Comply with NEMA WD 1, NEMA WD 6 Configuration 5-20R, UL 498, and FS W-C-596.

1. Products: Subject to compliance with requirements, provide one of the following:

    a. Cooper; CR5362 (duplex).
    b. Hubbell; HBL5352 (duplex).
    c. Leviton; 5352 (duplex).
    d. Pass & Seymour; 5362 (duplex).

B. Tamper-Resistant Convenience Receptacles, 125 V, 20 A: Comply with NEMA WD 1, NEMA WD 6 Configuration 5-20R, UL 498 Supplement sd, and FS W-C-596.

1. Products: Subject to compliance with requirements, provide one of the following:

    a. Cooper; TR8300.
    b. Hubbell; HBL8300SGA.
    c. Leviton; 8300-SGG.
    d. Pass & Seymour; TR63H.

2.4 GFCI RECEPTACLES

A. General Description:

1. Straight blade, non-feed-through type.
2. Comply with NEMA WD 1, NEMA WD 6, UL 498, UL 943 Class A, and FS W-C-596.
3. Include indicator light that shows when the GFCI has malfunctioned and no longer provides proper GFCI protection.

B. Duplex GFCI Convenience Receptacles, 125 V, 20 A:

1. Products: Subject to compliance with requirements, provide one of the following:

    a. Cooper; VGF20.
    b. Hubbell; GFR5352L.
    c. Pass & Seymour; 2095.
    d. Leviton; 7590.

C. Tamper-Resistant GFCI Convenience Receptacles, 125 V, 20 A:

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

    a. Hubbell; GFTR20.
    b. Pass & Seymour; 2095TR.

D. Duplex GFCI Weather Resistant Receptacles, 125V, 20A:
    1. Products: Subject to compliance with requirements, provide one of the following:
        a. Cooper: WRVGF20.
        b. Pass & Seymour: 2095TRWRW.
        c. Leviton: W7899-W.

2.5 TOGGLE SWITCHES

A. Comply with NEMA WD 1, UL 20, and FS W-S-896.

B. Switches, 120/277 V, 20 A:

1. Products: Subject to compliance with requirements, provide one of the following:

    1) Single Pole:
        a) Cooper; AH1221.
        b) Hubbell; HBL1221.
        c) Leviton; 1221-2.
        d) Pass & Seymour; CSB20AC1.

2.6 WALL-BOX DIMMERS

2.7 WALL-BOX DIMMERS

A. 0-10 V Dimmers:

1. General: Comply with UL 1472 and CSA-C22.2; cULus and UL listed.
2. 0-10V Dimmers: radiant® Part No. RH4FBL3P[TC][W]; preset single pole and 3-way operation; 120 or 277VAC, 60Hz; Rating: 30 mA Sink Current 10A & 120V and 5A @ 277V; constant memory returns lights to previous level after a power failure; adjustable dial allows users to trim the fixture; no derating required in multi-gang applications; white LED locator light; polycarbonate enclosure material;

2.8 WALL PLATES

A. Single and combination types shall match corresponding wiring devices.

1. Plate-Securing Screws: Metal with head color to match plate finish.
2. Material for Finished Spaces: Smooth, high-impact thermoplastic.
3. Material for Unfinished Spaces: Galvanized steel.
4. Kitchens: Stainless Steel.

B. Wet-Location, Weatherproof Cover Plates: NEMA 250, complying with Type 3R, weather-resistant, die-cast aluminum with lockable cover, listed and labeled for wet and damp locations "while in use".

2.9 FLOOR SERVICE FITTINGS

A. Type: Non-metallic, flush-type, dual-service concrete floor box suitable for wiring method used.

B. Conduit Hubs: Two, 1-inch hubs for power, and two, 1.5-inch hubs for communication cables.

C. Compartments: Barrier separates power from communication cabling.

D. Service Plate: Round, die-cast aluminum, with UL514 listed scrub shield; universal for use on carpet or tile floors. Finish per Architect.

E. Sub-Plate: Cast aluminum, type 4x4 with knockouts for (4) 20A, 125-volt receptacles and (4) communication jacks. Opening type for communication jacks to be coordinated with the end user.

F. Power Receptacles: (4) NEMA WD 6 Configuration 5-20R, gray finish, unless otherwise indicated.

G. Accessories:
1. Concrete cover and plugs: Keep concrete out of box during concrete pour.
2. Reducers: Adapt hubs to required conduit size.

2.10 POKE-THROUGH ASSEMBLIES

A. Description: Dual service, factory-fabricated and -wired assembly of below-floor junction box with multi-channeled, through-floor raceway/firestop unit and detachable matching floor service-outlet assembly.

B. Comply with UL 514 scrub water exclusion requirements.

C. Size: Selected to fit nominal 4-inch cored holes in floor and matched to floor thickness.

D. Fire Rating: Unit is listed and labeled for fire rating of floor-ceiling assembly.

E. Closure Plug: Arranged to close unused 4-inch cored openings and reestablish fire rating of floor.

F. Compartments: Barrier separates power from communication cabling.

G. Service Plate: Round, die-cast aluminum, with UL514 listed scrub shield; universal for use on carpet or tile floors. Finish per Architect.

H. Sub-Plate: Cast aluminum, type 4x4 with knockouts for (4) 20A, 125-volt receptacles and (4) communication jacks. Opening type for communication jacks to be coordinated with the end user.

I. Power Receptacles: (4) NEMA WD 6 Configuration 5-20R, gray finish, unless otherwise indicated.

2.11 FINISHES

A. Device Color: As selected by Architect unless otherwise indicated or required by NFPA 70 or device listing.

B. Wall Plate Color: For plastic covers, match device color.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Comply with NECA 1, including mounting heights listed in that standard, unless otherwise indicated.

B. Coordination with Other Trades:

1. Protect installed devices and their boxes. Do not place wall finish materials over device boxes and do not cut holes for boxes with routers that are guided by riding against outside of boxes.
2. Keep outlet boxes free of plaster, drywall joint compound, mortar, cement, concrete, dust, paint, and other material that may contaminate the raceway system, conductors, and cables.
3. Install device boxes in brick or block walls so that the cover plate does not cross a joint unless the joint is troweled flush with the face of the wall.
4. Install wiring devices after all wall preparation, including painting, is complete.

C. Conductors:

1. Do not strip insulation from conductors until right before they are spliced or terminated on devices.
2. Strip insulation evenly around the conductor using tools designed for the purpose. Avoid scoring or nicking of solid wire or cutting strands from stranded wire.
3. The length of free conductors at outlets for devices shall meet provisions of NFPA 70, Article 300, without pigtails.

D. Device Installation:

1. Replace devices that have been in temporary use during construction and that were installed before building finishing operations were complete.
2. Keep each wiring device in its package or otherwise protected until it is time to connect conductors.
3. Do not remove surface protection, such as plastic film and smudge covers, until the last possible moment.
4. Connect devices to branch circuits using pigtails that are not less than 6 inches in length.
5. When there is a choice, use side wiring with binding-head screw terminals. Wrap solid conductor tightly clockwise, two-thirds to three-fourths of the way around terminal screw.
6. Use a torque screwdriver when a torque is recommended or required by manufacturer.
7. When conductors larger than No. 12 AWG are installed on 15- or 20-A circuits, splice No. 12 AWG pigtails for device connections.
8. Tighten unused terminal screws on the device.
9. When mounting into metal boxes, remove the fiber or plastic washers used to hold device-mounting screws in yokes, allowing metal-to-metal contact.

E. Receptacle Orientation:

1. Install ground pin of vertically mounted receptacles up, and on horizontally mounted receptacles to the right.

F. Device Plates: Do not use oversized or extra-deep plates. Repair wall finishes and remount outlet boxes when standard device plates do not fit flush or do not cover rough wall opening.

G. Dimmers:

1. Install dimmers within terms of their listing.
2. Install unshared neutral conductors on line and load side of dimmers according to manufacturers' device listing conditions in the written instructions.

H. Arrangement of Devices: Unless otherwise indicated, mount flush, with long dimension vertical and with grounding terminal of receptacles on top. Group adjacent switches under single, multi-gang wall plates.

I. Adjust locations of floor service outlets to suit arrangement of partitions and furnishings.

J. Set nonmetallic floor boxes level. Trim after installation to fit flush with finished floor surface.

3.2 IDENTIFICATION

A. Comply with Section 16075 "Identification for Electrical Systems."

B. Identify each receptacle with panelboard identification and circuit number. Use hot, stamped, or engraved machine printing with black -filled lettering on face of plate, and durable wire markers or tags inside outlet boxes.

3.3 FIELD QUALITY CONTROL

A. Perform the following tests and inspections:

1. In healthcare facilities, prepare reports that comply with recommendations in NFPA 99.
2. Test Instruments: Use instruments that comply with UL 1436.
3. Test Instrument for Convenience Receptacles: Digital wiring analyzer with digital readout or illuminated digital-display indicators of measurement.

B. Tests for Convenience Receptacles:

1. Line Voltage: Acceptable range is 105 to 132 V.
2. Percent Voltage Drop under 15-A Load: A value of 6 percent or higher is unacceptable.
3. Ground Impedance: Values of up to 2 ohms are acceptable.
4. GFCI Trip: Test for tripping values specified in UL 1436 and UL 943.
5. Using the test plug, verify that the device and its outlet box are securely mounted.
6. Tests shall be diagnostic, indicating damaged conductors, high resistance at the circuit breaker, poor connections, inadequate fault current path, defective devices, or similar problems. Correct circuit conditions, remove malfunctioning units and replace with new ones, and retest as specified above.

C. Wiring device will be considered defective if it does not pass tests and inspections.

D. Prepare test and inspection reports.

END OF SECTION 16140

SECTION 16145 - LIGHTING CONTROL DEVICES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Timer switches.
2. Combination wallbox sensor/switches.
3. Indoor occupancy sensors.
4. Relay power packs for low voltage power and load switching.

B. Related Requirements:

1. Section 16140 "Wiring Devices".

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: Show installation details for occupancy and light-level sensors.

1. Interconnection diagrams showing field-installed wiring.
2. Include diagrams for power, signal, and control wiring.

1.4 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For each type of lighting control device to include in emergency, operation, and maintenance manuals.

PART 2 - PRODUCTS

2.1 TIMER SWITCHES

A. Basis of Design: Wattstopper TS-400. Subject to compliance with requirements, provide product indicated or comparable product.

B. Programmable wall switch with adjustable off-delay timer and features as specified herein.

C. Time switch shall be a completely self-contained control system that replaces a standard toggle switch. It shall have a ground wire and ground strap for safety. Switching mechanism shall be a latching air gap relay. Zero Crossing Circuitry shall be used to increase the relay life, protect from the effects of inrush current, and increase the switch's longevity.

D. Time switch shall be compatible with all electronic ballasts, motor loads, compact fluorescent and inductive loads. Triac and other harmonic generating devices shall not be allowed.

E. Time switch shall operate at universal voltages of 100-300 VAC; 50/60 Hz.

F. Time switch shall have no minimum load requirement and shall be capable of controlling 0 to 800 watt incandescent, fluorescent @ 100/120 VAC, 50/60 Hz; 0 to 1200 watts fluorescent @ 230/277 VAC, 50/60 Hz; 1/6 hp @ 125 VAC.

G. Time scroll feature shall allow manual overriding of the preset time-out period. Selecting time scroll UP shall allow time-out period to scroll up throughout the timer possibilities to the maximum. Time scroll DN (down) shall allow time-out period to scroll down to minimum.

H. Time switch shall have the option for a one second light flash warning at five minutes before the timer runs out and twice when the countdown reaches one minute (when used to control lighting loads). Time switch shall have the option for a beep warning that shall sound every five seconds once the time switch countdown reaches one minute.

I. Time switch shall have manual feature for timer reset where pressing the ON/OFF switch for more than 2 seconds resets the timer to the programmed time-out period.

J. Time switch shall have an electroluminescent backlit Liquid Crystal Display that shows the timer's countdown. Time-out period shall be adjustable in increments of 5 minutes from 5 minutes to 1 hour, and in increments of 15 minutes from 1 hour to 12 hours.

K. Time switch shall be capable of operating as an ON/OFF switch.

2.2 COMBINATION WALLBOX SENSOR/SWITCHES

A. General Requirements for Sensors: Automatic-wall-switch occupancy sensor, suitable for mounting in a single gang switchbox.

1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
2. Operating Ambient Conditions: Dry interior conditions, 32 to 120 deg F.

B. Passive Infrared Wallswitch Sensor:

1. Basis of Design: Wattstopper PW-100 Series. Subject to compliance with requirements, provide product indicated or comparable product.
2. Sensor shall be capable of detecting presence in the control area by detecting changes in the infrared energy. The Passive Infrared (PIR) technology shall utilize a temperature compensated, dual element sensor and a multi-element Fresnel lens. The lens shall be Poly IR4 material to offer superior performance in the infrared wavelengths and filter short wavelength IR, such as those emitted by the sun and other visible light sources. The lens shall have grooves facing in to avoid dust and residue build up which affects IR reception.
3. Sensor shall utilize SmartSet™ technology to optimize automatic time delay to fit occupant usage patterns. The use of SmartSet shall be selectable with a DIP switch.
4. Sensor shall utilize Zero Crossing circuitry to reduce stress on relay and therefore increase sensor life.
5. Sensor shall have no minimum load requirement and shall be capable of switching from 0 to 800 Watt incandescent; 0 to 800 Watt fluorescent or 1/6 hp @ 120 VAC, 50/60Hz; and 0 to 1200 Watt fluorescent @ 230/277 VAC, 50/60Hz.
6. To avoid false on activations and to provide immunity to RFI and EMI, Detection Signature Processing shall be used to examine the frequency, duration, and amplitude of a signal, to respond only to those signals caused by human motion.
7. Sensor shall cover up to 1,000 sq. ft. for walking motion, with a field view of 180 degrees.
8. Sensor shall have a time delay that is adjusted automatically (with the SmartSet setting) and shall have a fixed time delay of 5 to 30 minutes, set by DIP switches.
9. Sensor shall have a service switch to allow end-users to operate the sensor in the unlikely event of a failure, set by a DIP switch.
10. Sensor shall be able to control incandescent, magnetic low voltage, electronic low voltage, and fluorescent loads.
11. Switching mechanism shall be a relay(s). Triac and other harmonic generating devices shall not be allowed. Sensor shall have ground wire and grounded strap for safety.
12. The PIR wall switch sensor shall be a completely self-contained control system that replaces a standard toggle switch.
13. Voltage: Dual voltage, 120 and 277 V; type.

C. Ultrasonic Wallswitch Sensor:

1. Basis of Design: Wattstopper UW-100 Series. Subject to compliance with requirements, provide product indicated or comparable product.
2. Sensor shall be capable of detecting presence in the control area by detecting Doppler shifts in transmitted ultrasound. Ultrasonic sensing shall be volumetric in coverage with a frequency of 40 KHz. It shall utilize Advanced Signal Processing which automatically adjusts the detection threshold dynamically to compensate for constantly changing levels of activity and air flow throughout controlled space.
3. Sensor shall utilize SmartSet™ technology to optimize automatic time delay to fit occupant usage patterns. The use of SmartSet shall be selectable with a DIP switch.
4. Sensor shall utilize Zero Crossing circuitry to reduce stress on relay and therefore increase sensor life.
5. sensor shall have no minimum load requirement and shall be capable of switching from 0 to 800 Watt incandescent; 0 to 800 Watt fluorescent or 1/6 hp @ 120 VAC, 50/60Hz; and 0 to 1200 Watt fluorescent @ 230/277 VAC, 50/60Hz.
6. Sensor shall cover up to 400 sq. ft. for walking motion, and cover 180 degree.
7. Sensor shall have a time delay that is adjusted automatically (with the SmartSet setting) or shall have a fixed time delay of five to 30 minutes, set by DIP switches.
8. Sensor shall have a service switch to allow end-users to operate the sensor in the unlikely event of a failure; set by a trim pot or dip switch.
9. Sensor shall be able to control incandescent, magnetic low voltage, electronic low voltage, and fluorescent loads.

10. Switching mechanism shall be a relay(s). Triac and other harmonic generating devices shall not be allowed. Sensor shall have ground wire and grounded strap for safety.
11. The Ultrasonic wall switch sensor shall be a completely self contained control system that replaces a standard toggle switch.
12. Voltage: Dual voltage, 120 and 277 V; type.

D. Multi-way Dual Technology Wallswitch Sensor:

1. Basis of Design: Wattstopper DW-100 Series. Subject to compliance with requirements, provide product indicated or comparable product.
2. Sensor shall be capable of detecting presence in the control area by detecting Doppler shifts in transmitted ultrasound and passive infrared heat changes. Sensor shall utilize Dual Sensing Verification Principle for coordination between ultrasonic and PIR technologies to reduce likelihood of false operations.
3. For best results, sensor shall feature a trigger mode where the end-user can choose which technology will activate the sensor from off mode (initial), the type of detection that will reset the time delay (maintain), and the type of detection that will cause the sensor to be turned back on immediately after lights turned off due to lack of motion (re-trigger). Selection of technologies for initial, maintain, and re-trigger shall be done with DIP switches. Sensor shall have its trigger mode factory preset to allow for quick installation in most applications. In this default setting, both technologies must occur in order to initially activate lighting systems. Detection by either technology shall maintain lighting on, and detection by either technology shall turn lights back on after lights were turned off for five seconds or less in automatic mode and 30 seconds or less in manual mode.
4. Sensor shall have four occupancy logic options for customized control to meet application needs.
5. Ultrasonic sensing shall be volumetric in coverage with a frequency of 40 KHz. It shall utilize Advanced Signal Processing which automatically adjusts the detection threshold dynamically to compensate for constantly changing levels of activity and air flow throughout controlled space.
6. The PIR technology shall utilize a temperature compensated, dual element sensor and a multi-element Fresnel lens. The lens shall be Poly IR4 material to offer superior performance in the infrared wavelengths and filter short wavelength IR, such as those emitted by the sun and other visible light sources. The lens shall have grooves facing in to avoid dust and residue build up which affects IR reception.
7. Sensor shall utilize SmartSet™ technology to optimize automatic time delay to fit occupant usage patterns. The use of SmartSet shall be selectable with a DIP switch.
8. Sensor shall utilize Zero Crossing circuitry to reduce stress on relay and therefore increase sensor life.
9. Sensor shall have no minimum load requirement and shall be capable of switching from 0 to 800 Watt incandescent; 0 to 800 Watt fluorescent or 1/6 hp @ 120 VAC, 50/60Hz; and 0 to 1200 Watt fluorescent @ 230/277 VAC, 50/60Hz.
10. To avoid false on activations and to provide immunity to RFI and EMI, Detection Signature Analysis shall be used to examine the frequency, duration, and amplitude of a signal, to respond only to those signals caused by human motion.
11. Sensor shall cover up to 1,000 sq. ft. for walking motion, with a field view of 180 degrees.
12. Sensor shall have a time delay that is adjusted automatically (with the SmartSet setting) or shall have a fixed time delay of five to 30 minutes, set by DIP switches.
13. Sensor shall have a service switch to allow end-users to operate the sensor in the unlikely event of a failure; set by a trim pot.
14. Sensor shall be able to control incandescent, magnetic low voltage, electronic low voltage, and fluorescent loads.
15. Switching mechanism shall be a relay(s). Triac and other harmonic generating devices shall not be allowed. Sensor shall have ground wire and grounded strap for safety.
16. The Dual Technology wall switch sensor shall be a completely self contained control system that replaces a standard toggle switch.

17. Voltage: Dual voltage, 120 and 277 V; type.

2.3 INDOOR OCCUPANCY SENSORS AND POWER PACKS

A. General Requirements for Sensors: Wall- or ceiling-mounted, solid-state indoor occupancy sensors with a separate power pack.

1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
2. Operation: Unless otherwise indicated, turn lights on when coverage area is occupied, and turn them off when unoccupied; with a time delay for turning lights off, adjustable over a minimum range of 5 to 30 minutes.
3. Sensor Output: Contacts rated to operate the connected relay, complying with UL 773A. Sensor is powered from the power pack.

B. Power Pack: UL Listed, plenum-rated, RoHS-compliant. Power pack shall be a self-contained power supply and relay module . Power pack shall have primary voltage and frequency inputs of 120/230/277 VAC, 50/60Hz., and shall have dry contacts rated for 20-A ballast load at 120- and 277-V ac, for 13-A tungsten at 120-V ac, and for 1 hp at 120-V ac. Power pack shall provide a 24 VDC, 225 mA output with the relay connected and shall be classified as a Class 2 power source, as defined by NFPA 70. Power pack shall have an LED to indicate status of relay. Power pack shall have over-current protection if the low voltage current drawn exceeds 225 mA. In the event of an over-current, the low voltage +24VDC output shuts down to prevent permanent damage and the LED will blink continuously to indicate a fault condition. Power pack shall utilize zero crossing circuitry to protect from the effects of in-rush current and increase product longevity.

C. Mounting:
1. Sensor: Suitable for mounting in any position on a standard outlet box.
2. Relay: Externally mounted through a 1/2-inch knockout in a standard electrical enclosure.
3. Time-Delay and Sensitivity Adjustments: Recessed and concealed behind hinged door.

D. Indicator: Digital display, to show when motion is detected during testing and normal operation of sensor.

E. Bypass Switch: Override the "on" function in case of sensor failure.

F. Ceiling-mounted, PIR Type:

1. Basis of Design: Wattstopper CI-300 Series. Subject to compliance with requirements, provide product indicated or comparable product.
2. The passive infrared sensor shall be capable of detecting presence in the control area by detecting changes in the infrared energy. Small movements shall be detected such as when a person is writing while seated at a desk within an 8 feet radius of the sensor. To avoid false ON activations and to provide immunity to RFI and EMI, Digital Signature Analysis shall be used to examine the frequency, duration, and amplitude of a signal, to respond only to those signals caused by human motion.
3. Sensors shall utilize SmartSet technology to optimize time delay and sensitivity settings to fit occupants usage patterns. The use of SmartSet shall be selectable with a DIP switch.
4. Sensors shall be mounted to the ceiling with a flat, unobtrusive appearance and provide 360° of coverage.

5. Sensor shall utilize a temperature compensated dual element sensor and a multi-element Fresnel lens. Fresnel lens shall be a Poly IR 4 based material to offer superior performance in the Infrared wavelengths and filter short wavelength infrared, such as those emitted by the sun and other visible light sources. Lens shall have grooves facing in to avoid dust and residue build up which affects IR reception.
6. Sensor shall cover 360°, up to 1200 square feet of walking motion with the Standard Lens and up to 500 square feet of walking motion with the High Density lens when mounted at a ceiling height of 8 feet.

G. Ceiling-mounted, Ultrasonic Type:

1. Basis of Design: Wattstopper UT-300 Series. Subject to compliance with requirements, provide product indicated or comparable product.
2. The occupancy sensors shall be capable of detecting presence in the control area via Doppler shifts in transmitted ultrasound. Ultrasonic sensing shall be volumetric in coverage with a frequency of 40 KHz. It shall utilize Advance Signal Processing, which automatically adjusts the detection threshold dynamically to compensate for constantly changing levels of activity and airflow throughout controlled space.
3. To avoid false on activation and to provide immunity to RFI and EMI, Detection Signature Analysis shall be used to examine the frequency, duration, and amplitude of a signal so as to only respond to those signals caused by human motion.
4. Sensors shall provide 360° of coverage. Sensors shall cover 360° and walking motion up to 2000 square feet.
5. Sensors shall utilize SmartSet™ technology that automatically adjusts time delay settings to fit occupants' usage patterns for optimal energy efficiency. SmartSet feature shall be selectable with a DIP switch. Sensor shall have user-adjustable sensitivity setting.

H. Wall-mounted, PIR Type:

1. Basis of Design: Wattstopper CX-100 Series. Subject to compliance with requirements, provide product indicated or comparable product.
2. The passive infrared sensor shall be capable of detecting presence in the control area by detecting changes in the infrared energy. Small movements shall be detected such as when a person is writing while seated at a desk within 15 feet of the sensor.
3. To avoid false ON activations and to provide high sensitivity to minor motion, Pulse Count Processing and Detection Signature Analysis shall be used to examine the frequency, duration, and amplitude of the signal received by the sensor to respond only to those signals caused by human motion.
4. Sensor shall utilize mixed signal ASIC (application-specific integrated circuit) technology, which combines analog and digital processing into one chip package, to provide immunity to RFI and EMI.
5. Sensor shall utilize a temperature compensated dual element sensor and a multi-element Fresnel lens. Fresnel lens shall be a Poly IR 4 based material (for standard and Long Range lens) to offer superior filtering capability of competing light sources, such as the sun and other visible light sources. The lens shall have grooves facing in to avoid dust and residue build up which affects IR reception. Aisleway lenses shall be a Poly IR 2 based material that offers greater sensitivity to motion and superior detection performance.
6. Sensor shall cover up to 2000 square feet.
7. For accuracy and consistency, sensor shall have a DIP switch controlled, digital time delay adjustable from 15 seconds to 30 minutes.
8. Sensor shall have user-adjustable sensitivity settings.

2.4 CONDUCTORS AND CABLES

A. Power Wiring to Supply Side of Remote-Control Power Sources: Not smaller than No. 12 AWG. Comply with requirements in Section 16120 "Low-Voltage Electrical Power Conductors and Cables."

B. Classes 2 and 3 Control Cable: Multi-conductor cable with stranded-copper conductors not smaller than No. 18 AWG. Comply with requirements in Section 16120 "Low-Voltage Electrical Power Conductors and Cables."

PART 3 - EXECUTION

3.1 SENSOR INSTALLATION

A. Coordinate layout and installation of ceiling-mounted devices with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, smoke detectors, fire-suppression systems, and partition assemblies.

B. Install and aim sensors in locations to achieve not less than 90 percent coverage of areas indicated. Do not exceed coverage limits specified in manufacturer's written instructions.

3.2 WIRING INSTALLATION

A. Wiring Method: Comply with Section 16120 "Low-Voltage Electrical Power Conductors and Cables." Minimum conduit size is 1/2 inch.

B. Wiring within Enclosures: Comply with NECA 1. Separate power-limited and nonpower-limited conductors according to conductor manufacturer's written instructions.

C. Size conductors according to lighting control device manufacturer's written instructions unless otherwise indicated.

D. Splices, Taps, and Terminations: Make connections only on numbered terminal strips in junction, pull, and outlet boxes; terminal cabinets; and equipment enclosures.

3.3 IDENTIFICATION

A. Identify components and power and control wiring according to Section 16075 "Identification for Electrical Systems."

1. Identify controlled circuits in lighting contactors.
2. Identify circuits or luminaires controlled by photoelectric and occupancy sensors at each sensor.

B. Label time switches and contactors with a unique designation.

3.4 FIELD QUALITY CONTROL

A. Perform the following tests and inspections:

1. Operational Test: After installing time switches and sensors, and after electrical circuitry has been energized, start units to confirm proper unit operation.
2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

B. Lighting control devices will be considered defective if they do not pass tests and inspections.

C. Prepare test and inspection reports.

3.5 ADJUSTING

A. Occupancy Adjustments: When requested within 3 months from date of Substantial Completion, provide on-site assistance in adjusting sensors to suit actual occupied conditions. Provide up to two visits to Project during other-than-normal occupancy hours for this purpose.

1. For occupancy and motion sensors, verify operation at outer limits of detector range. Set time delay to suit Owner's operations.
2. For daylighting controls, adjust set points and deadband controls to suit Owner's operations.
3. Align high-bay occupancy sensors using manufacturer's laser aiming tool.

3.6 DEMONSTRATION

A. Coordinate demonstration of products specified in this Section with demonstration requirements for low-voltage, programmable lighting control systems specified in Section 16571 "Relay-Based Lighting Controls."

B. Train Owner's maintenance personnel to adjust, operate, and maintain lighting control devices.

END OF SECTION 16145

SECTION 16410 - ENCLOSED SWITCHES AND CIRCUIT BREAKERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Fusible switches.
2. Enclosed circuit breakers.
3. Enclosures.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of enclosed switch, circuit breaker, accessory, and component indicated. Include dimensioned elevations, sections, weights, and manufacturers' technical data on features, performance, electrical characteristics, ratings, accessories, and finishes.

1. Enclosure types and details for types other than NEMA 250, Type 1.
2. Current and voltage ratings.
3. Short-circuit current ratings (interrupting and withstand, as appropriate).
4. Detail features, characteristics, ratings, and factory settings of individual overcurrent protective devices, accessories, and auxiliary components.
5. Include time-current coordination curves (average melt) for each type and rating of overcurrent protective device; include selectable ranges for each type of overcurrent protective device. Submit on translucent log-log graph paper**.**

B. Shop Drawings: For enclosed switches and circuit breakers. Include plans, elevations, sections, details, and attachments to other work.

1. Wiring Diagrams: For power, signal, and control wiring.

C. Field quality-control reports.

1. Test procedures used.
2. Test results that comply with requirements.
3. Results of failed tests and corrective action taken to achieve test results that comply with requirements.

1.4 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For enclosed switches and circuit breakers to include in emergency, operation, and maintenance manuals. In addition to items specified in Section 017823 "Operation and Maintenance Data," include the following:

1. Manufacturer's written instructions for testing and adjusting enclosed switches and circuit breakers.
2. Time-current coordination curves (average melt) for each type and rating of overcurrent protective device; include selectable ranges for each type of overcurrent protective device. Submit on translucent log-log graph paper**.**

1.5 QUALITY ASSURANCE

A. Source Limitations: Obtain enclosed switches and circuit breakers, overcurrent protective devices, components, and accessories, within same product category, from single source from single manufacturer.

B. Product Selection for Restricted Space: Drawings indicate maximum dimensions for enclosed switches and circuit breakers, including clearances between enclosures, and adjacent surfaces and other items. Comply with indicated maximum dimensions.

C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

D. Comply with NFPA 70.

1.6 PROJECT CONDITIONS

A. Environmental Limitations: Rate equipment for continuous operation under the following conditions unless otherwise indicated:

1. Ambient Temperature: Not less than minus 22 deg F and not exceeding 104 deg F.

1.7 COORDINATION

A. Coordinate layout and installation of switches, circuit breakers, and components with equipment served and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.

PART 2 - PRODUCTS

2.1 FUSIBLE SWITCHES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
2. General Electric Company; GE Consumer & Industrial - Electrical Distribution.
3. Siemens Energy & Automation, Inc.
4. Square D; a brand of Schneider Electric.

B. Type HD, Heavy Duty, Single Throw, 240 or 600-V ac, 1200 A and Smaller: UL 98 and NEMA KS 1, horsepower rated, with clips or bolt pads to accommodate specified fuses, lockable handle with capability to accept three padlocks, and interlocked with cover in closed position.

C. Accessories:

1. Equipment Ground Kit: Internally mounted and labeled for copper and aluminum ground conductors.
2. Neutral Kit: Internally mounted; insulated, capable of being grounded and bonded; labeled for copper and aluminum neutral conductors.
3. Class R Fuse Kit: Provides rejection of other fuse types when Class R fuses are specified.
4. Lugs: Mechanical type, suitable for number, size, and conductor material.
5. Service-Rated Switches: Labeled for use as service equipment.

2.2 MOLDED-CASE CIRCUIT BREAKERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
2. General Electric Company; GE Consumer & Industrial - Electrical Distribution.
3. Siemens Energy & Automation, Inc.
4. Square D; a brand of Schneider Electric.

B. General Requirements: Comply with UL 489, NEMA AB 1, and NEMA AB 3, with interrupting capacity to comply with available fault currents.

C. Thermal-Magnetic Circuit Breakers: Inverse time-current element for low-level overloads and instantaneous magnetic trip element for short circuits. Provide with adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger. Provide with electronic trip units for circuit breaker frame sizes 400A and larger.

D. Adjustable, Instantaneous-Trip Circuit Breakers: Magnetic trip element with front-mounted, field-adjustable trip setting.

E. Electronic Trip Circuit Breakers: Field-replaceable rating plug, rms sensing, with the following field-adjustable settings:

1. Instantaneous trip.
2. Long- and short-time pickup levels.
3. Long- and short-time time adjustments.
4. Ground-fault pickup level, time delay, and I^2t response.

F. Features and Accessories:

1. Standard frame sizes, trip ratings, and number of poles.
2. Lugs: Mechanical type, suitable for number, size, trip ratings, and conductor material.
3. Shunt Trip: Trip coil energized from separate circuit, with coil-clearing contact.
4. Undervoltage Trip: Set to operate at 35 to 75 percent of rated voltage without intentional time delay.

2.3 ENCLOSURES

A. Enclosed Switches and Circuit Breakers: NEMA AB 1, NEMA KS 1, NEMA 250, and UL 50, to comply with environmental conditions at installed location.

1. Indoor, Dry and Clean Locations: NEMA 250, Type 1.
2. Indoor Locations Subject to Dust, Falling Dirt, and Dripping Noncorrosive Liquids: NEMA 250, Type 12.
3. Outdoors: NEMA 250, Type 3R, unless noted otherwise on plans.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine elements and surfaces to receive enclosed switches and circuit breakers for compliance with installation tolerances and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install individual wall-mounted switches and circuit breakers with tops at uniform height unless otherwise indicated.

B. Install fuses in fusible devices.

C. Comply with NECA 1.

3.3 IDENTIFICATION

A. Comply with requirements in Section 16075 "Identification for Electrical Systems."

1. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs.
2. Label each enclosure with engraved metal or laminated-plastic nameplate.

3.4 FIELD QUALITY CONTROL

A. Perform tests and inspections.

B. Acceptance Testing Preparation:

1. Test insulation resistance for each enclosed switch and circuit breaker, component, connecting supply, feeder, and control circuit.
2. Test continuity of each circuit.

C. Tests and Inspections:

1. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
2. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.

D. Enclosed switches and circuit breakers will be considered defective if they do not pass tests and inspections.

3.5 ADJUSTING

A. Adjust moving parts and operable components to function smoothly, and lubricate as recommended by manufacturer.

END OF SECTION 16410

SECTION 16415 - LOW-VOLTAGE TRANSFORMERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following types of dry-type transformers rated 600 V and less, with capacities up to 1000 kVA:

1. Distribution transformers.

1.3 ACTION SUBMITTALS

A. Product Data: Include rated nameplate data, capacities, weights, dimensions, minimum clearances, installed devices and features, and performance for each type and size of transformer indicated.

B. Shop Drawings: Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.

1. Wiring Diagrams: Power, signal, and control wiring.

1.4 INFORMATIONAL SUBMITTALS

A. Source quality-control test reports.

B. Field quality-control test reports.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For transformers to include in emergency, operation, and maintenance manuals.

1.6 QUALITY ASSURANCE

A. Source Limitations: Obtain each transformer type through one source from a single manufacturer.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

C. Comply with IEEE C57.12.91, "Test Code for Dry-Type Distribution and Power Transformers."

1.7 DELIVERY, STORAGE, AND HANDLING

A. Temporary Heating: Apply temporary heat according to manufacturer's written instructions within the enclosure of each ventilated-type unit, throughout periods during which equipment is not energized and when transformer is not in a space that is continuously under normal control of temperature and humidity.

1.8 COORDINATION

A. Coordinate size and location of concrete bases with actual transformer provided. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified with concrete.

B. Coordinate installation of wall-mounting and structure-hanging supports with actual transformer provided.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1.
2. Eaton Electrical Inc.; Cutler-Hammer Products.
3. General Electric Company.
4. Siemens Energy & Automation, Inc.
5. Square D; Schneider Electric.

2.2 GENERAL TRANSFORMER REQUIREMENTS

A. Description: Factory-assembled and -tested, air-cooled units for 60-Hz service.

B. Cores: Grain-oriented, non-aging silicon steel.

C. Coils: Continuous windings without splices except for taps.

1. Internal Coil Connections: Brazed or pressure type.
2. Coil Material: Copper.

2.3 DISTRIBUTION TRANSFORMERS

A. Comply with NEMA ST 20, and list and label as complying with UL 1561.

B. Cores: One leg per phase.

C. Indoor Transformer Enclosure: Ventilated , NEMA 250, Type 2.

1. Core and coil shall be encapsulated within resin compound, sealing out moisture and air.

D. Transformer Enclosure Finish: Comply with NEMA 250.

1. Finish Color: ANSI 49 gray.

E. Taps for Transformers 25 kVA and Larger: Two 2.5 percent taps above and four 2.5 percent taps below normal full capacity.

F. Insulation Class: 220 deg C, UL-component-recognized insulation system with a maximum of 115 deg C rise above 40 deg C ambient temperature.

G. Energy Efficiency for Transformers Rated 15 kVA and Larger:

1. Complying with NEMA TP 1, Class 1 efficiency levels.
2. Tested according to NEMA TP 2.

H. Low-Sound-Level Requirements: Minimum of 3 dBA less than NEMA ST 20 standard sound levels when factory tested according to IEEE C57.12.91.

I. Low-Sound-Level Requirements: Maximum sound levels, when factory tested according to IEEE C57.12.91, as follows:
1. 51 to 150 kVA: 50
2. 151 to 300 kVA: 55

J.

2.4 IDENTIFICATION DEVICES

A. Nameplates: Engraved, laminated-plastic or metal nameplate for each distribution transformer, mounted with corrosion-resistant screws. Nameplates and label products are specified in Section 260553 "Identification for Electrical Systems."

2.5 SOURCE QUALITY CONTROL

A. Test and inspect transformers according to IEEE C57.12.91.

B. Factory Sound-Level Tests: Conduct sound-level tests on equipment for this Project.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions for compliance with enclosure- and ambient-temperature requirements for each transformer.

B. Verify that field measurements are as needed to maintain working clearances required by NFPA 70 and manufacturer's written instructions.

C. Examine walls, floors, roofs, and concrete bases for suitable mounting conditions where transformers will be installed.

D. Verify that ground connections are in place and requirements in Section 16060 "Grounding and Bonding for Electrical Systems" have been met. Maximum ground resistance shall be 5 ohms at location of transformer.

E. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install wall-mounting transformers level and plumb with wall brackets fabricated by transformer manufacturer.

B. Construct concrete bases and anchor floor-mounting transformers according to manufacturer's written instructions and requirements in Section 16051 "Electrical Related Work."

3.3 CONNECTIONS

A. Ground equipment according to Section 16060 "Grounding and Bonding for Electrical Systems."

B. Connect wiring according to Section 16120 "Low-Voltage Electrical Power Conductors and Cables."

3.4 FIELD QUALITY CONTROL

A. Tests and Inspections:

1. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.

B. Remove and replace units that do not pass tests or inspections and retest as specified above.

C. Test Labeling: On completion of satisfactory testing of each unit, attach a dated and signed "Satisfactory Test" label to tested component.

3.5 ADJUSTING

A. Record transformer secondary voltage at each unit for at least 48 hours of typical occupancy period. Adjust transformer taps to provide optimum voltage conditions at secondary terminals. Optimum is defined as not exceeding nameplate voltage plus 10 percent and not being lower than nameplate voltage minus 3 percent at maximum load conditions. Submit recording and tap settings as test results.

B. Output Settings Report: Prepare a written report recording output voltages and tap settings.

3.6 CLEANING

A. Vacuum dirt and debris; do not use compressed air to assist in cleaning.

END OF SECTION 16415

SECTION 16442- PANELBOARDS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Distribution panelboards.
2. Lighting and appliance branch-circuit panelboards.

1.3 DEFINITIONS

A. SVR: Suppressed voltage rating.

B. TVSS: Transient voltage surge suppressor.

C. Inominal: Nominal discharge current.

D. MCOV: Maximum continuous operating voltage.

E. Mode(s), also Modes of Protection: The pair of electrical connections where the VPR applies.

F. MOV: Metal-oxide varistor; an electronic component with a significant non-ohmic current-voltage characteristic.

G. OCPD: Overcurrent protective device.

H. SCCR: Short-circuit current rating.

I. SPD: Surge protective device.

J. VPR: Voltage protection rating.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of panelboard, load center, switching and overcurrent protective device, transient voltage suppression device, accessory, and component indicated. Include dimensions and manufacturers' technical data on features, performance, electrical characteristics, ratings, and finishes.

B. Shop Drawings: For each panelboard, load center, and related equipment.

1. Include dimensioned plans, elevations, sections, and details. Show tabulations of installed devices, equipment features, and ratings.
2. Detail enclosure types and details for types other than NEMA 250, Type 1.
3. Detail bus configuration, current, and voltage ratings.
4. Short-circuit current rating of panelboards and overcurrent protective devices.
5. Include evidence of NRTL listing for series rating of installed devices.
6. Detail features, characteristics, ratings, and factory settings of individual overcurrent protective devices and auxiliary components.
7. Include wiring diagrams for power, signal, and control wiring.
8. Include time-current coordination curves for each type and rating of overcurrent protective device included in panelboards. Submit on translucent log-log graft paper; include selectable ranges for each type of overcurrent protective device.

1.5 INFORMATIONAL SUBMITTALS

A. Field Quality-Control Reports:

1. Test procedures used.
2. Test results that comply with requirements.
3. Results of failed tests and corrective action taken to achieve test results that comply with requirements.

B. Panelboard Schedules: For installation in panelboards. Submit final versions after load balancing.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For panelboards and components to include in emergency, operation, and maintenance manuals. In addition to items specified in Section 017823 "Operation and Maintenance Data," include the following:

1. Manufacturer's written instructions for testing and adjusting overcurrent protective devices.
2. Time-current curves, including selectable ranges for each type of overcurrent protective device that allows adjustments.

1.7 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Keys: Two spares for each type of panelboard cabinet lock.

1.8 QUALITY ASSURANCE

A. Source Limitations: Obtain panelboards, overcurrent protective devices, components, and accessories from single source from single manufacturer.

B. Product Selection for Restricted Space: Drawings indicate maximum dimensions for panelboards including clearances between panelboards and adjacent surfaces and other items. Comply with indicated maximum dimensions.

C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

D. Comply with NEMA PB 1.

E. Comply with NFPA 70.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Handle and prepare panelboards for installation according to NEMA PB 1.

1.10 PROJECT CONDITIONS

A. Environmental Limitations:

1. Do not deliver or install panelboards until spaces are enclosed and weathertight, wet work in spaces is complete and dry, work above panelboards is complete, and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.
2. Rate equipment for continuous operation under the following conditions unless otherwise indicated:

    a. Ambient Temperature: Not exceeding 0 deg F to plus 104 deg F.
    b. Altitude: Not exceeding 6600 feet.

B. Service Conditions: NEMA PB 1, usual service conditions, as follows:

1. Ambient temperatures within limits specified.
2. Altitude not exceeding 6600 feet.

1.11 COORDINATION

A. Coordinate layout and installation of panelboards and components with other construction that penetrates walls or is supported by them, including electrical and other types of equipment, raceways, piping, encumbrances to workspace clearance requirements, and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.

B. Coordinate sizes and locations of concrete bases with actual equipment provided. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified with concrete.

1.12 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace transient voltage suppression devices that fail in materials or workmanship within specified warranty period.

1. Warranty Period: Ten years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS FOR PANELBOARDS

A. Enclosures: Flush- and surface-mounted cabinets.

1. Rated for environmental conditions at installed location.

a. Indoor Dry and Clean Locations: NEMA 250, Type 1 .
b. Outdoor Locations: NEMA 250, Type 3R.
c. Kitchen Areas: Flush, NEMA 250, Type 12, stainless steel.

2. Front: Secured to box with concealed trim clamps. For surface-mounted fronts, match box dimensions; for flush-mounted fronts, overlap box.
3. Hinged Front Cover: Entire front trim hinged to box and with standard door within hinged trim cover.
4. Gutter Extension and Barrier: Same gage and finish as panelboard enclosure; integral with enclosure body. Arrange to isolate individual panel sections.
5. Finishes:

a. Panels and Trim: Unless noted otherwise, phosphatized steel , factory finished immediately after cleaning and pretreating with manufacturer's standard two-coat, baked-on finish consisting of prime coat and thermosetting topcoat.
b. Back Boxes: Unless noted otherwise, galvanized steel .

6. Directory Card: Typewritten, inside panelboard door, mounted in metal frame with transparent protective cover.

B. Incoming Mains Location: Top and bottom.

C. Conductor Connectors: Suitable for use with conductor material and sizes.

1. Material: Hard-drawn copper, 98 percent conductivity.
2. Main and Neutral Lugs: Mechanical type.
3. Ground Lugs and Bus-Configured Terminators: Mechanical type.

D. Future Devices: Mounting brackets, bus connections, filler plates, and necessary appurtenances required for future installation of devices.

E. Panelboard Short-Circuit Current Rating: Fully rated to interrupt symmetrical short-circuit current available at terminals.

2.2 PERFORMANCE REQUIREMENTS

A. Surge Suppression: Factory installed as an integral part of indicated panelboards, complying with UL 1449.

2.3 DISTRIBUTION PANELBOARDS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
2. General Electric Company; GE Consumer & Industrial - Electrical Distribution.
3. Siemens Energy & Automation, Inc.
4. Square D; a brand of Schneider Electric.

B. Panelboards: NEMA PB 1, power and feeder distribution type.

C. Doors: Secured with vault-type latch with tumbler lock; keyed alike.

1. For doors more than 36 inches high, provide two latches, keyed alike.

D. Phase, Neutral, and Ground Buses:

1. Material: Hard-drawn copper, 98 percent conductivity.
2. Equipment Ground Bus: Adequate for feeder and branch-circuit equipment grounding conductors; bonded to box.

E. Mains: Circuit breaker or Lugs only. See Panel Schedules on drawings.

F. Overcurrent Protective Devices: Bolt-on circuit breakers; plug-in circuit breakers where individual positive-locking device requires mechanical release for removal.

2.4 LIGHTING AND APPLIANCE BRANCH-CIRCUIT PANELBOARDS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
2. General Electric Company; GE Consumer & Industrial - Electrical Distribution.
3. Siemens Energy & Automation, Inc.
4. Square D; a brand of Schneider Electric.

B. Panelboards: NEMA PB 1, lighting and appliance branch-circuit type.

C. Phase, Neutral, and Ground Buses:

1. Material: Hard-drawn copper, 98 percent conductivity.
2. Equipment Ground Bus: Adequate for feeder and branch-circuit equipment grounding conductors; bonded to box.

D. Mains: Circuit breaker or lugs only. See Panel Schedules on drawings.

E. Overcurrent Protective Devices: Bolt-on circuit breakers, replaceable without disturbing adjacent units.

F. Doors: Concealed hinges; secured with flush latch with tumbler lock; keyed alike.

2.5 DISCONNECTING AND OVERCURRENT PROTECTIVE DEVICES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Eaton Electrical Inc.; Cutler-Hammer Business Unit.

2. General Electric Company; GE Consumer & Industrial - Electrical Distribution.
3. Siemens Energy & Automation, Inc.
4. Square D; a brand of Schneider Electric.

B. Molded-Case Circuit Breaker (MCCB): Comply with UL 489, with interrupting capacity to meet available fault currents.

1. Thermal-Magnetic Circuit Breakers: Inverse time-current element for low-level overloads, and instantaneous magnetic trip element for short circuits. Provide with adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger. Provide with electronic trip units for circuit breaker frame sizes 400A and larger.
2. Adjustable Instantaneous-Trip Circuit Breakers: Magnetic trip element with front-mounted, field-adjustable trip setting.
3. Electronic trip circuit breakers with rms sensing; field-replaceable rating plug or field-replicable electronic trip; and the following field-adjustable settings:

    a. Instantaneous trip.
    b. Long- and short-time pickup levels.
    c. Long- and short-time time adjustments.

4. Molded-Case Circuit-Breaker (MCCB) Features and Accessories:

    a. Standard frame sizes, trip ratings, and number of poles.
    b. Lugs: Mechanical style, suitable for number, size, trip ratings, and conductor materials.
    c. Application Listing: Appropriate for application; Type SWD for switching fluorescent lighting loads; Type HID for feeding fluorescent and high-intensity discharge (HID) lighting circuits.
    d. Shunt Trip: 120 -V trip coil energized from separate circuit, set to trip at 55 percent of rated voltage.
    e. Auxiliary Contacts: One SPDT switch with "a" and "b" contacts; "a" contacts mimic circuit-breaker contacts and "b" contacts operate in reverse of circuit-breaker contacts.
    f. Multipole units enclosed in a single housing or factory assembled to operate as a single unit. Handle ties are not allowed.
    g. Handle Padlocking Device: Fixed attachment, for locking circuit-breaker handle in off position.

2.6 TRANSIENT VOLTAGE SURGE SUPPRESSORS

A. Manufacturer: Identical to that of the panel manufacturer that the TVSS is installed in.

B. General: Comply with UL 1449.

1. Include LED indicator lights for power and protection status.
2. Internal thermal protection that disconnects the SPD before damaging internal suppressor components.
3. Include Form-C contacts rated at 5 A and 250-V ac, one normally open and one normally closed, for remote monitoring of protection status.

C. Peak Surge Current Rating: The minimum single-pulse surge current withstand rating per phase shall not be less than 100 kA. The peak surge current rating shall be the arithmetic sum of the ratings of the individual MOVs in a given mode.

D. Protection modes and UL 1449 VPR for grounded wye circuits with 480Y/277 V and 208Y/120 V, three-phase, four-wire circuits shall not exceed the following:

1. Line to Neutral: 1200 V for 480Y/277 V; 700 V for 208Y/120 V.
2. Line to Ground: 1200 V for 480Y/277 V; 700 V for 208Y/120 V.
3. Neutral to Ground: 1200 V for 480Y/277 V; 700 V for 208Y/120 V.

E. Line to Line: 2000 V for 480Y/277 V; 1200 V for 208Y/120 V.

F. SCCR: Equal or exceed 100kA.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Receive, inspect, handle, and store panelboards according to NEMA PB 1.1.

B. Examine panelboards before installation. Reject panelboards that are damaged or rusted or have been subjected to water saturation.

C. Examine elements and surfaces to receive panelboards for compliance with installation tolerances and other conditions affecting performance of the Work.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install panelboards and accessories according to NEMA PB 1.1.

B. Temporary Lifting Provisions: Remove temporary lifting eyes, channels, and brackets and temporary blocking of moving parts from panelboards.

C. Mount top of trim 90 inches above finished floor unless otherwise indicated.

D. Mount panelboard cabinet plumb and rigid without distortion of box. Mount recessed panelboards with fronts uniformly flush with wall finish and mating with back box.

E. Install overcurrent protective devices and controllers not already factory installed.

1. Set field-adjustable, circuit-breaker trip ranges.

F. Install filler plates in unused spaces.

G. For flush-mounted panels, stub four 1-inch empty conduits from panelboard into accessible ceiling space or space designated to be ceiling space in the future.

H. Arrange conductors in gutters into groups and bundle and wrap with wire ties after completing load balancing.

I. Comply with NECA 1.

3.3 IDENTIFICATION

A. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs complying with Section 16075 "Identification for Electrical Systems."

B. Create a directory to indicate installed circuit loads after balancing panelboard loads; incorporate Owner's final room designations. Obtain approval before installing. Use a computer or typewriter to create directory; handwritten directories are not acceptable.

C. Panelboard Nameplates: Label each panelboard with a nameplate complying with requirements for identification specified in Section 16075 "Identification for Electrical Systems."

D. Device Nameplates: Label each branch circuit device in distribution panelboards with a nameplate complying with requirements for identification specified in Section 16075 "Identification for Electrical Systems."

3.4 FIELD QUALITY CONTROL

A. Perform tests and inspections.

B. Acceptance Testing Preparation:

1. Test insulation resistance for each panelboard bus, component, connecting supply, feeder, and control circuit.
2. Test continuity of each circuit.

C. Tests and Inspections:

1. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
2. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.

D. Panelboards will be considered defective if they do not pass tests and inspections.

E. Prepare test and inspection reports, including a certified report that identifies panelboards included and that describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

3.5 ADJUSTING

A. Adjust moving parts and operable component to function smoothly, and lubricate as recommended by manufacturer.

B. Set field-adjustable circuit-breaker trip ranges as specified in Section 16055 "Overcurrent Protective Device Coordination ."

3.6 PROTECTION

A. Temporary Heating: Apply temporary heat to maintain temperature according to manufacturer's written instructions.

END OF SECTION 16442

SECTION 16491- FUSES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Cartridge fuses rated 600-V ac and less for use in control circuits, enclosed switches, enclosed controllers and motor-control centers.
2. Spare-fuse cabinets.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated. Include construction details, material, dimensions, descriptions of individual components, and finishes for spare-fuse cabinets. Include the following for each fuse type indicated:

1. Ambient Temperature Adjustment Information: If ratings of fuses have been adjusted to accommodate ambient temperatures, provide list of fuses with adjusted ratings.

a. For each fuse having adjusted ratings, include location of fuse, original fuse rating, local ambient temperature, and adjusted fuse rating.
b. Provide manufacturer's technical data on which ambient temperature adjustment calculations are based.

2. Dimensions and manufacturer's technical data on features, performance, electrical characteristics, and ratings.
3. Current-limitation curves for fuses with current-limiting characteristics.
4. Time-current coordination curves (average melt) and current-limitation curves (instantaneous peak let-through current) for each type and rating of fuse. Submit on translucent log-log graph paper**.**
5. Coordination charts and tables and related data.
6. Fuse sizes for elevator feeders and elevator disconnect switches.

1.4 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For fuses to include in emergency, operation, and maintenance manuals. In addition to items specified in Section 017823 "Operation and Maintenance Data," include the following:

1. Ambient temperature adjustment information.
2. Current-limitation curves for fuses with current-limiting characteristics.

3. Time-current coordination curves (average melt) and current-limitation curves (instantaneous peak let-through current) for each type and rating of fuse. Submit on translucent log-log graph paper.
4. Coordination charts and tables and related data.

1.5 QUALITY ASSURANCE

A. Source Limitations: Obtain fuses, for use within a specific product or circuit, from single source from single manufacturer.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

C. Comply with NEMA FU 1 for cartridge fuses.

D. Comply with NFPA 70.

1.6 PROJECT CONDITIONS

A. Where ambient temperature to which fuses are directly exposed is less than 20deg F or more than 104deg F , apply manufacturer's ambient temperature adjustment factors to fuse ratings.

1.7 COORDINATION

A. Coordinate fuse ratings with utilization equipment nameplate limitations of maximum fuse size and with system short-circuit current levels.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following :

1. Cooper Bussmann, Inc.
2. Edison Fuse, Inc.
3. Ferraz Shawmut, Inc.
4. Littelfuse, Inc.

2.2 CARTRIDGE FUSES

A. Characteristics: NEMA FU 1, nonrenewable cartridge fuses with voltage ratings consistent with circuit voltages.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine fuses before installation. Reject fuses that are moisture damaged or physically damaged.

B. Examine holders to receive fuses for compliance with installation tolerances and other conditions affecting performance, such as rejection features.

C. Examine utilization equipment nameplates and installation instructions. Install fuses of sizes and with characteristics appropriate for each piece of equipment.

D. Evaluate ambient temperatures to determine if fuse rating adjustment factors must be applied to fuse ratings.

E. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 FUSE APPLICATIONS

A. Cartridge Fuses:

1. Service Entrance: Class L, time delay.
2. Feeders: Class RK1, time delay .
3. Motor Branch Circuits: Class RK1, time delay.
4. Other Branch Circuits: Class RK1, time delay.
5. Control Circuits: Class CC, time delay.

3.3 INSTALLATION

A. Install fuses in fusible devices. Arrange fuses so rating information is readable without removing fuse.

3.4 IDENTIFICATION

A. Install labels complying with requirements for identification specified in Section 16075 "Identification for Electrical Systems" and indicating fuse replacement information on inside door of each fused switch and adjacent to each fuse block, socket, and holder.

END OF SECTION 16491

SECTION 16511- INTERIOR LIGHTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Interior lighting fixtures, lamps, and ballasts.
2. Emergency lighting units.
3. Exit signs.
4. Lighting fixture supports.
5. Interior solid-state luminaires that use LED technology.

B. Related Sections:

1. Section 260923 "Lighting Control Devices" for automatic control of lighting, including time switches, photoelectric relays, occupancy sensors, and multipole lighting relays and contactors.
2. Section 260933 "Central Dimming Controls" and Section 260936 "Modular Dimming Controls" for architectural dimming systems.
3. Section 260943.23 "Relay-Based Lighting Controls" for manual or programmable control systems with low-voltage control wiring or data communication circuits. Section 262726 "Wiring Devices" for manual wall-box dimmers for incandescent lamps.

1.3 DEFINITIONS

A. BF: Ballast factor.

B. CCT: Correlated color temperature.

C. CRI: Color-rendering index.

D. LED: Light-emitting diode.

E. LER: Luminaire efficacy rating.

F. Lumen: Measured output of lamp and luminaire, or both.

G. Luminaire: Complete lighting fixture, including ballast housing if provided.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of lighting fixture, arranged in order of fixture designation. Include data on features, accessories, finishes, and the following:

1. Physical description of lighting fixture including dimensions.
2. Emergency lighting units including battery and charger.
3. Ballast, including BF.
4. Energy-efficiency data.
5. Life, output (lumens, CCT, and CRI), and energy-efficiency data for lamps.
6. Photometric data and adjustment factors based on laboratory tests, complying with IESNA Lighting Measurements Testing & Calculation Guides, of each lighting fixture type. The adjustment factors shall be for lamps, ballasts, and accessories identical to those indicated for the lighting fixture as applied in this Project.

    a. Testing Agency Certified Data: For indicated fixtures, photometric data shall be certified by a qualified independent testing agency. Photometric data for remaining fixtures shall be certified by manufacturer.

B. Shop Drawings: For nonstandard or custom lighting fixtures. Include plans, elevations, sections, details, and attachments to other work.

1. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
2. Wiring Diagrams: For power, signal, and control wiring.

C. Samples: For each lighting fixture indicated in the Interior Lighting Fixture Schedule. Each Sample shall include the following:

1. Lamps and ballasts, installed.
2. Cords and plugs.
3. Pendant support system.

D. Installation instructions.

E. Qualification Data: For qualified agencies providing photometric data for lighting fixtures.

F. Product Certificates: For each type of ballast for bi-level and dimmer-controlled fixtures, from manufacturer.

G. Field quality-control reports.

H. Warranty: Sample of special warranty.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For lighting equipment and fixtures to include in emergency, operation, and maintenance manuals.

1. Provide a list of all lamp types used on Project; use ANSI and manufacturers' codes.

1.6 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Lamps: 10 for every 100 of each type and rating installed. Furnish at least one of each type.

1.7 QUALITY ASSURANCE

A. Luminaire Photometric Data Testing Laboratory Qualifications: Provided by an independent agency, with the experience and capability to conduct the testing indicated, that is an NRTL as defined by OSHA in 29 CFR 1910, complying with the IESNA Lighting Measurements Testing & Calculation Guides.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

C. Comply with NFPA 70.

1.8 COORDINATION

A. Coordinate layout and installation of lighting fixtures and suspension system with other construction that penetrates ceilings or is supported by them, including HVAC equipment, fire-suppression system, and partition assemblies.

1.9 WARRANTY

A. Special Warranty for Emergency Lighting Batteries: Manufacturer's standard form in which manufacturer of battery-powered emergency lighting unit agrees to repair or replace components of rechargeable batteries that fail in materials or workmanship within specified warranty period.

1. Warranty Period for Emergency Lighting Unit Batteries: 10 years from date of Substantial Completion. Full warranty shall apply for first year, and prorated warranty for the remaining nine years.
2. Warranty Period for Emergency Fluorescent Ballast and Self-Powered Exit Sign Batteries: Seven years from date of Substantial Completion. Full warranty shall apply for first year, and prorated warranty for the remaining six years.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basic of Design Product: Subject to compliance with requirements, provide product indicated on Drawings or a comparable product. .

2.2 GENERAL REQUIREMENTS FOR LIGHTING FIXTURES AND COMPONENTS

A. Recessed Fixtures: Comply with NEMA LE 4 for ceiling compatibility for recessed fixtures.

B. Fluorescent and LED Fixtures: Comply with UL 1598. Where LER is specified, test according to NEMA LE 5 and NEMA LE 5A as applicable.

C. Metal Parts: Free of burrs and sharp corners and edges.

D. Sheet Metal Components: Steel unless otherwise indicated. Form and support to prevent warping and sagging.

E. Doors, Frames, and Other Internal Access: Smooth operating, free of light leakage under operating conditions, and designed to permit relamping without use of tools. Designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during relamping and when secured in operating position.

F. Diffusers and Globes:

1. Acrylic Lighting Diffusers: 100 percent virgin acrylic plastic. High resistance to yellowing and other changes due to aging, exposure to heat, and UV radiation.

    a. Lens Thickness: At least 0.125 inch minimum unless otherwise indicated.
    b. UV stabilized.

2. Glass: Annealed crystal glass unless otherwise indicated.

G. Factory-Applied Labels: Comply with UL 1598. Include recommended lamps and ballasts. Labels shall be located where they will be readily visible to service personnel, but not seen from normal viewing angles when lamps are in place.

1. Label shall include the following lamp and ballast characteristics:

    a. "USE ONLY" and include specific lamp type.
    b. Lamp diameter code (T-4, T-5, T-8, T-12, etc.), tube configuration (twin, quad, triple, etc.), base type, and nominal wattage for fluorescent and compact fluorescent luminaires.
    c. Start type (preheat, rapid start, instant start, etc.) for fluorescent and compact fluorescent luminaires.
    d. CCT and CRI for all luminaires.

2.3 BALLASTS FOR LINEAR FLUORESCENT LAMPS

A. General Requirements for Electronic Ballasts:

1. Comply with UL 935 and with ANSI C82.11.
2. Designed for type and quantity of lamps served.
3. Ballasts shall be designed for full light output unless another BF, dimmer, or bi-level control is indicated.
4. Sound Rating: Class A.
5. Total Harmonic Distortion Rating: Less than 10 percent.
6. Transient Voltage Protection: IEEE C62.41.1 and IEEE C62.41.2, Category A or better.
7. Operating Frequency: 42 kHz or higher.
8. Lamp Current Crest Factor: 1.7 or less.

9. BF: 0.88 or higher.
10. Power Factor: 0.98 or higher.
11. Parallel Lamp Circuits: Multiple lamp ballasts shall comply with ANSI C82.11 and shall be connected to maintain full light output on surviving lamps if one or more lamps fail.

B. Luminaires controlled by occupancy sensors shall have programmed-start ballasts.

C. Electronic Programmed-Start Ballasts for T5 and T5HO Lamps: Comply with ANSI C82.11 and the following:

1. Lamp end-of-life detection and shutdown circuit for T5 diameter lamps.
2. Automatic lamp starting after lamp replacement.

D. Single Ballasts for Multiple Lighting Fixtures: Factory wired with ballast arrangements and bundled extension wiring to suit final installation conditions without modification or rewiring in the field.

E. Ballasts for Low-Temperature Environments:

1. Temperatures 0 Deg F and Higher: Electronic type rated for 0 deg F starting and operating temperature with indicated lamp types.

2.4 BALLASTS FOR COMPACT FLUORESCENT LAMPS

A. Description: Electronic-programmed rapid-start type, complying with UL 935 and with ANSI C 82.11, designed for type and quantity of lamps indicated. Ballast shall be designed for full light output unless dimmer or bi-level control is indicated:

1. Lamp end-of-life detection and shutdown circuit.
2. Automatic lamp starting after lamp replacement.
3. Sound Rating: Class A.
4. Total Harmonic Distortion Rating: Less than 20 percent.
5. Transient Voltage Protection: IEEE C62.41.1 and IEEE C62.41.2, Category A or better.
6. Operating Frequency: 20 kHz or higher.
7. Lamp Current Crest Factor: 1.7 or less.
8. BF: 0.95 or higher unless otherwise indicated.
9. Power Factor: 0.98 or higher.
10. Interference: Comply with 47 CFR 18, Ch. 1, Subpart C, for limitations on electromagnetic and radio-frequency interference for non-consumer equipment.

2.5 LED FIXTURES

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. NRTL Compliance: Luminaires for hazardous locations shall be listed and labeled for indicated class and division of hazard by an NRTL.

C. FM Global Compliance: Luminaires for hazardous locations shall be listed and labeled for indicated class and division of hazard by FM Global.

D. Bulb shape complying with ANSI C79.1.

E. Lamp base complying with ANSI C81.61.

F. CRI of minimum 80. CCT of 3500 K.

G. Rated lamp life of minimum 50,000 hours at L70.

H. Lamps dimmable from 100 percent to 1 percent of maximum light output.

I. Photometric data and adjustment factors shall be based on laboratory tests, complying with IESNA Lighting Measurements Testing and Calculation Guides, of each lighting fixture type. The adjustment factors shall be for lamps and accessories identical to those indicated for the lighting fixture as applied in this Project, IES LM-79, and IES LM-80.

J. LED driver shall be integral to fixture unless otherwise noted.

K. Nominal Operating Voltage: 120 V ac through 277 V ac.

L. Housings:

1. Extruded-aluminum housing and heat sink.

2.6 EMERGENCY FIXTURE POWER UNIT

A. Internal Type: Self-contained, modular, battery-inverter unit, factory mounted within lighting fixture body and compatible with ballast or driver. Comply with UL 924.

1. Emergency Connection: Operate fluorescent lamp(s) or array(s) of LED's continuously at an output of 1100 lumens. Connect unswitched circuit to battery-inverter unit and switched circuit to fixture ballast.
2. Nightlight Connection: Operate one fluorescent lamp or LED array continuously.
3. Test Push Button and Indicator Light: Visible and accessible without opening fixture or entering ceiling space.

    a. Push Button: Push-to-test type, in unit housing, simulates loss of normal power and demonstrates unit operability.
    b. Indicator Light: LED indicates normal power on. Normal glow indicates trickle charge; bright glow indicates charging at end of discharge cycle.

4. Battery: Sealed, maintenance-free, nickel-cadmium type.
5. Charger: Fully automatic, solid-state, constant-current type with sealed power transfer relay.
6. Integral Self-Test: Factory-installed electronic device automatically initiates code-required test of unit emergency operation at required intervals. Test failure is annunciated by an integral audible alarm and a flashing red LED.

2.7 EXIT SIGNS

A. General Requirements for Exit Signs: Comply with UL 924; for sign colors, visibility, luminance, and lettering size, comply with authorities having jurisdiction.

B. Internally Lighted Signs:

1. Lamps for AC Operation: Fluorescent, two for each fixture, 20,000 hours of rated lamp life.
2. Lamps for AC Operation: LEDs, 50,000 hours minimum rated lamp life.
3. Self-Powered Exit Signs (Battery Type): Integral automatic charger in a self-contained power pack.

    a. Battery: Sealed, maintenance-free, nickel-cadmium type.
    b. Charger: Fully automatic, solid-state type with sealed transfer relay.
    c. Operation: Relay automatically energizes lamp from battery when circuit voltage drops to 80 percent of nominal voltage or below. When normal voltage is restored, relay disconnects lamps from battery, and battery is automatically recharged and floated on charger.
    d. Test Push Button: Push-to-test type, in unit housing, simulates loss of normal power and demonstrates unit operability.
    e. LED Indicator Light: Indicates normal power on. Normal glow indicates trickle charge; bright glow indicates charging at end of discharge cycle.
    f. Integral Self-Test: Factory-installed electronic device automatically initiates code-required test of unit emergency operation at required intervals. Test failure is annunciated by an integral audible alarm and a flashing red LED.

2.8 EMERGENCY LIGHTING UNITS

A. General Requirements for Emergency Lighting Units: Self-contained units complying with UL 924.

1. Battery: Sealed, maintenance-free, lead-acid type.
2. Charger: Fully automatic, solid-state type with sealed transfer relay.
3. Operation: Relay automatically turns lamp on when power-supply circuit voltage drops to 80 percent of nominal voltage or below. Lamp automatically disconnects from battery when voltage approaches deep-discharge level. When normal voltage is restored, relay disconnects lamps from battery, and battery is automatically recharged and floated on charger.
4. Test Push Button: Push-to-test type, in unit housing, simulates loss of normal power and demonstrates unit operability.
5. LED Indicator Light: Indicates normal power on. Normal glow indicates trickle charge; bright glow indicates charging at end of discharge cycle.
6. Wire Guard: Heavy-chrome-plated wire guard protects lamp heads or fixtures.
7. Integral Time-Delay Relay: Holds unit on for fixed interval of 5 minutes when power is restored after an outage.
8. Integral Self-Test: Factory-installed electronic device automatically initiates code-required test of unit emergency operation at required intervals. Test failure is annunciated by an integral audible alarm and a flashing red LED.

2.9 FLUORESCENT LAMPS

A. T8 rapid-start lamps, rated 32 W maximum, nominal length of 48 inches, 2800 initial lumens (minimum), CRI 75 (minimum), color temperature 3500 K, and average rated life 20,000 hours unless otherwise indicated.

B. T8 rapid-start lamps, rated 17 W maximum, nominal length of 24 inches, 1300 initial lumens (minimum), CRI 75 (minimum), color temperature 3500 K, and average rated life of 20,000 hours unless otherwise indicated.

C. T5 rapid-start lamps, rated 28 W maximum, nominal length of 45.2 inches, 2900 initial lumens (minimum), CRI 85 (minimum), color temperature 3500 K, and average rated life of 20,000 hours unless otherwise indicated.

D. Compact Fluorescent Lamps: 4-Pin, CRI 80 (minimum), color temperature 3500 K, average rated life of 10,000 hours at three hours operation per start, and suitable for use with dimming ballasts unless otherwise indicated.

1. 13 W: T4, double or triple tube, rated 900 initial lumens (minimum).
2. 18 W: T4, double or triple tube, rated 1200 initial lumens (minimum).
3. 26 W: T4, double or triple tube, rated 1800 initial lumens (minimum).
4. 32 W: T4, triple tube, rated 2400 initial lumens (minimum).
5. 42 W: T4, triple tube, rated 3200 initial lumens (minimum).

2.10 LIGHTING FIXTURE SUPPORT COMPONENTS

A. Comply with Section 16051 "Basic Materials & Methods" for channel- and angle-iron supports and nonmetallic channel and angle supports.

B. Single-Stem Hangers: 1/2-inch steel tubing with swivel ball fittings and ceiling canopy. Finish same as fixture.

C. Twin-Stem Hangers: Two, 1/2-inch steel tubes with single canopy designed to mount a single fixture. Finish same as fixture.

D. Wires: ASTM A 641/A 641M, Class 3, soft temper, zinc-coated steel, 12 gage .

E. Wires for Humid Spaces: ASTM A 580/A 580M, Composition 302 or 304, annealed stainless steel, 12 gage .

F. Rod Hangers: 3/16-inch minimum diameter, cadmium-plated, threaded steel rod.

G. Hook Hangers: Integrated assembly matched to fixture and line voltage and equipped with threaded attachment, cord, and locking-type plug.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Lighting fixtures:

1. Set level, plumb, and square with ceilings and walls unless otherwise indicated.
2. Install lamps in each luminaire.

B. Temporary Lighting: If it is necessary, and approved by Architect, to use permanent luminaires for temporary lighting, install and energize the minimum number of luminaires necessary. When construction is sufficiently complete, remove the temporary luminaires, disassemble, clean thoroughly, install new lamps, and reinstall.

C. Lay-in Ceiling Lighting Fixtures Supports: Use grid as a support element.

1. Install ceiling support system rods or wires, independent of the ceiling suspension devices, for each fixture. Locate not more than 6 inches from lighting fixture corners.
2. Support Clips: Fasten to lighting fixtures and to ceiling grid members at or near each fixture corner with clips that are UL listed for the application.
3. Fixtures of Sizes Less Than Ceiling Grid: Install as indicated on reflected ceiling plans or center in acoustical panel, and support fixtures independently with at least two 3/4-inch metal channels spanning and secured to ceiling tees.

D. Suspended Lighting Fixture Support:

1. Pendants and Rods: Where longer than 48 inches, brace to limit swinging.
2. Stem-Mounted, Single-Unit Fixtures: Suspend with twin-stem hangers.
3. Continuous Rows: Use tubing or stem for wiring at one point and tubing or rod for suspension for each unit length of fixture chassis, including one at each end.
4. Do not use grid as support for pendant luminaires. Connect support wires or rods to building structure.

E. Connect wiring according to Section 16120 "Low-Voltage Electrical Power Conductors and Cables."

3.2 IDENTIFICATION

A. Install labels with panel and circuit numbers on concealed junction and outlet boxes. Comply with requirements for identification specified in Section 16075 "Identification for Electrical Systems."

3.3 FIELD QUALITY CONTROL

A. Test for Emergency Lighting: Interrupt power supply to demonstrate proper operation. Verify transfer from normal power to battery and retransfer to normal.

B. Prepare a written report of tests, inspections, observations, and verifications indicating and interpreting results. If adjustments are made to lighting system, retest to demonstrate compliance with standards.

3.4 STARTUP SERVICE

A. Burn-in all lamps that require specific aging period to operate properly, prior to occupancy by Owner. Burn-in fluorescent and compact fluorescent lamps intended to be dimmed, for at least 100 hours at full voltage.

3.5 ADJUSTING

A. Occupancy Adjustments: When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting aimable luminaires to suit actual occupied conditions. Provide up to two visits to Project during other-than-normal occupancy hours for this purpose. Some of this work may be required after dark.

1. Adjust aimable luminaires in the presence of Architect.

END OF SECTION 16511

SECTION 16521- EXTERIOR LIGHTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Exterior luminaires with lamps and ballasts.
2. Luminaire-mounted photoelectric relays.
3. Poles and accessories.
4. Exterior solid-state luminaires that are designed for and exclusively use LED lamp technology.
5. Luminaire supports.

B. Related Sections:

1. Section 16511 "Interior Lighting" for exterior luminaires normally mounted on exterior surfaces of buildings.
2. Section 16751 "Relay-Based Lighting Controls" for manual or programmable control systems with low-voltage control wiring or data communication circuits.

1.3 DEFINITIONS

A. CCT: Correlated color temperature.

B. CRI: Color-rendering index.

C. LER: Luminaire efficacy rating.

D. Lumen: Measured output of lamp and luminaire, or both.

E. Luminaire: Complete lighting fixture, including ballast housing if provided.

F. Pole: Luminaire support structure, including tower used for large area illumination.

G. Standard: Same definition as "Pole" above.

1.4 STRUCTURAL ANALYSIS CRITERIA FOR POLE SELECTION

A. Dead Load: Weight of luminaire and its horizontal and vertical supports, lowering devices, and supporting structure, applied as stated in AASHTO LTS-4-M.

B. Live Load: Single load of 500 lbf, distributed as stated in AASHTO LTS-4-M.

C. Ice Load: Load of 3 lbf/sq. ft., applied as stated in AASHTO LTS-4-M Ice Load Map.

D. Wind Load: Pressure of wind on pole and luminaire and banners and banner arms, calculated and applied as stated in AASHTO LTS-4-M.

1. Basic wind speed for calculating wind load for poles 50 feet high or less is 130mph.

a. Wind Importance Factor: 1.23.
b. Minimum Design Life: 50 years.
c. Velocity Conversion Factors: 1.10.

1.5 ACTION SUBMITTALS

A. Product Data: For each luminaire, pole, and support component, arranged in order of lighting unit designation. Include data on features, accessories, finishes, and the following:

1. Physical description of luminaire, including materials, dimensions, effective projected area, and verification of indicated parameters.
2. Details of attaching luminaires and accessories.
3. Details of installation and construction.
4. Luminaire materials.
5. Photometric data and adjustment factors based on laboratory tests , complying with IES Lighting Measurements Testing and Calculation Guides, of each luminaire type. The adjustment factors shall be for lamps and accessories identical to those indicated for the luminaire as applied in the project IES LM-79 and IES LM80.

a. Testing Agency Certified Data: For indicated luminaires, photometric data shall be certified by a qualified independent testing agency. Photometric data for remaining luminaires shall be certified by manufacturer.
b. Manufacturer Certified Data: Photometric data shall be certified by manufacturer's laboratory with a current accreditation under the National Voluntary Laboratory Accreditation Program for Energy Efficient Lighting Products.

6. Photoelectric relays.
7. Ballasts, including energy-efficiency data.
8. Lamps, including life, output, CCT, CRI, lumens, and energy-efficiency data.
9. Materials, dimensions, and finishes of poles.
10. Means of attaching luminaires to supports, and indication that attachment is suitable for components involved.
11. Anchor bolts for poles.
12. Manufactured pole foundations.

B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.

1. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
2. Anchor-bolt templates keyed to specific poles and certified by manufacturer.
3. Design calculations, certified by a qualified professional engineer, indicating strength of screw foundations and soil conditions on which they are based.
4. Wiring Diagrams: For power, signal, and control wiring.

C. Samples: For products designated for sample submission in the Exterior Lighting Device Schedule. Each Sample shall include lamps and ballasts.

1.6 INFORMATIONAL SUBMITTALS

A. Pole and Support Component Certificates: Signed by manufacturers of poles, certifying that products are designed for indicated load requirements in AASHTO LTS-4-M and that load imposed by luminaire and attachments has been included in design. The certification shall be based on design calculations by a professional engineer.

B. Qualification Data: For qualified agencies providing photometric data for lighting fixtures.

C. Field quality-control reports.

D. Warranty: Sample of special warranty.

1.7 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For luminaires and poles to include in emergency, operation, and maintenance manuals.

1.8 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Lamps: One for every 100 of each type and rating installed. Furnish at least one of each type.

1.9 QUALITY ASSURANCE

A. Luminaire Photometric Data Testing Laboratory Qualifications: Provided by an independent agency, with the experience and capability to conduct the testing indicated, that is an NRTL as defined by OSHA in 29 CFR 1910, accredited under the NVLAP for Energy Efficient Lighting Products and complying with applicable IES testing standards.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

C. Provide luminaires from a single manufacturer for each luminaire type.

D. Comply with IEEE C2, "National Electrical Safety Code."

E. Comply with NFPA 70.

1.10 DELIVERY, STORAGE, AND HANDLING

A. Package aluminum poles for shipping according to ASTM B 660.

B. Store poles on decay-resistant-treated skids at least 12 inches above grade and vegetation. Support poles to prevent distortion and arrange to provide free air circulation.

C. Handle wood poles so they will not be damaged. Do not use pointed tools that can indent pole surface more than 1/4 inch deep. Do not apply tools to section of pole to be installed below ground line.

D. Retain factory-applied pole wrappings on fiberglass and laminated wood poles until right before pole installation. Handle poles with web fabric straps.

E. Retain factory-applied pole wrappings on metal poles until right before pole installation. For poles with nonmetallic finishes, handle with web fabric straps.

1.11 FIELD CONDITIONS

A. Verify existing and proposed utility structures prior to the start of work associated with luminaire installation.

B. Mark locations of exterior luminaires for approval by Architect prior to the start of luminaire installation.

1.12 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace products that fail in materials or workmanship; that corrode; or that fade, stain, perforate, erode, or chalk due to effects of weather or solar radiation within specified warranty period. Manufacturer may exclude lightning damage, hail damage, vandalism, abuse, or unauthorized repairs or alterations from special warranty coverage.

1. Warranty Period for Luminaires: Five years from date of Substantial Completion.
2. Warranty Period for Metal Corrosion: Five years from date of Substantial Completion.
3. Warranty Period for Color Retention: Five years from date of Substantial Completion.
4. Warranty Period for Poles: Repair or replace lighting poles and standards that fail in finish, materials, and workmanship within manufacturer's standard warranty period, but not less than three years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis of Design Product: Subject to compliance with requirements, provide product indicated on Drawings or a comparable product.

2.2 GENERAL REQUIREMENTS FOR LUMINAIRES

A. Luminaires shall comply with UL 1598 and be listed and labeled for installation in wet locations by an NRTL acceptable to authorities having jurisdiction.

B. Lateral Light Distribution Patterns: Comply with IESNA RP-8 for parameters of lateral light distribution patterns indicated for luminaires.

C. Metal Parts: Free of burrs and sharp corners and edges.

D. Sheet Metal Components: Corrosion-resistant aluminum unless otherwise indicated. Form and support to prevent warping and sagging.

E. Housings: Rigidly formed, weather- and light-tight enclosures that will not warp, sag, or deform in use. Provide filter/breather for enclosed luminaires.

F. Doors, Frames, and Other Internal Access: Smooth operating, free of light leakage under operating conditions, and designed to permit relamping without use of tools. Designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during relamping and when secured in operating position. Doors shall be removable for cleaning or replacing lenses. Designed to disconnect ballast when door opens.

G. Exposed Hardware Material: Stainless steel.

H. Plastic Parts: High resistance to yellowing and other changes due to aging, exposure to heat, and UV radiation.

I. Light Shields: Metal baffles, factory installed and field adjustable, arranged to block light distribution to indicated portion of normally illuminated area or field.

J. Reflecting surfaces shall have minimum reflectance as follows unless otherwise indicated:

1. White Surfaces: 85 percent.
2. Specular Surfaces: 83 percent.
3. Diffusing Specular Surfaces: 75 percent.

K. Lenses and Refractors Gaskets: Use heat- and aging-resistant resilient gaskets to seal and cushion lenses and refractors in luminaire doors.

L. Luminaire Finish: Manufacturer's standard paint applied to factory-assembled and -tested luminaire before shipping. Where indicated, match finish process and color of pole or support materials.

M. Factory-Applied Finish for Aluminum Luminaires: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

1. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.
2. Natural Satin Finish: Provide fine, directional, medium satin polish (AA-M32); buff complying with AA-M20; and seal aluminum surfaces with clear, hard-coat wax.
3. Class I, Clear Anodic Finish: AA-M32C22A41 (Mechanical Finish: medium satin; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class I, clear coating 0.018 mm or thicker) complying with AAMA 611.
4. Class I, Color Anodic Finish: AA-M32C22A42/A44 (Mechanical Finish: medium satin; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class I, integrally colored or electrolytically deposited color coating 0.018 mm or thicker) complying with AAMA 611.

    a. Color: As selected by Architect from manufacturer’s standard catalog of colors.

N. Factory-Applied Labels: Comply with UL 1598. Include recommended lamps and ballasts. Labels shall be located where they will be readily visible to service personnel, but not seen from normal viewing angles when lamps are in place.

1. Label shall include the following lamp and ballast characteristics:

    a. "USES ONLY" and include specific lamp type.
    b. CCT and CRI for all luminaires.

2.3 LED LUMINAIRE REQUIREMENTS

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. NRTL Compliance: Luminaires shall be listed and labeled for indicated class and division of hazard by an NRTL.

C. FM Global Compliance: Luminaires for hazardous locations shall be listed and labeled for indicated class and division of hazard by FM Global.

D. UL Compliance: Comply with UL 1598 and listed for wet location.

E. Lamp base complying with ANSI C81.61.

F. Bulb shape complying with ANSI C79.1.

G. CRI of minimum 70. CCT of 3500 K.

H. L70 lamp life of at least 50,000 hours.

I. Lamps dimmable from 100 percent to 5 percent of maximum light output.

J. Internal driver.

K. Source Limitations: Obtain luminaires from single source from a single manufacturer.

L. Source Limitations: For luminaires, obtain each color, grade, finish, type, and variety of luminaire from single source with resources to provide products of consistent quality in appearance and physical properties.

2.4 GENERAL REQUIREMENTS FOR POLES AND SUPPORT COMPONENTS

A. Structural Characteristics: Comply with AASHTO LTS-4-M.

1. Wind-Load Strength of Poles: Adequate at indicated heights above grade without failure, permanent deflection, or whipping in steady winds of speed indicated in "Structural Analysis Criteria for Pole Selection" Article.
2. Strength Analysis: For each pole, multiply the actual equivalent projected area of luminaires and brackets by a factor of 1.1 to obtain the equivalent projected area to be used in pole selection strength analysis.

B. Luminaire Attachment Provisions: Comply with luminaire manufacturers' mounting requirements. Use stainless-steel fasteners and mounting bolts unless otherwise indicated.

C. Mountings, Fasteners, and Appurtenances: Corrosion-resistant items compatible with support components.

1. Materials: Shall not cause galvanic action at contact points.
2. Anchor Bolts, Leveling Nuts, Bolt Caps, and Washers: Hot-dip galvanized after fabrication unless otherwise indicated.
3. Anchor-Bolt Template: Plywood or steel.

D. Handhole: Oval-shaped, with minimum clear opening of 2-1/2 by 5 inches, with cover secured by stainless-steel captive screws.

E. Concrete Pole Foundations: Cast in place, with anchor bolts to match pole-base flange. Concrete, reinforcement, and formwork are specified in Section 033000 "Cast-in-Place Concrete."

2.5 ALUMINUM POLES

A. Poles: Seamless, extruded structural tube complying with ASTM B 429/B 429M, Alloy 6063-T6 with access handhole in pole wall.

B. Poles: ASTM B 209, 5052-H34 marine sheet alloy with access handhole in pole wall.

1. Shape: Round, tapered.
2. Mounting Provisions: Butt flange for bolted mounting on foundation or breakaway support.

C. Pole-Top Tenons: Fabricated to support luminaire or luminaires and brackets indicated, and securely fastened to pole top.

D. Grounding and Bonding Lugs: Welded 1/2-inch threaded lug, complying with requirements in Section 260526 "Grounding and Bonding for Electrical Systems," listed for attaching grounding and bonding conductors of type and size listed in that Section, and accessible through handhole.

E. Brackets for Luminaires: Detachable, with pole and adapter fittings of cast aluminum. Adapter fitting welded to pole and bracket, then bolted together with stainless-steel bolts.

1. Tapered oval cross section, with straight tubular end section to accommodate luminaire.
2. Finish: Same luminaire.

F. Prime-Coat Finish: Manufacturer's standard prime-coat finish ready for field painting.

G. Aluminum Finish: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

1. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.
2. Natural Satin Finish: Provide fine, directional, medium satin polish (AA-M32); buff complying with AA-M20; and seal aluminum surfaces with clear, hard-coat wax.
3. Class I, Clear Anodic Finish: AA-M32C22A41 (Mechanical Finish: medium satin; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class I, clear coating 0.018 mm or thicker) complying with AAMA 611.
4. Class I, Color Anodic Finish: AA-M32C22A42/A44 (Mechanical Finish: medium satin; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class I, integrally colored or electrolytically deposited color coating 0.018 mm or thicker) complying with AAMA 611.

a. Color: As selected by Architect from manufacturer's full range.

2.6 POLE ACCESSORIES

A. Base Covers: Manufacturers' standard metal units, arranged to cover pole's mounting bolts and nuts. Finish same as pole.

PART 3 - EXECUTION

3.1 LUMINAIRE INSTALLATION

A. Install lamps in each luminaire.

B. Fasten luminaire to structural supports.

1. Use fastening methods and materials selected to resist seismic forces defined for the application and approved by manufacturer.

C. Supports:
1. Sized and rated for luminaire weight.
2. Able to maintain luminaire position after cleaning and relamping.
3. Support luminaires without causing deflection of finished surface.
4. Luminaire-mounting devices shall be capable of supporting a horizontal force of 100 percent of luminaire weight and a vertical force of 400 percent of luminaire weight.

D. Wiring Method: Install cables in raceways. Conceal raceways and cables.

E. Adjust luminaires that require field adjustment or aiming.

F. Coordinate layout and installation of luminaires with other construction.

G. Comply with requirements in Section 16120 "Low-Voltage Electrical Power Conductors and Cables" and 16130 "Raceways and Boxes for Electrical Systems" for wiring connections and wiring methods.

3.2 POLE INSTALLATION

A. Alignment: Align pole foundations and poles for optimum directional alignment of luminaires and their mounting provisions on the pole.

B. Clearances: Maintain the following minimum horizontal distances of poles from surface and underground features unless otherwise indicated on Drawings:

1. Fire Hydrants and Storm Drainage Piping: 60 inches.
2. Water, Gas, Electric, Communication, and Sewer Lines: 5 feet.
3. Trees: 15 feet from tree trunk.

C. Concrete Pole Foundations: Set anchor bolts according to anchor-bolt templates furnished by pole manufacturer. Concrete materials, installation, and finishing requirements are specified in Section 033000 "Cast-in-Place Concrete."

D. Foundation-Mounted Poles: Mount pole with leveling nuts, and tighten top nuts to torque level recommended by pole manufacturer.

1. Use anchor bolts and nuts selected to resist seismic forces defined for the application and approved by manufacturer.
2. Grout void between pole base and foundation. Use non-shrink or expanding concrete grout firmly packed to fill space.
3. Install base covers unless otherwise indicated.
4. Use a short piece of 1/2-inch- diameter pipe to make a drain hole through grout. Arrange to drain condensation from interior of pole.

E. Raise and set poles using web fabric slings (not chain or cable).

3.3 BOLLARD LUMINAIRE INSTALLATION

A. Align units for optimum directional alignment of light distribution.

B. Install on concrete base with top 4 inches above finished grade or surface at bollard location. Cast conduit into base, and shape base to match shape of bollard base. Finish by troweling and rubbing smooth. Concrete materials, installation, and finishing are specified in Section 033000 "Cast-in-Place Concrete."

3.4 INSTALLATION OF INDIVIDUAL GROUND-MOUNTING LUMINAIRES

A. Install on concrete base with top 4 inches above finished grade or surface at luminaire location. Cast conduit into base, and finish by troweling and rubbing smooth. Concrete materials, installation, and finishing are specified in Section 033000 "Cast-in-Place Concrete."

3.5 CORROSION PREVENTION

A. Aluminum: Do not use in contact with earth or concrete. When in direct contact with a dissimilar metal, protect aluminum by insulating fittings or treatment.

B. Steel Conduits: Comply with Section 16130 "Raceways and Boxes for Electrical Systems." In concrete foundations, wrap conduit with 0.010-inch- thick, pipe-wrapping plastic tape applied with a 50 percent overlap.

3.6 GROUNDING

A. Ground metal poles and support structures according to Section 260526 "Grounding and Bonding for Electrical Systems."

1. Install grounding electrode for each pole unless otherwise indicated.
2. Install grounding conductor pigtail in the base for connecting luminaire to grounding system.

3.7 FIELD QUALITY CONTROL

A. Inspect each installed fixture for damage. Replace damaged fixtures and components.

B. Illumination Observations: Verify normal operation of lighting units after installing luminaires and energizing circuits with normal power source.

C. Prepare a written report of tests, inspections, observations, and verifications indicating and interpreting results. If adjustments are made to lighting system, retest to demonstrate compliance with standards.

END OF SECTION 16521

SECTION 16571 - RELAY-BASED LIGHTING CONTROLS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

B. Section 16145, "Lighting Control Devices".

1.2 SUMMARY

A. Section Includes:

1. Programmable Lighting Control Panels using mechanically held relays for switching.
2. Digital Lighting Management Controllers using relays for switching individual spaces (Room Controllers).

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for control modules, power distribution components, relays, manual switches and plates, and conductors and cables.
2. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.

B. Shop Drawings: For each relay panel and related equipment.

1. Include dimensioned plans, elevations, sections, and details. Show tabulations of installed devices, equipment features, and ratings.
2. Detail enclosure types and details for types other than NEMA 250, Type 1.
3. Detail wiring partition configuration, current, and voltage ratings.
4. Short-circuit current rating of relays.
5. Include diagrams for power, signal, and control wiring.
6. Block Diagram: Show interconnections between components specified in this Section and devices furnished with power distribution system components. Indicate data communication paths and identify networks, data buses, data gateways, concentrators, and other devices to be used. Describe characteristics of data communication lines.

1.4 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Submit evidence that lighting controls are compatible with connected monitoring and control devices and systems specified in other Sections.

1. Show interconnecting signal and control wiring, and interface devices that prove compatibility of inputs and outputs.

B. Field quality-control reports.

C. Sample Warranty: For manufacturer's special warranty.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For lighting controls to include in emergency, operation, and maintenance manuals.

1. Include programming record sheet and lighting control operational summary sheet.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Handle and prepare panels for installation according to NECA 407.

PART 2 - PRODUCTS

2.1 SYSTEM DESCRIPTION - PROGRAMMABLE LIGHTING CONTROL PANEL

A. Input signal from field-mounted manual switches, or digital signal sources, shall open or close one or more lighting control relays in the lighting control panels. Any combination of inputs shall be programmable to any number of control relays.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

C. Comply with 47 CFR, Subparts A and B, for Class A digital devices.

D. Comply with UL 916.

2.2 SYSTEM DESCRIPTION - DIGITAL LIGHTING MANAGMENT CONTROLLERS

A. Digital Room Controllers – Self-configuring, digitally addressable one, two or three relay controllers with 0-10 volt or forward phase control dimming outputs (if applicable) and single relay application-specific plug load controllers.

B. Digital Occupancy Sensors – Self-configuring, digitally addressable and calibrated occupancy sensors with LCD display and two-way active infrared (IR) communications.

C. Digital Switches – Self-configuring, digitally addressable pushbutton switches, dimmers, and scene switches with two-way active infrared (IR) communications.

D. Configuration Tools – Handheld remote for room configuration provides two way infrared (IR) communications to digital devices and allows complete configuration and reconfiguration of the device / room from up to 30 feet away. Unit to have Organic LED display, simple pushbutton interface, and allow bi-directional communication of room variables and occupancy sensor settings. Computer software also customizes room settings.

2.3 PROGRAMMABLE LIGHTING CONTROL RELAY PANELS

A. Basis-of-Design Product: The basis-of-design is ILC Apprentice II. Subject to compliance with requirements, provide product indicated on Drawings or comparable product.

B. Description: Standalone lighting control panel using mechanically latched relays to control lighting and appliances.

C. Lighting Control Panel:
1. Description
a. Lighting Control Panels shall be UL listed and consist of the following:
1) Enclosure/Tub: NEMA 1.
2) Cover: Surface or Flush as required, hinged, lockable and shall restrict access to line voltage section.
3) Interior: Barrier for separation of high voltage (class 1) and low voltage (class 2) wiring. It shall include intelligence boards, power supply and controls relays. Clock display and keypad shall be mounted on interior cabinet door for easy user access and programming.
2. Features
a. Panel shall accept up to eight single pole relays. Relays shall be individual latching relays with 20 Amp load contacts for ballast (including HID, magnetic or electronic type ballasts), tungsten and general purpose loads. Provide isolated auxiliary contacts for pilot light switching. Relays shall use quick connectors and be individually replaceable to facilitate ease of use.
b. Where indicated, panels shall provide space within the high voltage section of the enclosure to accommodate up to 12 multi-pole contactors. Two sections of DIN rail mounting shall be provided as standard. No field drilling or fabrication shall be required for mounting contactors or other accessories within the enclosure.
c. The lighting control panel shall provide a stagger up delay, override push buttons, pilot light outputs, and LED status light indicators for each relay or contactor control channel.
d. The clock shall have a backlight display, user keypad and shall provide 8 channels of time or astronomical control. Preprogrammed lighting control scenarios shall include: scheduled on/off, manual on/scheduled off, manual on/automatic switch sweep off, astronomic or photocell on/off and astronomic or photocell control with scheduled on/off. Time clock shall provide up to 42 holidays, automatic daylight savings adjustment, astronomic coordinates by major cities, and help screens. Program memory shall be non-volatile and clock shall retain time keeping during power outages for at least 48 hours.
e. The panel shall have 8 universal switch inputs that are low voltage, self-configuring and shall not require programming to accept momentary on/ momentary off switch, push button switch (cycling), maintained switch or 24VDC signals from occupancy sensors, photocells or other interfacing devices.
f. Occupancy sensor and time control shall be integrated to allow occupancy sensor control after hours with hold on of lighting during occupancy scheduled time. During occupied time, control scenarios shall be selectable for time schedule of lighting on or occupancy sensor detection of lighting on initially and then hold on of lighting during occupied hours. Control shall provide selectable occupancy sensor blink warning prior to shut off and adjustable occupancy sensor time delay from the time clock keypad.
g. After-hour interior lighting shut off control shall provide a full duration override time of 1 to 240 minutes with a warning blink five minutes prior to shutting the lighting off. An impending shut off will be cancelled and the override period re-initialized through the operation of any assigned switch input.
h. After-hour interior lighting shut off control may be by line voltage power interrupt control to automatic control switches. The lighting control relay panel shall provide

a warning blink signal to automatic control switches, thus allowing a five-minute delay prior to shutting off lighting. The lighting shut off event may be cancelled by pressing the automatic control switch push button. The lighting control panel time clock shall provide periodic lighting sweep signals to shut off automatic control switches.

2.4 DIGITAL LIGHTING MANAGEMENT CONTROLLERS

A. Basis-of-Design Product: The basis-of-design is WattStopper LMRC series. Subject to compliance with requirements, provide product indicated on Drawings or comparable product.

B. Room Controllers shall automatically bind the room loads to the connected devices in the space without commissioning or the use of any tools. Room Controllers shall be provided to match the room lighting load and control requirements. The controllers will be simple to install and shall not have, dip switches, potentiometers or require special configuration. The control units shall include the following features:

1. Automatic room configuration to the most energy-efficient sequence of operation based upon the devices in the room.
2. Simple replacement – Using the default automatic configuration capabilities, a room controller may be replaced with an off-the-shelf unit without requiring any configuration or setup.
3. Device Status LEDs to indicate power, load status, data transmission, and configuration status.
4. Quick installation features including standard junction box mounting and quick low voltage connections via RJ-45 connectors.
5. Plenum rated.
6. Manual override with indication.
7. Zero crossing circuitry for each load to extend contact life.

C. It shall be possible to connect multiple room controllers together with Category 6 communication cables to create a local network of controllers for a larger space.

2.5 FIELD MOUNTED SIGNAL SOURCES FOR PROGRAMMABLE LIGHTING CONTROL PANEL

A. Automatic Control Switch: Push button wall switch capable of on/off manual operation and shall also be capable of receiving automatic control signals through interrupting power to the circuit feeding the switch and load. Control switch shall be capable of 3-way, 4-way, or multi-way switching. Self-adjusting zero cross switching technology shall be used to protect from the effects of high inrush current and to increase switch/relay operation life. Control switch shall have user adjustable settings for occupancy sensor/control panel operating mode, enable/disable audible beep, and enable/disable command on feature. Settings shall be made using the switch push button and configuration LEDs and shall not require the removal of the switch faceplate. Lighting control panel operation shall include the capability of automatically shutting switches off, turning switches on, and delaying switches off. Delay off operation shall provide a one or two second warning blink followed by a five minute delay time period before shutting off the lights. During the delay off period, the locator LED shall blink and, if enabled, an audible warning beep shall sound each minute for the first four minutes and each five seconds during the last minute of the delay time period. The delayed shut off may be canceled by pressing the front push button.

B. Low Voltage Momentary Switch: Modular, momentary contact, three wire, for operating one or more relays and to override automatic controls.

1. Match color and style specified in Section 16140 "Wiring Devices."
2. Integral green LED pilot light to indicate when circuit is on.

2.6 FIELD MOUNTED SIGNAL SOURCES FOR DIGITAL LIGHTING MANAGEMENT CONTROLLERS

A. Occupancy Sensors: Ceiling mounted passive infrared (PIR), ultrasonic or dual technology digital (passive infrared and ultrasonic) occupancy sensor. Furnish the Company's system which accommodates the square-foot coverage requirements for each area controlled, utilizing room controllers, digital occupancy sensors and accessories which suit the lighting and electrical system parameters.

1. Digital Occupancy Sensors shall provide graphic LCD display for digital calibration and electronic documentation. Provide digital calibration and pushbutton programming for the following variables:
   a. Sensitivity: 0-100% in 10% increments.
   b. Time Delay: 1-30 minutes in 1 minute increments.
   c. Test Mode: 5-second time delay.
2. Units shall not have any dip switches or potentiometers for field settings.

B. Digital Wall Switches: Low voltage momentary pushbutton switches in 1, 2, 3, 4, 5 and 8 button configuration; available in white, light almond, ivory, grey, red and black; compatible with wall plates with decorator opening. Wall switches shall include the following features:

1. Two-way infrared (IR) transceiver for use with personal and configuration remote controls.
2. Removable buttons for field replacement with engraved buttors and/or alternate color buttons. Button replacement may be completed without removing the switch from the wall.
3. Red configuration LED on each switch that blinks to indicate data transmission.
4. Two RJ-45 ports for connection to DLM local network.
5. Multiple digital wall switches may be installed in a room by simply connecting them to the free topology DLM local network. No additional configuration shall be required to achieve multi-way switching.

2.7 CONDUCTORS AND CABLES

A. Power Wiring to Supply Side of Class 2 Power Source: Not smaller than No. 12 AWG, complying with Section 16120 "Low-Voltage Electrical Power Conductors and Cables."

B. Classes 2 and 3 Control Cables: Multiconductor cable with copper conductors not smaller than No. 18 AWG, complying with Section 16120 "Low-Voltage Electrical Power Conductors and Cables."

C. Digital and Multiplexed Signal Cables: Unshielded, twisted-pair cable with copper conductors, complying with TIA/EIA-568-B.2, Category 6 for horizontal copper cable.

PART 3 - EXECUTION

3.1 GENERAL

A. Install the work of this Section in accordance with manufacturer's printed instructions unless otherwise indicated.

3.2 EXAMINATION

A. Receive, inspect, handle, and store panels according to NECA 407.

B. Examine panels before installation. Reject panels that are damaged or rusted or have been subjected to water saturation.

C. Examine elements and surfaces to receive panels for compliance with installation tolerances and other conditions affecting performance of the Work.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 WIRING INSTALLATION

A. Comply with NECA 1.

B. Wiring Method: Install cables in raceways except within consoles, cabinets, desks, and counters. Conceal raceway and cables except in unfinished spaces.

1. Comply with requirements for raceways and boxes specified in Section 16130 "Raceways and Boxes for Electrical Systems."

C. Wiring within Enclosures: Bundle, lace, and train conductors to terminal points with no excess and without exceeding manufacturer's limitations on bending radii. Install lacing bars and distribution spools.

3.4 PANEL INSTALLATION

A. Comply with NECA 1.

B. Install panels and accessories according to NECA 407.

C. Mount top of trim 90 inches above finished floor unless otherwise indicated.

D. Mount panel cabinet plumb and rigid without distortion of box.

E. Install filler plates in unused spaces.

3.5 IDENTIFICATION

A. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Section 16075 "Identification for Electrical Systems."

B. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs complying with Section 16075 "Identification for Electrical Systems."

C. Create a directory to indicate loads served by each relay; incorporate Owner's final room designations. Obtain approval before installing. Use a PC or typewriter to create directory; handwritten directories are unacceptable.

D. Lighting Control Panel Nameplates: Label each panel with a nameplate complying with requirements for identification specified in Section 16075 "Identification for Electrical Systems."

3.6 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections. Upon completion of the installation, the manufacturer's factory authorized representative shall start up and verify a complete fully functional system.

B. Perform the following tests and inspections with the assistance of a factory-authorized service representative:

1. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
2. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.

C. Acceptance Testing Preparation:

1. Test continuity of each circuit.

D. Lighting control panel will be considered defective if it does not pass tests and inspections.

E. Prepare test and inspection reports, including a certified report that identifies lighting control panels and describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations made after remedial action.

3.7 STARTUP SERVICE

A. Engage a factory-authorized service representative to perform startup service.

1. Complete installation and startup checks according to manufacturer's written instructions.
2. Confirm correct communications wiring, initiate communications between panels, and program the lighting control system according to approved configuration schedules, time-of-day schedules, and input override assignments.
3. Program control panel to match sequence on drawings, unless directed otherwise by the end user.

B. Calibrate all sensor time delays and sensitivity to guarantee proper detection of occupants and energy savings. Adjust time delay so that controlled area remains lighted for 5 minutes after occupant leaves area.

C. Provide written or computer-generated documentation on the commissioning of the system including room by room description including:

1. Sensor parameters, time delays, sensitivities, and setpoints.
2. Sequence of operation, (e.g. manual ON, Auto OFF. etc.).
3. Load Parameters (e.g. blink warning, etc.).

D. Re-commissioning – After 30 days from occupancy re-calibrate all sensor time delays and sensitivities to meet the Owner's Project Requirements. Provide a detailed report to the Architect / Owner of re-commissioning activity.

3.8 ADJUSTING

A. Occupancy Adjustments: When requested within 12 months from date of Substantial Completion, provide on-site assistance in adjusting system to suit actual occupied conditions. Provide up to two visits to Project during other-than-normal occupancy hours for this purpose.

3.9 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain the control unit and operator interface. Provide a minimum of 4 hours training.

END OF SECTION 16571

SECTION 16721- FIRE-ALARM SYSTEM

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

B. The complete installation shall conform to the applicable sections of NFPA 72 and NFPA 70, National Electrical Code.

C. NFPA 90A

D. NFPA 101

E. Americans with Disabilities Act

F. ASME/ANSI A17.1 and A17.3

1.2 SUMMARY

A. This section includes fire alarm system components that include, but are not limited to, the following::

1. Fire-alarm control unit.
2. Power supplies
3. Single and multiple station smoke alarms.
4. Addressable manual fire-alarm stations.
5. Addressable smoke detectors.
6. Addressable heat detectors.
7. Conventional smoke detectors.
8. Conventional heat detectors.
9. Notification appliances.
10. Remote annunciator.
11. Addressable monitoring and control interface devices.

B. Work covered by this specification section includes the furnishing of labor, equipment, materials, and complete operational performance required for installation of the Fire Alarm System as shown on the drawings, as specified, and as directed by the Architect/Engineer.

C. The work covered by this section of the specification shall be coordinated with the related work as specified elsewhere under the project specifications.

1.3 SYSTEM DESCRIPTION AND GENERAL REQUIREMENTS

A. General: Complete, microprocessor-based, addressable fire detection and alarm system with manual and automatic alarm initiation, and addressable analog initiating devices as indicated .

B. The fire alarm system shall allow for loading and editing special instructions and operating sequences as required. The system shall be capable of on-site programming to accommodate system expansion and facilitate changes in operation. All software-programmed operations shall be stored in a non-volatile memory within the fire alarm control unit. Loss of primary and secondary power shall not erase the instructions stored in memory.

C. All control equipment must have transient protection to comply with UL864 requirements.

D. Where Fire Alarm circuits leave the building, additional transient protection must be provided for each circuit. Devices must be UL listed under standard # 497B.

E. System connections for alarm-notification circuits and voice/alarm communication circuits shall be Class B/Style Y.

F. System connections for signaling line addressable device circuits shall be Class B/Style 4.

G. System connections for initiating device circuits shall be Class B/Style B.

H. Power supplies, signaling line circuits, initiating device circuits, notification appliance circuits, control equipment, and control panel components shall all be sized and designed so that no more than 75% of the capacity of the circuit / component is utilized. For example, no more than 75 addressable devices shall be connected to a signaling line circuit with a capacity of 100 devices; notification appliance circuits with a capacity of 2 amps shall not be loaded any greater than 1.5 amps; and power supplies rated for 4 amps shall not be loaded any greater than 3 amps.

I. Power Requirements

1. All control panels and power supplies shall receive 120 VAC power via dedicated circuits. Circuit breakers serving fire alarm control equipment shall have a red marking, shall be accessible to authorized personnel only, and shall be identified as service fire alarm control equipment. The location of the circuit breaker or circuit disconnecting means shall be permanently identified at the associated fire alarm control unit.
2. The system shall be provided with sufficient battery capacity to operate the entire system upon loss of normal 120 VAC power in normal supervisory mode for a period of 24 hours plus an additional 5 minutes of alarm operation at the end of this period. Provide 25% spare battery capacity for future expansion. Include additional battery cans and chargers as necessary.
3. The system shall automatically transfer to battery standby upon normal power failure. All battery charging and recharging operations shall be automatic.
4. The system batteries shall be supervised so that a low battery condition or disconnection of the battery shall be audibly and visibly indicated at the control unit.

J. System Survivability:

1. Smoke detectors shall be placed above each fire alarm system control unit, including remote power supplies and amplifiers, in accordance with NFPA 72.

K. Smoker Detector Sensitivity and Environmental Compensation:

1. The FACP / detector shall maintain a moving average of the detector’s smoke chamber value to automatically compensate (move the threshold) for dust, dirt, and component degradation conditions that could affect detection operations. The control unit / detector shall automatically maintain constant smoke obscuration sensitivity for each sensor by compensating for environmental factors.

2. The FACP shall automatically indicate when individual detectors are excessively dirty, dirty, or almost dirty so that maintenance can be done on all detectors simultaneously.
3. The FACP shall be listed for automatic compliance with NFPA 72 sensitivity testing requirement.
4. Remote Smoke-Detector Sensitivity Adjustment: The sensitivity of each addressable detector shall be able to be remotely adjusted and displayed at the FACP. Controls shall select specific addressable smoke detectors for adjustment, display their current status and sensitivity settings, and change those settings.
5. Day / Night Sensitivity: It shall be possible to program automated changes in sensitivity of specific detector groups based on repetitive time schedules.

1.4 SYSTEM SEQUENCE OF OPERATION

A. Alarm Sequence: Upon activation of any manual station or any automatic alarm detection device the following shall take place:

1. An audible and visual general alarm condition shall be indicated at the FACP and the annunciators.
2. The alarm shall be recorded in a separate alarm history log.
3. Audible and visible alarm notification signals throughout the building are activated. Alarms shall remain on until silenced by the alarm silence switch at the FACP. Any subsequent alarm shall reactivate the alarm notification appliances.
4. All smoke doors on the floor of alarm normally held open by magnetic door holders shall be released after a 5-second delay.
5. All designated egress doors shall be unlocked.
6. Supply and return fans serving the area where the alarm originated shall be shut down.
7. A supervised alarm signal shall be transmitted to notify the monitoring station.

B. Supervisory and Trouble Sequence: Upon detecting any trouble or supervisory condition, the following shall take place:

1. An audible signal shall sound and the associated visual signal shall illuminate at the FACP and the annunciators. Audible and visual differentiation between supervisory and trouble conditions shall be provided. The differentiation shall be clearly identified in plain-language on the FACP alphanumeric display.
2. A record of the supervisory or trouble condition shall be kept in the associated FACP historical log.
3. Trouble and supervisory conditions shall initiate the transmission of a supervised trouble or supervisory signal, respectively, to the monitoring station.

C. Alarm Verification Sequence: Upon activation of any smoke detector, the control panel initiates a 60 second delay during which a second alarm from the same device must occur before the alarm sequence is activated.

1. The alarm verification operation shall be selectable by addressable device.
2. The control Unit shall have the capability to display the number of times (tally) a device had gone into a verification mode. Should this smoke verification tally reach a pre-programmed number, a trouble condition shall occur.

D. Elevator Recall Sequence: The activation of any elevator lobby, elevator pit, elevator shaft, or elevator machine room smoke detector shall , in addition to the alarm sequences listed above, cause the associated elevator cabs to be recalled according to the following sequence:

1. If the alarmed device is on any floor other than the main level of egress, the elevator cabs shall be recalled to the main level of egress.
2. If the alarmed device is on the main egress level, the elevator cabs shall be recalled to the predetermined alternate recall level as determined by the local authority having jurisdiction.

E. Elevator Shunt Trip Sequence: The activation of any elevator pit, elevator shaft, or elevator machine room heat detector shall, in addition to the operations listed above for elevator recall, causes the associated elevators to be shunt tripped. Power to the shunt trip coil shall be supervised by the system, and loss of power to the shunt trip control circuit shall initiate the supervisory sequence.

F. AHU Shutdown Sequence: The activation of any duct-mounted smoke detector shall, in addition to the alarm sequence indicated above, causes the associated air handling unit to be shut down.

G. Smoke Damper Control Sequence: Activation of a duct-mounted smoke detector located upstream of a smoke damper shall, in addition to the alarm sequence indicated above, cause the associated smoke damper to be shut.

H. Door Holder Sequence: The activation of a smoke detector within 5 feet of a smoke door shall cause, in addition to the above alarm sequence, the associated smoke door to close.

I. Kitchen Hood Suppression Release Control Sequence: Activation of the kitchen hood suppression release panel shall, in addition to the alarm sequence above, initiate the following control sequences (if not initiated directly by the Kitchen Hood Suppression System Panel):

1. All circuit breakers that feed power to appliances under the hood shall be shunt-tripped. Power to the shunt trip coils shall be supervised by the system, and loss of power to the shunt trip control circuits shall initiate the supervisory sequence.
2. Power to all normally closed, gas system solenoid valves shall be removed, shutting off the supply of natural gas to the appliances under the hood.
3. The kitchen hood supply fan shall be shut down.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product specified, including performance parameters and installation details.

B. Shop Drawings: For fire-alarm system. Include plans, elevations, sections, details, and attachments to other work.

1. Comply with recommendations in the "Documentation" Section of the "Fundamentals of Fire Alarm Systems" Chapter in NFPA 72.
2. Include power calculations indicating exactly what devices (and how much current they draw) are on each notification appliance circuit. Include voltage drop calculations for notification appliance circuits.
3. Include battery-size calculations.
4. Include voice/alarm signaling-service amplifier power calculations.
5. Include a riser diagram showing all panel interconnections and the quantity of devices on each circuit.
6. Include floor plans to indicate all panel and device locations showing address of each addressable device.

7. Include a list of labels for every addressable device in the system for approval by the Owner prior to programming.
8. Include a wire legend describing the manufacturer's recommended cables and cable characteristics.
9. Include a project-specific system sequence of operation description.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For fire-alarm systems and components to include in emergency, operation, and maintenance manuals. In addition to items specified in Section 017823 "Operation and Maintenance Data," include the following:

1. Comply with the "Records" Section of the "Inspection, Testing and Maintenance" Chapter in NFPA 72.
2. Provide "Record of Completion Documents" according to NFPA 72 article "Permanent Records" in the "Records" Section of the "Inspection, Testing and Maintenance" Chapter.
3. Record copy of site-specific software.
4. Provide "Maintenance, Inspection and Testing Records" according to NFPA 72 article of the same name and include the following:

    a. Frequency of testing of installed components.
    b. Frequency of inspection of installed components.
    c. Requirements and recommendations related to results of maintenance.
    d. Manufacturer's user training manuals.

5. Manufacturer's required maintenance related to system warranty requirements.
6. Abbreviated operating instructions for mounting at fire-alarm control unit.
7. Final device address list.

1.7 QUALITY ASSURANCE

A. System installers shall be trained and certified by the equipment manufacturer for installation of units required for this Project. At a minimum, installation shall be supervised by personnel certified by NICET as a fire-alarm Level III technician.

B. Shop Drawings shall be prepared by persons with the following qualifications:

1. Trained and certified by manufacturer in fire-alarm system design.
2. Licensed or certified by authorities having jurisdiction.

C. Source Limitations for Fire-Alarm System and Components: Obtain fire-alarm system from a single source and from a single manufacturer. Components shall be compatible with, and operate as, an extension of existing system.

D. Electrical Components, Devices, and Accessories: U.L. listed and labeled by a qualified testing agency, and marked for intended location and application.

E. Fire alarm system installer shall be located within 50 miles of the project location and shall have a minimum of 5 years experience in installing such systems.

F. Fire alarm system service provider shall be located within 50 miles of the project location and shall have a minimum of 10 years experience in servicing such systems.

1.8 WARRANTY

A. The entire fire alarm system shall be warranted free from defects in material and workmanship for a period of one year from the date of final system acceptance.

1.9 SERVICE AGREEMENT

A. Comply with UL 864.

B. Provide a full service and maintenance contract for the system, for the duration of the warranty period. Agreement shall include all equipment, labor, programming, testing, and adjusting as necessary during the warranty period to maintain a fully-functional, code-compliant system. Contract shall include a minimum of two visits for detector sensitivity adjustments.

PART 2 - PRODUCTS

2.1 FIRE-ALARM CONTROL PANEL (FACP)

A. General Requirements for Fire-Alarm Control Panels

1. A signal from one device shall not prevent the receipt of signals from any other device.
2. Loss of primary power at a FACP shall sound a trouble signal and shall indicate at that FACP when the system is operating on an alternate power supply.
3. Communication between each fire alarm control panel and addressable devices shall be completely digital.
4. Each panel shall have provisions for disabling and enabling all circuits individually for maintenance or testing purposes.
5. Each FACP shall contain separate alarm, trouble, and supervisory logs to prevent alarm and supervisory conditions from being overwritten by intermittent trouble conditions.
6. Each FACP shall be field-programmable, microprocessor-based, modular, power-limited design with electronic modules, complying with UL 864 and listed and labeled by an NRTL.
    a. System software and programs shall be held in flash electrically erasable programmable read-only memory (EEPROM), retaining the information through failure of primary and secondary power supplies.
    b. Include a real-time clock for time annotation of events on the event recorder and printer.

B. Alphanumeric Display and System Controls: Arranged for interface between human operator at fire-alarm control unit and addressable system components including annunciation and supervision. Display alarm, supervisory, and component status messages and the programming and control menu. Manual and automatic operation of alarm and supervisory initiating devices shall be annunciated on each FACP display indicating the location and type of device.

1. Annunciator and Display: Liquid-crystal type, 80 characters, minimum.
2. Keypad: Arranged to permit entry and execution of programming, display, and control commands and to indicate control commands to be entered into the system for control of smoke-detector sensitivity and other parameters.
3. Each FACP shall display only those primary controls and displays essential to operation during a fire alarm condition. Keyboards or keypads shall not be required to operate the

system during fire alarm conditions. A local audible device shall sound during each key press to provide an audible feedback to ensure that the key had been pressed properly.

C. Each FACP shall be capable of supporting a minimum of 100 addressable devices of any type on a single addressable circuit.

D. Each FACP shall be capable of being tested by one person. In test mode, control functions shall be bypassed and the monitoring station shall be disconnected. Should the one-person test feature be on for an inappropriate amount of time the FACP shall revert to the normal mode automatically. It shall be possible to separate addressable devices into test groups. Test groups shall be programmable and field editable. Each FACP shall be capable of a minimum of 8 test groups.

E. Each FACP shall be "network upgradeable". It shall not be necessary to replace the FACP in order to provide a networked system at a later date.

F. Each FACP shall be provided with a minimum of 2 RS-232 outputs capable of operating a remote maintenance terminal and/or printers; outputs shall be ASCII from an EIA RS-232C connection with an adjustable baud rate. Each output shall be field configurable for supervised or for unsupervised operation.

G. Provide integral DACT that communicates alarm, trouble, and supervisory conditions to a UL listed remote station. The monitoring service shall be provided under a separate contract with the owner. Capabilities of the transmitter shall be as specified below.

H. Relay Outputs: At a minimum, provide three, form C, programmable, relay contacts rated a minimum of 2-amps at 24-volts DC. Contacts shall be programmed to indicate system alarm, supervisory, and trouble conditions, respectively, for monitoring by other systems.

I. Primary Power: 24-V dc obtained from 120-V ac service and a power-supply module. Initiating devices, notification appliances, signaling lines, trouble signals, supervisory signals, digital alarm communicator transmitters etc. shall be powered by 24-V dc source.

1. Alarm current draw of entire fire-alarm system shall not exceed 75 percent of the power-supply module rating.

2.2 DIGITAL ALARM COMMUNICATOR TRANSMITTER

A. Digital alarm communicator transmitter shall be acceptable to the remote central station and shall comply with UL 632 and be listed and labeled by an NRTL.

B. Functional Performance: Unit shall receive an alarm, supervisory, or trouble signal from fire-alarm control unit and automatically capture one of two available telephone line(s) and dial a preset number for a remote monitoring station. When contact is made with the remote monitoring station, signals shall be transmitted. If service on either line is interrupted for longer than 45 seconds, transmitter shall initiate a local trouble signal and transmit the signal indicating loss of telephone line to the remote alarm receiving station over the remaining line. Transmitter shall automatically report telephone service restoration to the central station. If service is lost on both telephone lines, transmitter shall initiate the local trouble signal.

C. Digital data transmission shall include the following:

1. Address/zone of the alarm condition.
2. Address/zone of the supervisory condition.

3. Address/zone of the trouble-condition.
4. Loss of ac supply or loss of power.
5. Low battery.
6. Abnormal test signal.
7. Communication bus failure.

D. Self-Test: Conducted automatically every 24 hours with report transmitted to remote monitoring station.

2.3 REMOTE POWER SUPPLIES

A. Where additional notification power is required, provide remote power supplies as necessary to support the notification load.

B. Remote power supplies shall have a minimum of 4 DC output circuits and 8 amps of available power.

C. Mount remote power supplies as necessary in locations to be approved by the owner. Show remote power supply locations on submittal shop drawings.

2.4 BATTERIES

A. Batteries shall be sealed lead-acid, maintenance-free-type. Size all batteries to meet the requirements set in paragraph 1.3 "SYSTEM DESCRIPTION AND GENERAL REQUIREMENTS.

2.5 REMOTE SYSTEM ANNUNCIATOR

A. Annunciators shall use the same Primary Acknowledge, Silence, and Reset Keys, Status LEDs and LCD Display as the system FACP.

B. Mounting: Flush cabinet, NEMA 250, Type 1.

C. Operator keys shall be key-switch enabled to prevent unauthorized use. The key shall only be removable in the disabled position.

D. Annunciators shall display alarm, trouble, and supervisory status information for every device connected to the system.

2.6 MANUAL FIRE-ALARM STATIONS

A. General Requirements: Comply with UL 38.

1. Pull stations shall be addressable, Double-action (push-pull) type, fabricated of high impact red polycarbonate, and finished in red with molded, raised-letter operating instructions of contrasting color. Stations requiring the breaking of a glass panel are not acceptable. Stations requiring the breaking of a concealed rod may be provided.
2. Station Reset: Key- or wrench-operated switch.
3. Stations shall show visible indication of operation; and shall be mounted on recessed outlet box. If surface mounting is required by field conditions, provide manufacturer's red-painted surface back box.

4. Indoor Protective Shield: Where indicated on drawings, provide a factory-fabricated clear plastic enclosure hinged at the top to permit lifting for access to initiate an alarm. Lifting the cover actuates an integral battery-powered audible horn intended to discourage false-alarm operation. The horn shall be rated at a minimum of 85 dB at 10 feet and shall be powered by a 9-volt battery.
5. Weatherproof Protective Shield: When located outside or in high humidity areas, provide a weatherproof, factory-fabricated clear plastic enclosure hinged at the top to permit lifting for access to initiate an alarm.

2.7 ADDRESSABLE DETECTORS, BASES, AND HOUSINGS

A. General Requirements:

1. Integral Addressable Module: Arranged to communicate detector information to the fire-alarm control panel, to program detector sensitivity from the FACP, and to control programmable base / housing functions.
2. Mounting: Detector and associated electronic components shall be mounted in a twist-lock module that connects to a fixed base or is inside a protective housing. Provide terminals in the fixed base / housing for connection to building wiring.
3. Self-Restoring: Detectors do not require resetting or readjustment after actuation to restore them to normal operation.
4. Integral Visual-Indicating Light: LED type indicating detector activation and power-available status.
5. Supervision: Removal of a detector head from its base / housing shall cause a trouble signal at the FACP.

B. Detector Bases for Spot-Type Detectors: Bases shall be compatible with detector installed and shall provide for a quick and secure detector plug-in. Detectors without separate bases will not be allowed. Wiring connections shall be via screws accepting conductors in sizes from 24 AWG to 14 AWG.

1. Sounder Bases: Where noted on plans, detectors shall be provided with programmable sounder bases. It shall be possible to program the sounder to operate on local or general alarm conditions. Sounder shall be rated a minimum of 85 dB and shall implement the NFPA 72 standard “temporal 3 coded” evacuation signal. It shall be possible for several sounders in a common area to be synchronized. As an added security feature, sounder bases shall be provided with a mechanical locking feature for the detector, preventing unauthorized removal of a detector from the base.

C. Heat Detectors: U.L. 521. Analog, addressable, rate compensated, communicating actual temperature information to the FACP

1. Rate-of-rise temperature characteristic shall be selectable at fire-alarm control unit for 15 or 20 deg F (8 or 11 deg C) per minute.
2. Fixed-temperature sensing shall be independent of rate-of-rise sensing and shall be settable at fire-alarm control unit to operate at 135 or 155 deg F (57 or 68 deg C).

D. Photoelectric Smoke Detectors: U.L. 268. Analog, addressable, operating on the light scattering principle of smoke detection, communicating % per foot obscuration information to the FACP.

1. Sensitivity Range: 0.5% to 3.5% per foot of smoke obscuration.
2. Air velocity range: 0-2000 ft/min (minimum).

E. Duct-Mounted Smoke Detector: U.L. 268A. Analog, addressable, photoelectric smoke detector, communicating % per foot obscuration information to the FACP, mounted in a protective housing that accommodates sampling tubes and is suitable for mounting to HVAC ductwork.

1. Protective Housing: Impact resistant, suitable for mounting to either round or rectangular ducts, listed for use with the supplied detector.
2. Sensitivity Range: 0.5% to 3.5% per foot of smoke obscuration
3. Air velocity range: 300-4000 ft/min (minimum).
4. Sampling Tubes: Design and dimensions as recommended by manufacturer for specific duct size, air velocity, and installation conditions.
5. Relay Fan Shutdown: Form C contact rated to interrupt fan motor-control circuit.
6. Remote alarm/test station: Provide a remote alarm test station for each concealed, duct-mounted smoke detector in accordance with NFPA 72. Locate alarm / test station in a visible location, near the concealed detector.

2.8 ADDRESSABLE INTERFACE DEVICES

A. Description: Addressable, completely supervised control and monitor modules as required for a completely addressable system. The use of panel mounted conventional zone or relay circuits is not acceptable unless otherwise indicated on drawings. Modules shall mount in a standard electrical outlet box and shall be compatible with other addressable devices on the same signaling line circuit.

B. Addressable Control Module: Programmable relay with contacts rated a minimum of 1-amp at 24-volts DC, ½-amp at 120-volts AC.

C. Addressable Monitor Module: Provides class B supervision of a set of dry contacts and communicates status back to the FACP.

D. Addressable Signal Modules: Class A or class B supervised notification appliance circuit for selective control of specific horns, strobes, or speakers.

E. ISOLATOR MODULES

F. Addressable relay residing on the signaling line circuit that isolates devices downstream of the relay from the FACP and devices upstream of the relay upon detecting a short or ground fault on the circuit.

2.9 NOTIFICATION APPLIANCES

A. General Requirements for Notification Appliances: Connected to notification appliance signal circuits, zoned as indicated, equipped for mounting as indicated and with screw terminals for system connections.

1. Combination Devices: Factory-integrated audible and visual notification devices in a single mounting assembly. The audible and visual characteristics shall be as specified for each individual device, herein.
2. Circular shape when mounted in ceiling; square or rectangular shape when mounted in wall.
3. Where required by drawings provide protective guards that are UL listed with the device it is intended to protect.

4. Color: Unless noted otherwise, devices shall be white when mounted in ceilings and red when mounted in or on walls Surface-mounted back boxes shall be of the same color as the device mounted in it.

B. Fire Alarm Horns: U.L. 464. Electronic polarized type operating with a piezoelectric element in an impact-resistant, flame-retardant thermoplastic housing. Horns shall produce a minimum of 85dB, measured 10 feet from the source. All audible horn tones shall be in the NFPA recognized temporal code 3 format.

1. Mounting: Recessed in a 4-inch square handy box or surface-mounted in matching, finished surface box furnished by the manufacturer of the device.
2. Weatherproof: Rated for outdoor use where located outside or denoted as weatherproof on plans, furnished with weatherproof boxes, plates, or gaskets as required.

C. Visible Notification Appliances: U.L. 1971, unless noted or specified otherwise. Xenon strobe lights with clear lens mounted on an aluminum faceplate. The word "FIRE" shall be engraved in minimum 1-inch high letters on the faceplate.

1. For units with guards to prevent physical damage, light output ratings shall be determined with guards in place.
2. Mounting: Recessed in a 4-inch square handy box or surface-mounted in matching, finished surface box furnished by the manufacturer of the device.
3. Weatherproof: U.L. 1638. Rated for outdoor use where located outside or denoted as weatherproof on plans, furnished with weatherproof boxes, plates, or gaskets as required.
4. Flashing shall be in a temporal pattern, synchronized with audible units. All strobes on the same notification appliance circuit shall be synchronized.

2.10 MAGNETIC DOOR HOLDERS

A. Electromagnetic type holders, 24 VDC, developing a minimum of 25 pounds of holding force. Door holders / closers shall be wall mounted as indicated.

2.11 SYSTEM PRINTER

A. Printer shall be listed and labeled by an NRTL as an integral part of fire-alarm system.

PART 3 - EXECUTION

3.1 GENERAL

A. Power: Provide dedicated 20-amp, 120-volt circuit to each control panel and power supply. Circuit shall be identified and protected per NFPA 72.

B. DACT: Provide communication rough-in for connection of DACT to required telephone lines. Coordinate DACT requirements with communication system provider.

3.2 EQUIPMENT INSTALLATION

A. Comply with NFPA 72 and manufacturer's installation instructions for installation of fire-alarm equipment.

B. Install wall-mounted equipment, with tops of cabinets not more than 72 inches above the finished floor.

C. Manual Stations: Mount with operating handle 48-inches above finished floor, unless otherwise noted on plans. Mount within 5 feet of the exit doorway served. For doorway openings over 40-feet, provide a station on each end, within 5-feet of the opening.

D. Spot Type Smoke and Heat Detectors: Install where shown on drawings in accordance with NFPA 72 guidelines. Conflicts between plans and NFPA 72 requirements shall be brought to the immediate attention of the Engineer for resolution prior to device installation. No additional compensation will be provided for removal of detectors installed in violation of NFPA 72 requirements. Where field conditions are not as illustrated on plans, or where field changes impact device locations, notify the Engineer for resolution.
   1. Locate a minimum of 3-feet from a supply air diffuser.
   2. Locate a minimum of 12-inches from a surface-mounted light fixture.

E. Duct Smoke Detectors: Comply with NFPA 72 and NFPA 90A. Install sampling tubes so they extend the full width of duct.

F. Air Sampling Type Smoke Detectors: Install in accordance with manufacturer's instructions, in locations readily accessible for maintenance.

G. Heat Detectors for Elevator Control: Coordinate temperature rating and location with sprinkler ratings and locations. Locate within 2-feet of each sprinkler head.

H. Remote Status and Alarm Indicators: Furnish and install near each smoke detector and each sprinkler water-flow switch and valve-tamper switch that is not readily visible from normal viewing position.

I. Addressable Monitor and Control Modules: Mount within 3-feet of the device to be monitored or controlled.

J. Wall-mounted notification devices: Install 80 inches above the finished floor or 6 inches below the ceiling, whichever is lower, as measured from the bottom of the device.

3.3 CABLE INSTALLATION

A. Install wiring in metal raceway according to Division 16 Section "Raceways and Boxes for Electrical Systems."Conceal raceways except in unfinished spaced and as indicated on plans.

B. Install conductors in enclosures parallel with or at right angles to the sides and back of the enclosure. Bundle, lace, and train the conductors to terminal points with no excess. Connect conductors that are terminated, spliced, or interrupted in any enclosure associated with the fire alarm system to terminal blocks. Mark each terminal according to the wiring diagrams of the system. Make all connections with approved crimp-on terminal spade lugs pressure-type terminal blocks, or plug connectors.

C. Use numbered terminal strips in junction, pull or outlet boxes, cabinets, or equipment enclosures where any circuit tap is made.

D. Wire and cable shall be a type listed for its intended use by an approval agency acceptable to the Authority Having Jurisdiction (AHJ) and shall be installed in accordance with the appropriate articles from the current approved edition of the National Electric Code.

E. Color-code fire alarm cables with a red overall jacket. Paint fire alarm system junction boxes and covers red.

3.4 IDENTIFICATION

A. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Section 16075 "Identification for Electrical Systems."

3.5 GROUNDING

A. Ground equipment and cable shields as specified by the equipment manufacturer.

B. Ground fire-alarm control unit and associated circuits; comply with IEEE 1100. Install a ground wire from main service ground to fire-alarm control unit.

3.6 FIELD QUALITY CONTROL

A. Provide the services of a NICET level III project installation manager to supervise the total installation, including the field assembly and connection of components.

B. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust components, assemblies, and equipment installations, including connections.

C. Tests and Inspections:

1. Visual Inspection: Conduct visual inspection prior to testing.

    a. Inspection shall be based on completed Record Drawings and system documentation that is required by NFPA 72 in its "Completion Documents, Preparation" Table in the "Documentation" Section of the "Fundamentals of Fire Alarm Systems" Chapter.
    b. Comply with "Visual Inspection Frequencies" Table in the "Inspection" Section of the "Inspection, Testing and Maintenance" Chapter in NFPA 72; retain the "Initial/Reacceptance" column and list only the installed components.

2. System Testing: Comply with "Test Methods" Table in the "Testing" Section of the "Inspection, Testing and Maintenance" Chapter in NFPA 72. Correct deficiencies indicated by tests and completely retest work affected by such deficiencies. Verify by the system test that the total system meets the specifications and complies with applicable standards.
3. Test audible appliances for the public operating mode according to manufacturer's written instructions. Perform the test using a portable sound-level meter complying with Type 2 requirements in ANSI S1.4.
4. Factory-authorized service representative shall prepare the "Fire Alarm System Record of Completion" in the "Documentation" Section of the "Fundamentals of Fire Alarm Systems" Chapter in NFPA 72 and the "Inspection and Testing Form" in the "Records" Section of the "Inspection, Testing and Maintenance" Chapter in NFPA 72.

D. Reacceptance Testing: Perform reacceptance testing to verify the proper operation of added or replaced devices and appliances.

E. Fire-alarm system will be considered defective if it does not pass tests and inspections.

F. Provide a written record of inspections, test, and detailed test results in the form of a test log. Submit log to the owner upon the satisfactory completion of tests.

G. Perform a final test as required by the Authority Having Jurisdiction in order to obtain a certificate of occupancy. Demonstrate that the system meets the specifications and complies with applicable standards. This final test shall be witnessed by a representative of the Authority Having Jurisdiction, the Engineer, the Architect, and a factory-authorized service representative.

3.7 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain fire-alarm system. Provide a minimum of 8 hours of training.

END OF SECTION 16721

DIVISION 22

WATER DISTRIBUTION

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes water-distribution piping and specialties outside the building for the following:

1. Water main, valves, and fittings.

1.2 SUBMITTALS

A. Product Data: For the following:

1. Pipe

2. Valves and accessories.

B. Operation and Maintenance Data: For the following:

1. Valves.

1.3 QUALITY ASSURANCE

A. Regulatory Requirements:

1. Comply with requirements of utility company supplying water. Include tapping of water mains and backflow prevention.

2. Comply with standards of authorities having jurisdiction for potable-water-service piping, including materials, installation, testing, and disinfection.

3. Comply with standards of authorities having jurisdiction for fire-suppression water-service piping, including materials, hose threads, installation, and testing.

B. Piping materials shall bear label, stamp, or other markings of specified testing agency.

C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

D. Comply with FM's "Approval Guide" or UL's "Fire Protection Equipment Directory" for fire-service-main products.

E. NFPA Compliance: Comply with NFPA 24 for materials, installations, tests, flushing, and valve and hydrant supervision for fire-service-main piping for fire suppression.

F. NSF Compliance:

1. Comply with NSF 14 for plastic potable-water-service piping.

2. Comply with NSF 61 for materials for water-service piping and specialties for domestic water.

1.4 PROJECT CONDITIONS

A. Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:

1. Notify Architect not less than two days in advance of proposed utility interruptions.

2. Do not proceed with utility interruptions without Architect's written permission.

1.5 COORDINATION

A. Coordinate connection to water main with utility company and/or owner.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where subparagraph titles below introduce lists, the following requirements apply for product selection:

1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the products specified. Products: Subject to compliance with requirements, provide one of the products specified.

2. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the manufacturers specified.

3. Manufacturers: Subject to compliance with requirements, provide products by the manufacturers specified.

2.1 PIPING MATERIALS

A. Refer to Part 3 "Piping Applications" Article for applications of pipe, tube, fitting, and joining materials.

2.2 PIPE AND FITTINGS

A. Mechanical-Joint, Ductile-Iron Pipe: AWWA C151, with mechanical-joint, bell- and plain spigot end unless grooved or flanged ends are indicated.

1. Mechanical-Joint, Ductile-Iron Fittings: AWWA C110, ductile- or gray-iron standard pattern or AWWA C153, ductile-iron compact pattern.

2. Glands, Gaskets, and Bolts: AWWA C111, ductile- or gray-iron glands, rubber gaskets, and steel bolts.

B. PVC: SDR 26, Class 160, Type 1, Grade 1, ASTM D2241.

1. Comply with UL 1285 for fire-service mains if indicated.

2.3 JOINING MATERIALS

A. Refer to Division 2 Section "Utility Materials" for commonly used joining materials.

B. Brazing Filler Metals: AWS A5.8, BCuP Series.

C. Soldering Flux: ASTM B 813, water-flushable type.

D. Solder Filler Metal: ASTM B 32, lead-free type with 0.20 percent maximum lead content.

2.4 VALVES

A. AWWA, Cast-Iron, Gate Valves:

1. Manufacturers:

American AVK Co.; Valves & Fittings Div.
American Cast Iron Pipe Co.; American Flow Control Div.
American Cast Iron Pipe Co.; Waterous Co. Subsidiary.
Crane Co.; Crane Valve Group; Stockham Div.
East Jordan Iron Works, Inc.
Grinnell Corporation; Mueller Co.; Water Products Div.
McWane, Inc.; Clow Valve Co. Div. (Oskaloosa).
McWane, Inc.; Kennedy Valve Div.
McWane, Inc.; Tyler Pipe; Utilities Div.
NIBCO INC.
United States Pipe and Foundry Company.
Or Equal

B. Nonrising-Stem, Metal-Seated Gate Valves: AWWA C500, gray- or ductile-iron body and bonnet; with cast-iron or bronze double-disc gate, bronze gate rings, bronze stem, and stem nut.

1. Minimum Working Pressure: 200 psig.

2. End Connections: Mechanical joint.

3. Interior Coating: Complying with AWWA C550.

C. UL/FM, Cast-Iron Gate Valves:

1. Manufacturers:

American Cast Iron Pipe Co.; American Flow Control Div.
American Cast Iron Pipe Co.; Waterous Co. Subsidiary.

Central Sprinkler Company.
Crane Co.; Crane Valve Group; Stockham Div.
Grinnell Corporation.
Grinnell Corporation; Mueller Co.; Water Products Div.
McWane, Inc.; Clow Valve Co. Div. (Oskaloosa).
McWane, Inc.; Kennedy Valve Div.
McWane, Inc.; M & H Valve Company Div.
NIBCO INC.
United States Pipe and Foundry Company.
Or Equal

D. UL/FM, Nonrising-Stem Gate Valves: UL 262, FM-approved iron body and bonnet with flange for indicator post, bronze seating material, and inside screw.

1. Minimum Working Pressure: 175 psig

2. End Connections: Flanged.

2.5 GATE VALVE ACCESSORIES AND SPECIALTIES

A. Tapping-Sleeve Assemblies: Comply with MSS SP-60. Include sleeve and valve compatible with drilling machine.

1. Manufacturers:

American Cast Iron Pipe Co.; Waterous Co. Subsidiary.
East Jordan Iron Works, Inc.
Grinnell Corporation; Mueller Co.; Water Products Div.
International Piping Services Company.
McWane, Inc.; Clow Valve Co. Div. (Oskaloosa).
McWane, Inc.; Kennedy Valve Div.
McWane, Inc.; M & H Valve Company Div.
United States Pipe and Foundry Company.
Or Equal

2. Tapping Sleeve: Cast- or ductile-iron or stainless-steel, two-piece bolted sleeve with flanged outlet for new branch connection. Include sleeve matching size and type of pipe material being tapped and with recessed flange for branch valve.

3. Valve: AWWA, cast-iron, nonrising-stem, [seated gate valve with one raised face flange mating tapping-sleeve flange.

B. Valve Boxes: Comply with AWWA M44 for cast-iron valve boxes. Include top section, ajustable extension of length required for depth of burial of valve, plug with lettering “WATER,” bottom section with base of size to fit over valve, and approximately 5-inch diameter barrel.

1. Operating Wrenches: Steel tee-handle with one pointed end, stem of length to operate deepest buried valve, and socket matching valve operating nut.

C. Vertical-Type Indicator Posts: UL 789, FM-approved, cast-iron body with operating wrench, extension rod, and adjustable cast-iron barrel of length required for depth of burial of valve.

PART 2 - EXECUTION

3.1 PIPING APPLICATIONS

A. Refer to Division 2 Section “Earthwork” for excavating, trenching, and backfilling.

B. Underground Water-Service Piping: Use the following piping materials for each size range:

1. NPS 8: Ductile-iron, mechanical-joint pipe; ductile-iron, mechanical-joint fittings; and mechanical joints.

2. NPS 8: PVC, AWWA Class 150 pipe; PVC, AWWA Class 150 molded fittings; and gasketed joints.

C. Underground Fire-Service-Main Piping: Ductile-iron, push-on-joint pipe; ductile-iron, push-on-joint fittings; and gasketed or mechanical-joint pipe; ductile-iron, mechanical-joint fittings; and mechanical joints.

D. Underground Combined Water-Service and Fire-Service-Main Piping: Ductile-iron, push-on joint pipe; ductile-iron, push-on-joint fittings; and gasketed or mechanical-joint pipe; ductile-iron, mechanical-joint fittings; and mechanical joints.

3.2 VALVE APPLICATIONS

A. General Application: Use mechanical-joint-end valves for NPS 3 and larger underground installation. Use threaded- or flanged-end valves for installation in vaults. Use UL/FM, nonrising-stem gate valves for installation with indicator posts. Use corporation valves and curb valves with ends compatible with piping, for NPS 2 and smaller installation.

B. Drawings indicate valve types to be used. Where specific valve types are not indicated, the following requirements apply:

1. Underground Valves, NPS 4 and Larger, for Indicator Posts: UL/FM, Cast-iron, non-rising-stem gate valves with indicator post.

3.3 JOINT CONSTRUCTION

A. See Division 2 Section "Utility Materials" for basic piping joint construction.

B. Make pipe joints according to the following:

1. Ductile-Iron Piping, Gasketed Joints for Water-Service Piping: AWWA C600 and AWWA M41.

2. Ductile-Iron Piping, Gasketed Joints for Fire-Service-Main Piping: UL 194.

3. PVC Piping Gasketed Joints: Use joining materials according to AWWA C900. Construct joints with elastomeric seals and lubricant according to ASTM D 2774 or ASTM D 3139 and pipe manufacturer's written instructions.

4. Dissimilar Materials Piping Joints: Use adapters compatible with both piping materials, with OD, and with system working pressure. Refer to Division 2 Section "Utility Materials" for joining piping of dissimilar metals.

3.4 PIPING INSTALLATION

A. Water-Main Connection: Tap water main according to requirements of water utility company and of size and in location indicated.

B. Make connections larger than NPS 2 with tapping machine according to the following:

1. Install tapping sleeve and tapping valve according to MSS SP-60.

2. Install tapping sleeve and tapping valve on pipe to be tapped.

3. Use tapping machine compatible with valve and tapping sleeve; cut hole in main through valve.

4. Remove tapping machine and connect water piping.

5. Install valve with stem pointing up and with valve box.

C. Make connections NPS 2 and smaller with drilling machine according to the following:

1. Install service-saddle assemblies and corporation valves in size, quantity, and arrangement required by utility company standards.

2. Install service-saddle assemblies on water-service pipe to be tapped. Position outlets for corporation valves.

3. Use drilling machine compatible with service-saddle assemblies and corporation valves. Drill hole in main. Remove drilling machine and connect water-service piping.

4. Install corporation valves into service-saddle assemblies.

5. Install manifold for multiple taps in water main.

6. Install curb valve in water-service piping with head pointing up and with service box.

D. Comply with NFPA 24 for fire-service-main piping materials and installation.

E. Install ductile-iron, water-service piping according to AWWA C600 and AWWA M41.

F. Install PVC, AWWA pipe according to AWWA M23 and ASTM F 645.

G. Install PE pipe according to ASTM D 2774 and ASTM F 645.

H. Bury piping with depth of cover over top at least 30 inches, with top at least 12 inches below level of maximum frost penetration.

I. Extend water-service piping and connect to water-supply source and building water piping systems at outside face of building wall in locations and pipe sizes indicated.

1. Terminate water-service piping at building wall until building water piping systems are installed. Terminate piping with caps, plugs, or flanges as required for piping material. Make connections to building water piping systems when those systems are installed.

J. Install underground piping with restrained joints at horizontal and vertical changes in direction. Use restrained-joint piping, thrust blocks, anchors, tie-rods and clamps, and other supports.

K. Anchor service-entry piping to building wall.

3.5 ANCHORAGE INSTALLATION

A. Install anchorages for tees, plugs and caps, bends, crosses, valves, and hydrant branches. Include anchorages for the following piping systems:

1. Gasketed-Joint, Ductile-Iron, Water-Service Piping: According to AWWA C600.

2. Gasketed-Joint, PVC Water-Service Piping: According to AWWA M23.

3. Fire-Service-Main Piping: According to NFPA 24.

4. Apply full coat of asphalt or other acceptable corrosion-resistant material to surfaces of installed ferrous anchorage devices.

3.6 VALVE INSTALLATION

A. AWWA Gate Valves: Comply with AWWA C600 and AWWA M44. Install each underground valve with stem pointing up and with valve box.

B. UL/FM Gate Valves: Comply with NFPA 24. Install each underground valve and valves in vaults with stem pointing up and with vertical cast-iron indicator post.

C. Corporation Valves and Curb Valves: Install each underground curb valve with head pointed up and with service box.

3.7 CONNECTIONS

A. Piping installation requirements are specified in other Division 2 Sections. Drawings indicate general arrangement of piping and specialties.

B. See Division 2 Section "Utility Materials" for piping connections to valves and equipment.

C. Connect water-distribution piping to existing water main. Use tapping sleeve and tapping valve.

D. Connect water-distribution piping to interior domestic-water and fire-suppression piping.

E. Connect waste piping from drinking fountains to sanitary sewerage system.

3.8 FIELD QUALITY CONTROL

A. Piping Tests: Conduct piping tests before joints are covered and after thrust blocks have hardened sufficiently. Fill pipeline 24 hours before testing and apply test pressure to stabilize system. Use only potable water.

B. Hydrostatic Tests: Test at not less than 1-1/2 times working pressure for 2 hours.

1. Increase pressure in 50-psig increments and inspect each joint between increments. Hold at test pressure for 1 hour; decrease to 0 psig. Slowly increase again to test pressure and hold for 1 more hour. Maximum allowable leakage is 2 quarts per hour per 100 joints. Remake leaking joints with new materials and repeat test until leakage is within allowed limits.

C. Prepare reports of testing activities.

3.8 IDENTIFICATION

A. Install continuous underground detectable warning tape during backfilling of trench for underground water-service piping. Locate below finished grade, directly over piping. See Division 2 Section “Earthwork” for underground warning tapes.

B. Permanently attach equipment nameplate or marker, indicating plastic water-service piping, on main electrical meter panel. See Division 2 Section “Utility Materials” for identifying devices.

3.9 CLEANING

A. Clean and disinfect water-distribution piping as follows:

B. Purge new water-distribution piping systems and parts of existing systems that have been altered, extended, or repaired before use.

C. Use purging and disinfecting procedure prescribed by authorities having jurisdiction or, if method is not prescribed by authorities having jurisdiction, use procedure described in NFPA 24 for flushing of piping. Flush piping system with clean, potable water until dirty water does not appear at points of outlet.

D. Use purging and disinfecting procedure prescribed by authorities having jurisdiction or, if method is not prescribed by authorities having jurisdiction, use procedure described in AWWA C651 or as described below:

1. Fill system or part of system with water/chlorine solution containing at least 50 ppm of chlorine; isolate and allow to stand for 24 hours.

2. Drain system or part of system of previous solution and refill with water/chlorine solution containing at least 200 ppm of chlorine; isolate and allow to stand for 3 hours.

3. After standing time, flush system with clean, potable water until no chlorine remains in water coming from system.

4. Submit water samples in sterile bottles to authorities having jurisdiction. Repeat procedure if biological examination shows evidence of contamination.

5. Prepare reports of purging and disinfecting activities.

END OF SECTION 221113

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes sanitary sewerage outside the building.

1.2 PERFORMANCE REQUIREMENTS

A. Gravity-Flow, Nonpressure-Piping Pressure Ratings: At least equal to system test pressure.

B. Force-Main Pressure Ratings: At least equal to system operating pressure, but not less than 150 psig.

1.3 SUBMITTALS

A. Product Data: For the following:

1. Gravity Sewer Piping

2. Sewer Force Main Piping

1.4 PROJECT CONDITIONS

A. Site Information: Perform site survey, research public utility records, and verify existing utility locations.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where subparagraph titles below introduce lists, the following requirements apply for product selection:

B. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the manufacturers specified.

C. Manufacturers: Subject to compliance with requirements, provide products by the manufacturers specified.

2.2 PIPING MATERIALS

A. Refer to Part 3 “Piping Applications” Paragraph for applications of pipe and fitting materials.

2.3 PIPES AND FITTINGS

A. Hub-and-Spigot, Cast-Iron Soil Pipe and Fittings: ASTM A 74, gray iron, for gasketed joints.

1. Gaskets: ASTM C 564, rubber, compression type, thickness to match class of pipe.

B. Ductile-Iron Sewer Pipe: ASTM A 746, for push-on joints.

1. Standard-Pattern, Ductile-Iron Fittings: AWWA C110, ductile or gray iron, for push-on joints.

2. Compact-Pattern, Ductile-Iron Fittings: AWWA C153, for push-on joints.

3. Gaskets: AWWA C111, rubber.

C. PVC Sewer Pipe and Fittings: According to the following:

1. PVC Sewer Pipe and Fittings, NPS 15 and Smaller: AWWA C-900, for solvent-cemented or gasketed joints.

2. Gaskets: ASTM F 477, elastomeric seals.

2.4 MANHOLES

A. Normal-Traffic Precast Concrete Manholes: ASTM C 478, precast, reinforced concrete, of depth indicated, with provision for rubber gasketed joints.

1. Diameter: 48 inches, minimum, unless otherwise indicated.

2. Ballast: Increase thickness of precast concrete sections or add concrete to base section, as required to prevent flotation.

3. Base Section: 6-inch minimum thickness for floor slab and 4-inch minimum thickness for walls and base riser section, and having separate base slab or base section with integral floor.

4. Riser Sections: 4-inch minimum thickness and lengths to provide depth indicated.

5. Top Section: Eccentric-cone type, unless concentric-cone or flat-slab-top type is indicated. Top of cone of size that matches grade rings.

6. Gaskets: ASTM C 443, rubber.

7. Grade Rings: Include two or three reinforced-concrete rings, of 6- to 9-inch total thickness, that match 24-inchdiameter frame and cover.

8. Steps: Fiberglass, individual steps or ladder. Include width that allows worker to place both feet on one step and is designed to prevent lateral slippage off step. Cast or anchor into base, riser, and top section sidewalls with steps at 12- to 16-inch intervals. Omit steps for manholes less than 60 inches deep.

9. Steps: ASTM C 478, individual steps or ladder. Omit steps for manholes less than 60 inches deep.

10. Pipe Connectors: ASTM C 923, resilient, of size required, for each pipe connecting to base section.

B. Manhole Frames and Covers: ASTM A 536, Grade 60-40-18, ductile-iron castings designed for heavy-duty service. Include 24-inch ID by 7- to 9-inch riser with 4-inch minimum width flange, and 26-inch diameter cover. Include indented top design with lettering “SANITARY SEWER” cast into cover.

C. Manhole Cover Inserts: Manufactured, plastic form, of size to fit between manhole frame and cover and designed to prevent stormwater inflow. Include handle for removal and gasket for gastight sealing.

1. Manufacturers:

   FRW Industries, Inc.
   Knutson Manufacturing Co.
   Parson Environmental Products, Inc.
   Or Equal

2. Type: Solid.

2.4 CONCRETE

A. General: Cast-in-place concrete according to ACI 318, ACI 350R, and the following:

1. Cement: ASTM C 150, Type II.

2. Fine Aggregate: ASTM C 33, sand.

3. Coarse Aggregate: ASTM C 33, crushed gravel.

4. Water: Potable.

B. Portland Cement Design Mix: 4000 psi minimum, with 0.45 maximum water-cementitious materials ratio.

1. Reinforcement Fabric: ASTM A 185, steel, welded wire fabric, plain.

2. Reinforcement Bars: ASTM A 615/A 615M, Grade 60, deformed steel.

C. Structure Channels and Benches: Factory or field formed from concrete. Portland cement design mix, 4000 psi minimum, with 0.45 maximum water-cementitious materials ratio. Include channels and benches in manholes.

1. Channels: Concrete invert, formed to same width as connected piping, with height of vertical sides to three-fourths of pipe diameter. Form curved channels with smooth, uniform radius and slope.

a. Invert Slope: 1 percent through manhole.

2. Benches: Concrete, sloped to drain into channel.

a. Slope: 4 percent.

D. Ballast and Pipe Supports: Portland cement design mix, 3000 psi minimum, with 0.58 maximum water-cementitious materials ratio.

1. Reinforcement Fabric: ASTM A 185, steel, welded wire fabric, plain.

2. Reinforcement Bars: ASTM A 615/A 615M, Grade 60, deformed steel.

2.5 PROTECTIVE COATINGS

A. Description: One- or two-coat, coal-tar epoxy; 15-mil minimum thickness, unless otherwise indicated; factory or field applied to the following surfaces:

1. Concrete Manholes: On exterior and interior surfaces.

2. Manhole Frames and Covers: On entire surfaces.

2.6 BACKWATER VALVES

A. Gray-Iron Backwater Valves: ASME A112.14.1, gray-iron body and bolted cover, with bronze seat.

1. Manufacturers:

Josam Co.
McWane, Inc.; Tyler Pipe; Wade Div.
Smith, Jay R. Mfg. Co.
Watts Industries, Inc.; Ancon Drain Div.
Watts Industries, Inc.; Enpoco, Inc. Div.
Zurn Industries, Inc.; Hydromechanics Div.
Or Equal

2. Horizontal Type: With swing check valve and hub-and-spigot ends.

3. Combination Horizontal and Manual Gate-Valve Type: With swing check valve, integral gate valve, and hub-and-spigot ends.

4. Terminal Type: With bronze seat, swing check valve, and hub inlet.

B. PVC Backwater Valves: Similar to ASME A112.14.1, horizontal type; with PVC body, PVC removable cover, and PVC swing check valve.

1. Manufacturers:

Canplas, Inc.
IPS Corp.
NDS, Inc.
Plastic Oddities, Inc.
Sioux Chief Manufacturing Co., Inc.
Or Equal

2.6 CLEANOUTS

A. Gray-Iron Cleanouts: ASME A112.36.2M, round, gray-iron housing with clamping device and round, secured, scoriated, gray-iron cover. Include gray-iron ferrule with inside calk or spigot connection and countersunk, tapered-thread, brass closure plug. Use units with top-loading classifications according to the following applications:

1. Light Duty: In earth or grass foot-traffic areas.
2. Medium Duty: In paved foot-traffic areas.
3. Heavy Duty: In vehicle-traffic service areas.
4. Extra-Heavy Duty: In roads.
5. Sewer Pipe Fitting and Riser to Cleanout: ASTM A 74, Service class, cast-iron soil pipe and fittings.

B. PVC Cleanouts: PVC body with PVC threaded plug. Include PVC sewer pipe fitting and riser to cleanout of same material as sewer piping.

PART 2 - EXECUTION

3.1 INSTALLATION

A. Excavating, trenching, and backfilling are specified in Division 2 Section “Earthwork.”

B. Identification: Materials and their installation are specified in Division 2 Section “Earthwork.” Arrange for installing green warning tapes directly over piping and at outside edges of underground structures.

1. Use warning tape or detectable warning tape over ferrous piping.
2. Use detectable warning tape over nonferrous piping and over edges of underground structures.

C. Piping Applications: Include watertight joints.

1. NPS 4 and NPS 6: PVC sewer pipe and fittings, gaskets, and gasketed joints.

2. NPS 8 and NPS 10: PVC sewer pipe and fittings, gaskets, and gasketed joints.

D. Sleeve-Type Pipe Couplings: Use where required to join piping and no other appropriate method is specified. Do not use instead of specified joining methods.

E. General Locations and Arrangements: Drawing plans and details indicate general location and arrangement of underground sanitary sewerage piping. Location and arrangement of piping layout take design considerations into account. Install piping as indicated, to extent practical.

F. Install piping beginning at low point, true to grades and alignment indicated with unbroken continuity of invert. Place bell ends of piping facing upstream. Install gaskets, seals, sleeves, and couplings according to manufacturer's written instructions for using lubricants, cements, and other installation requirements. Maintain swab or drag in line, and pull past each joint as it is completed.

G. Use manholes for changes in direction, unless fittings are indicated. Use fittings for branch connections, unless direct tap into existing sewer is indicated.

H. Use proper size increasers, reducers, and couplings where different sizes or materials of pipes and fittings are connected. Reducing size of piping in direction of flow is prohibited.

I. Install gravity-flow piping and connect to building's sanitary drains, of sizes and in locations indicated. Terminate piping as indicated.

1. Install piping pitched down in direction of flow, at minimum slope of 0.4 percent, unless otherwise indicated.

2. Install piping with 36-inch minimum cover.

J. Extend sanitary sewerage piping and connect to building's sanitary drains, of sizes and in locations indicated. Terminate piping as indicated.

K. Pipe Joint Construction and Installation: Join and install pipe and fittings according to 6nstalllations indicated.

1. Refer to Division 2 Section "Utility Materials" for basic piping joint construction and installation.

2. PVC Sewer Pipe and Fittings:

3. Join pipe and gasketed fittings with gaskets according to ASTM D3034, SDR 35 for gravity sewer. Join pipe and fittings with gaskets according to ASTM D1869 for sewer force main (Class 160, SDR 26).

4. Join piping made of different materials or dimensions with couplings made for this application. Use couplings that are compatible with and that fit both systems' materials and dimensions.

L. Manhole Installation: Install complete with appurtenances and accessories indicated.

1. Form continuous concrete channels and benches between inlets and outlet.

2. Set tops of frames and covers flush with finished surface of manholes that occur in pavements. Set tops 3 inches above finished surface elsewhere, unless otherwise indicated.

3. Install precast concrete manhole sections with gaskets according to ASTM C 891.

M. Concrete Placement: Place cast-in-place concrete according to ACI 318 and ACI 350R.

N. Install backwater valves in piping where indicated.

O. Install cleanouts and riser extension from sewer pipe to cleanout at grade. Use cast-iron soil pipe fittings in sewer pipes at branches for cleanouts and cast-iron soil pipe for riser extensions to cleanouts. Install piping so cleanouts open in direction of flow in sewer pipe.

P. Set cleanout frames and covers in earth in cast-in-place concrete block, 18 by 18 by 12 inches deep. Set with tops 1 inch above surrounding grade.

Q. Set cleanout frames and covers in concrete pavement with tops flush with pavement surface.

R. Make connections to existing piping and underground structures so finished Work complies as nearly as practical with requirements specified for new Work.

S. Use commercially manufactured wye fittings for piping branch connections. Remove section of existing pipe; install wye fitting into existing piping; and encase entire wye fitting, plus 6-inch overlap, with not less than 6 inches of concrete with 28-day compressive strength of 3000 psi

T. Make branch connections from side into existing piping, NPS 4 to NPS 20. Remove section of existing pipe; install wye fitting into existing piping; and encase entire wye with not less than 6 inches of concrete with 28-day compressive strength of 3000 psi.

U. Protect existing piping and structures to prevent concrete or debris from entering while making tap connections. Remove debris or other extraneous material that may accumulate.

V. Clear interior of piping and structures of dirt and superfluous material as work progresses. Maintain swab or drag in piping, and pull past each joint as it is completed.

1. Place plug in end of incomplete piping at end of day and when work stops.

2. Flush piping between manholes and other structures to remove collected debris, if required by authorities having jurisdiction.

3.2 FIELD QUALITY CONTROL

A. Inspect interior of piping to determine whether line displacement or other damage has occurred. Inspect after approximately 24 inches of backfill is in place, and again at completion of Project.

1. Defects requiring correction include the following:

a. Alignment: Less than full diameter of inside of pipe is visible between structures.

b. Deflection: Flexible piping with deflection that prevents passage of ball or cylinder of size not less than 92.5 percent of piping diameter.

c. Crushed, broken, cracked, or otherwise damaged piping.

d. Infiltration: Water leakage into piping.

e. Exfiltration: Water leakage from or around piping.

2. Replace defective piping using new materials, and repeat inspections until defects are within allowances specified.

3. Reinspect and repeat procedure until results are satisfactory.

B. Test new piping systems, and parts of existing systems that have been altered, extended, or repaired, for leaks and defects.

1. Do not enclose, cover, or put into service before inspection and approval.

2. Test completed piping systems according to authorities having jurisdiction.

3. Schedule tests and inspections by authorities having jurisdiction with at least 24 hours' advance notice.

4. Submit separate reports for each test.

5. If authorities having jurisdiction do not have published procedures, perform tests as follows:

a. Sanitary Sewerage: Perform hydrostatic test.

i. Allowable leakage is maximum of 50 gal. per inch of nominal pipe size per mile of pipe, during 24-hour period.

ii. Close openings in system and fill with water.

iii. Purge air and refill with water.

iv. Disconnect water supply.

v. Test and inspect joints for leaks.

vi. Option: Test ductile-iron piping according to AWWA C600, Section "Hydrostatic Testing." Use test pressure of at least 10 psig.

6. Sanitary Sewerage: Perform air test according to UNI-B-6.

7. Manholes: Perform hydraulic test according to ASTM C 969.

8. Leaks and loss in test pressure constitute defects that must be repaired.

9. Replace leaking piping using new materials, and repeat testing until leakage is within allowances specified.

END OF SECTION 221313

DIVISION 32

SECTION 311000 CLEARING, GRUBBING AND PROOF-ROLLING

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 GENERAL REQUIREMENTS:

A. This specification shall govern for all work necessary to complete the clearing, grubbing and proof-rolling as indicated by the drawings and as required for the construction of the building.

PART 2 – PRODUCTS -- NOT APPLICABLE

PART 3 – CONSTRUCTION METHODS:

3.1 CLEARING, GRUBBING AND PROOF-ROLLING

A. The site should be stripped of topsoil, any soft or loose soils, undocumented fill, silts, roots and other vegetation. Utilities should be located and rerouted as necessary. Voids resulting from tree and shrub removal (if any) should be backfilled with engineered fill material as soon as practical to prevent possible water retention and saturation of the soil.

B. The exposed subgrade soils at the building footprint areas must be proof-rolled using a single axle rubber tired vehicle weighing at least 15 tons. Any soils observed to rut or deflect excessively (greater than 1-inch) under the moving loads should be undercut and replaced with properly compacted engineered fill. In order to limit degradation of the subgrade during proof-rolling, the number of passes should be minimized. After proof-rolling, the upper eight (8) inches of exposed soil should be scarified and then be recompacted to at least 95 percent of the Standard Proctor (ASTM D-698) maximum dry density. The Geotechnical Engineer or his representative should witness all proof-rolling and undercutting activities. These activities should be performed during a period of dry weather.

3. 2 DISPOSAL

A. Remove all materials from the clearing, grubbing, and stripping operation from the site.

END OF SECTION 31 10 00

SECTION 312000 EARTHWORK

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 DESCRIPTION

A. The extent of earthwork and site grading, including preparation of subgrade for pavements where shown on the drawings. The following operations are included in this section of the specifications:

1. Preparation of subgrade, complete.
2. Compacted fill under and around paving.
3. Excavation and backfilling, complete, including the footings and miscellaneous items.
4. Testing and Inspection Service: The Owner shall employ and pay for a testing and inspection service. Testing service will include soil survey for satisfactory soil materials, sampling and testing soil materials proposed for use in the work, and field testing facilities for quality control testing during earthwork operations.

1.3 QUALITY ASSURANCE

A. References
1. ASTM D698 - Moisture Density Relations of Soils and Soil-Aggregate Mixture using 5.5 (2.49 kg) Rammer and 12 inch (305 mm) Drop.
2. ASTM D2167 - Test Methods for Density and Unit Weight of Soil In Place by the Rubber Balloon Method.
3. Texas State Department of Highways and Public Transportation, referred to as THD, Standard Specifications for Construction of Highways, Streets and Bridges, latest editions.
4. American Association of State Highways and Transportation Officials, referred to as AASHTO.

1.4 SUBMITTALS

A. Test Reports: Reports of all tests and inspections shall be forwarded to the Owner, Architect, Structural Engineer and Contractor. Reports of tests shall state whether or not tests conform to contract documents.

1.5 STORAGE AND HANDLING

A. Material Storage: Stockpile excavated materials classified as satisfactory soil material where directed, until required for fill; place, grade and shape stockpiles for proper drainage.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Fill: Engineered fill materials should be free of organic debris and other deleterious materials, have a maximum clay lump size less than three inches and have a liquid limit of less than 40 with plasticity index (PI) values between 10 and 20 and plot above the “A” line on the Plasticity Chart. The fill should be placed in maximum lifts of eight (8) inches of loose materials and should be compacted within the range of one (1) percentage point below to three (3) percentage points above the optimum moisture content value as determined by the standard Proctor (ASTM D698) test. If water must be added, it should be uniformly applied and thoroughly mixed into the soil by disking or scarifying. Engineered fill should be compacted to at least 95 percent of the standard Proctor maximum dry density. The edges of any compacted fill above the surrounding surface grade should extend at least five feet beyond the edges of the building and parking areas prior to sloping.
Each lift of compacted soil should be tested by the Geotechnical Engineer or his representative prior to placement of subsequent lifts. As a guideline, it is recommended field density tests be taken at a frequency of not less than one test per lift for every 2,500 square feet (sf) in the building area and every 5,000 sf in parking and drive areas.

2.2 FABRICATION

A. No additional requirements.

PART 3 - EXECUTION

3.1 PROTECTION

A. Safety Codes and Standards: The Contractor shall be solely responsible for performing the work in a safe and workmanlike manner. The Contractor shall be responsible for familiarizing himself with and complying with all safety requirements of the governing authorities having jurisdiction.

B. Existing Utilities: Locate existing utilities underground by careful excavation before starting earthwork operations. If utilities are to remain in place, provide protection from damage during construction operations. Should uncharted or incorrectly charted piping or other utilities be encountered during excavation, consult the Architect immediately for directions as to procedure. Cooperate with Owner and public and private utility companies in keeping services and facilities in operation. Repair damaged utilities to satisfaction of utility owner.
   1. Do not interrupt existing utilities serving facilities occupied and used by the Owner or others, except when permitted in writing by Architect and then only after temporary utility services have been provided.

C. Use of Explosives: Do not bring explosives onto site or use in work without the prior written permission of Architect. Contractor is solely responsible for the handling, storage, and use of explosive materials when their use is permitted.

D. Protection of Persons and Property:
1. Barricade open excavations and post with warning lights as required for the safety of persons. Protect structures, utilities sidewalks, pavements, and other facilities immediately adjacent to excavations from damages caused by settlement, lateral movement, undermining, washout and other hazards.
2. Take precautions and provide necessary bracing and shoring to guard against movement or settlement of existing improvements or new construction. Contractor is entirely responsible for strength and adequacy of bracing and shoring, and for safety and support of construction from damage or injury caused by lack thereof or by movement or settlement.

3.2 EXCAVATION

A. Excavation consists of the removal and disposal of all material encountered to obtain required elevations. Excavations shall be made to proper depth, with allowances made for clearances to install services and forms. Cuts shall be accurately shaped to cross-sections and grades indicated.

1. Classification of Existing Materials: N/A

2. The foundation excavations should be observed by a representative of a testing agency prior to steel or concrete placement to assess that the foundation materials are capable of supporting the design loads and are consistent with the materials discussed in accordance with the geotechnical report. Soft or loose soil zones encountered at the bottom of the footing excavations should be removed to the level of firm soils or adequately compacted fill as directed by the Geotechnical Engineer. Cavities formed as a result of excavation of soft or loose soil zones should be backfilled with compacted engineered fill or granular fill including compacted crushed stone. Footing excavations should be observed and concrete placed as quickly as possible to avoid exposure of the footing bottoms to wetting and drying. Surface run-off water should be drained away from the excavations and not be allowed to pond prior to or after concrete placement. The foundation concrete should be placed during the same day the excavation is made. If it is required that footing excavations be left open for more than one day, they should be protected to reduce evaporation or entry of moisture.

B. Unauthorized Excavation: Unauthorized excavation consists of removal of the material indicated below elevations without specific direction of the Architect. Replace unauthorized excavation as herein specified. Excavations from footing carried below elevations indicated on drawings shall be filled with specified footing type concrete at Contractor's expense. Excavations carried below the grades indicated for trenches shall be backfilled with suitable soil or select fill at Contractor's expense.

C. Dewatering:
1. Perform earthwork and site grading in a manner to prevent surface water and sub grade or ground water from flowing into excavations, and to prevent water from flooding the project site and surrounding area.
2. Do not allow water to accumulate in excavations. Remove all water from excavations using dewatering methods, which will prevent softening of foundations bottoms, undercutting footings, and soil changes detrimental to stability of the sub grades and foundations. Provide and maintain pumps,

sumps, suction and discharge lines, and other dewatering components necessary to convey water away from the site.

3. Convey water removed from excavations and rainwater to collecting or runoff areas. Provide and maintain temporary drainage ditches and other diversions. Do not use trench excavations for site utilities as temporary drainage ditches.

D. In no case shall "water settling" or jetting be employed.

3.3 BACKFILL AND FILL

A. General:
1. Backfill consists of the placement of specified backfill material in layers, in the excavations to the required sub grade elevations.
2. Fill consists of the placement of specified fill materials, in layers, over the ground surface to the required elevations.

B. Backfill and Fill Materials:
1. Provide satisfactory soil materials for backfill and fill. Use excavated or borrow material that has been sampled, tested, and approved as satisfactory backfill and fill material by the testing service.

C. Placement and Compaction:
1. After subgrade preparation and observation have been completed, fill placement to attain the original grade or greater may begin. Engineered material should be used for fill in the structure as necessary to raise the site grades. The first layer of fill should be keyed into the existing subgrade to prevent slippage and placed in a relatively uniform horizontal lift on the compacted soils.
2. Fill should be placed in maximum lifts of eight (8) inches of loose materials and should be compacted within the range of one (1) percentage point below to three (3) percentage points above the optimum moisture content value as determined by the Standard Proctor test. If water must be added, it should be uniformly applied and thoroughly mixed into the soil by disking or scarifying.

3.4 COMPACTION

A. Perform the compaction of soil materials using suitable soil compaction equipment for the materials to be compacted and the work area locations.

B. Engineered fill should be compacted to at least 95 percent of the Standard Proctor maximum dry density as determined by ASTM Designation D 698. The edges of the compacted fill should extend at least ten (10) feet beyond the edge of the building. Each lift of compacted soil should be tested and inspected by the soils engineer or his representative prior to placement of subsequent lifts. As a guideline, it is recommended field density tests be taken at a frequency of not less than one (1) test per lift for every 2,500 sq. ft. in the building area and one (1) test per lift for every 5,000 sq. ft. in the parking/driveway areas.

C. Control soil compaction during construction for compliance with percentage of maximum density specified for each area classification.

D. Compaction Equipment:
1. Provide compaction equipment of suitable size and number, and in satisfactory working condition to compete the work on schedule.

2. Use sheepsfoot rollers, pneumatic tired roller, tamper rollers, vibrating tampers, pneumatic hand tampers, or other compaction equipment capable of obtaining the required density throughout the entire area being compacted.

E. Percentage of Maximum Density Requirements:
1. Buildings and Miscellaneous Structures: See Foundation Notes on drawing.
2. Concrete Pavements.

F. Moisture Control:
1. Provide equipment capable of adding measured amounts of moisture to the soil material as determined by moisture density relation tests. Maintain the actual moisture content in the soil material at the time of compaction to within the limits specified for each area classification.
2. Where the sub grade or layer of soil material must be moisture conditioned before compaction, uniformly apply the required amount of water to the surface of sub grade, or layer of soil material, in such a manner as to prevent free water appearing in the surface during or subsequent to compaction operations.
3. Remove and replace, or scarify and air dry, soil material that is too wet to permit compaction to specified percentage of maximum density.
4. Soil material that has been removed because it is too wet to permit compaction may be stockpiled or spread on the surface where directed by the Architect and permitted to dry. Assist drying by discing, harrowing or pulverizing, until the moisture content is reduced to a satisfactory value, as determined by moisture density relation tests. When accepted by the Architect, the soil material may be used in compacted backfill or fill.

3.5 GRADING AND DRAINAGE

A. Uniformly grade all areas within the limits of site grading under this section, including adjacent transition areas. Smooth the finished surface within the specified tolerances, compact with uniform levels or slopes between points where elevations are shown, or between such points and existing grades. Where finish contour lines are not shown ground surfaces shall be finished to drain away from buildings and minor surfaces shall be finished.

3.6 MAINTENANCE

A. Protection of existing site:
1. Carefully maintain benchmarks, monuments, layout stakes and other reference points.
2. Protect property, including adjoining property and public right-of-ways, from damage by trucks and equipment.

B. Protection of graded Areas:
1. Protect newly graded areas from traffic and erosion, and keep free of trash and debris.
2. Repair and re-establish grades in settled, eroded, and rutted areas to the specified tolerances.

C. Reconditioning Compacted Areas: When completed compacted areas are disturbed by subsequent construction operations or adverse weather, scarify the surface, reshape and compact to the required density prior to further construction. Use hand tamping for recompaction over underground utilities, if any.

3.7 DISPOSAL OF EXCESS AND WASTE MATERIALS

A. Remove all waste materials, including excavated material classified as unsatisfactory soil material, trash, and debris, from the Owner's property and legally dispose of it.

3.8 FIELD QUALITY CONTROL

A. The Architect will inspect construction throughout the various work stages.

B. Notify the Architect and Owner's testing agency at least 72 hours in advance, excluding Saturday and Sunday, before Earthwork.

C. Testing Laboratory Services:
1. Tests for Proposed Soil Materials: The testing service will determine the suitability of all materials to be used as fills. Submit one moisture-density curve for each type of soil encountered in sub grade and used as fill. Determine maximum densities in accordance with ASTM D698, current issue.
2. Testing service must inspect and approve all sub grades and fill layers before further construction work is performed thereon. Each sub grade and fill layer shall be tested for in-place density and moisture content in accordance with ASTM D2167 at a frequency of one test per 5,000 square feet or a minimum of 2 samples, whichever is greater, to assure that the fill is properly compacted.
3. If, in Architect's opinion, based on reports of testing service and inspection the sub grade or fills which have been placed are below specified density, Architect will require additional compaction and testing at Contractor's expense. Results of density test of soil-in-place will be considered satisfactory if average of any four consecutive density tests which may be selected are in each instance equal to or greater than specified density, and if not more than one density test out of five has a value more than 2% below required density.

3.9 WARRANTY/GUARANTEE

A. Contractor shall be responsible for additional work as may be required to correct work which does not conform to specified requirements, including density and tolerances.

END OF SECTION 31 20 00

SECTION 315000 STRUCTURAL EXCAVATION AND BACKFILL

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

A. This specification shall govern for all work necessary to accomplish the structural excavation required to complete the project.

PART 2 - MATERIALS

2.1 GENERAL

A. Structural excavation shall include all material encountered including earth, asphalt, base material, concrete, masonry, rock, trees, stumps, and roots.

PART 3 - EXECUTION

3.1 STRUCTURAL EXCAVATION EXCEEDING 5 FEET IN DEPTH:

A. Excavation Safety:
1. The Contractor's excavation safety procedures shall, in all respects, meet the current standards established by the U. S. Department of Labor, Occupational Safety and Health Administration (OSHA) on excavation, trenching and shoring.

B. Responsibility:
1. Contractor has the sole and exclusive responsibility for the sufficiency of the trench excavation safety systems utilized.
2. The Contractor shall specifically agree that neither the Owner nor the Engineer has such responsibility, and Contractor will not rely on the Owner or the Engineer or any of their representatives for inspection, design, supervision, construction or any other aspect of trench excavation safety protection.
3. Contractor shall fully indemnify, safe and hold harmless Owner and Engineer, their employees and agents (hereinafter the Indemnities) against any and all liability, damage, loss, claims, demands and actions of any nature whatsoever on account of personal injuries (including, without limitation on the foregoing, workers' compensation and death claims), or property loss or damage of any kind whatsoever, which arise out of or are in any manner connected with, or are claimed to arise out of or be in any way connected with, the negligence of the Contractor in the inspection, design, engineering, supervision, construction, safety devices or other activity connected with the trench excavation safety protection under this Agreement.
4. Contractor shall, at his own expense, investigate all such claims and demands, attend to their settlement or other disposition, defend all actions based thereon and pay all charges of attorneys and all other costs and expenses of any kind arising from any such liability, damage, loss, claims demands, and actions.

3.2 STRUCTURAL EXCAVATION 5 FEET OR LESS IN DEPTH:

A. GENERAL:
1. The limit of excavation shall be such to allow for placing and removing forms, installing sheeting, shoring, bracing, etc. The Contractor shall pile excavated material in a manner that will not endanger the work and will avoid obstructing sidewalks and driveways. Gutters shall be kept clear.

B. VERTICAL SIDES:
1. When necessary to protect existing or proposed structures or other improvements, the Contractor shall maintain vertical sides of the excavation.
2. The limit shall not exceed three feet outside the footing on a vertical plane parallel to the footing except where specifically approved otherwise by the Engineer.
3. The Contractor shall provide and install any sheeting, shoring and bracing as necessary to provide a safe work area as required to protect workmen, structures, equipment, trees, etc. The Contractor shall be responsible for the design and adequacy of all sheeting, shoring, and bracing.
4. The sheeting, shoring, and bracing shall be removed as the excavation is backfilled in such a manner as to prevent injurious caving.

C. SLOPING SIDES:
1. Where sufficient space is available, the Contractor shall be allowed to back slope the sides of the excavation.
2. The back slope shall be such that the excavation shall be safe from caving.
3. The type of material being excavated shall govern the back slope used. The Contractor shall be responsible for determining the back slope used, but in any case the back slope shall be no steeper than 1 foot horizontal to 1 foot vertical.

3.3 CONSTRUCTION METHODS

A. DEWATERING
1. The Contractor shall keep the excavation free from water by use of cofferdams, bailing, pumping, well point, or any combination as the particular situation may warrant.
2. All dewatering devices shall be installed in such a manner as to provide clearance for construction, removal of forms, and inspection of exterior of form work.
3. It is the intent of these specifications that the foundation be placed on a firm dry bed. The foundation bed shall be kept in a dewatered condition a sufficient period of time to insure the safety of the structure, but in no case shall dewatering be terminated sooner than 7 days after placing concrete. All dewatering methods and procedures are subject to the approval of the Engineer.
4. The excavation shall be protected from excessive rainfall and drying. The excavation shall be inspected and approved by the Engineer before work on the structure is started.
5. It is the intent of these specifications that the Contractor provide a relatively smooth, firm foundation bed for footings and slabs that bear directly on the undisturbed earth without additional cost to the Owner, regardless of the soil conditions encountered. The Engineer will be the judge as to whether these conditions have been met.
6. The Contractor shall pile excavated material in a manner that will not endanger the work.

B. UNAUTHORIZED OVEREXCAVATION
1. Excavation for slabs, footings, etc., that bear on earth shall not be carried below the elevation shown on the drawings.
2. In the event the excavation is carried on below the indicated elevation, the Contractor shall bring the slab, footing, etc., to the required grade by filling with concrete having a minimum compressive strength of at least 3000 p.s.i. at 28 days.

C. BACKFILL MATERIAL
   1. General:
      a. Suitable material chosen from the excavation shall be used for backfill. The material chosen shall be free of large lumps or clods, which will not readily break down under compaction.
      b. This material will be subject to approval by the Engineer.
      c. Backfill material shall be free of vegetation or other extraneous material.

   2. Excavated materials, which are to be used for, fill or backfill may be stockpiled on the site. The Engineer shall approve location of stockpiles.
   3. Top soil should be stockpiled separately and used for finish grading around structure.
   4. Fiberglass Manholes and Wetwells:
      a. Sand shall be used for backfill around manholes and/or wetwells for a distance of 2 feet from the outside surface and extending from the bottom of the excavation to the bottom of the top slab.
      b. Suitable material (as set out above) chosen from the excavation may be used for the remainder of the backfill.
      c. Location of stockpiles shall be approved by the Engineer.

D. SCHEDULE OF BACKFILLING
   1. Concrete and Masonry Structures:
      a. The Contractor shall begin backfilling of concrete structures no sooner than 7 days but no later than 14 days, after they are cast.
      b. The Contractor shall backfill brick and mortar structures after they have been in place at least 3 days.
   2. Fiberglass Manholes and Wetwells:
      a. The Contractor may begin backfilling of manholes and/or wetwells as soon as the concrete has been allowed to cure and any forms are removed.

E. BACKFILL
   1. General:
      a. Backfill shall be placed in layers of not more than 9 inches (loose measure) and mechanically tamped to at least 95% Standard Proctor Density A.S.T.M. Specification D-698. Flooding will NOT be permitted. Backfill shall be placed in such a manner as to prevent any wedging action against the structure.
   2. Fiberglass Manholes and Wetwells:
      a. Backfill shall be placed in layers of not more than 6 inches (loose measure) and mechanically tamped to at least 95% Standard Proctor Density. Flooding will NOT be permitted. Backfill shall be placed in such a manner as to prevent any wedging action against the structure.

F. EXCESS AND UNSUITABLE MATERIAL
   1. All excess and/or unsuitable excavated material shall be loaded and hauled off the Contractor.

END OF SECTION 31 50 00

SECTION 316200 DRIVEN PILES

PART 1 – GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Structural treated timber piles for building foundation.

B. Related Sections:
   1. Section 01 41 00 – Special Inspections
   2. Section 03 30 00 – Cast-In-Place Concrete

1.2 TESTING LABORATORY SERVICES

C. Permanent Piles: The independent Testing Laboratory specified in “Section 01 45 00" will perform the following services.
   1. Inspection: Perform inspections at source and at project site. Mark conforming piles for identification.
   2. Logging: Log the driving of all piling and record the following:
      a. Date driven, type of hammer, pile description including tip, length and butt dimensions measured just prior to driving.
      b. Location of pile.
      c. Number of blows per foot for full length of pile.
      d. Tip and butt elevation.
      e. Vibration Measurements.
      f. Record control elevations provided by Contractor.
      g. Heaved piles.
   3. Pile load tests.
   4. Reporting: Submit driving records daily.
   5. Inspect pile shells before concreting.

1.3 CONTRACTOR DUTIES

A. Protection of Property: The Contractor shall document the conditions of existing paving, structures, sewers, utilities, and other property on and adjacent to the work site and shall take suitable precautions to protect such property from damage which could result from the piling work. Should damage occur due to Contractor's operations, the Contractor shall repair or replace the damaged work to restore it to its original condition, without additional cost to the Owner.
   1. Documentation: Photograph existing conditions of structures, finishes, equipment, and adjacent improvements that might be construed as damage resulting from pile driving operations. File photos with Architect before starting pile driving.

B. Notification: The Contractor shall notify the Architect and the Testing Laboratory 48 hours prior to driving initial pile. Pile driving must not commence without representatives of the Architect and the Testing Laboratory being present.

C. Regulatory Agency: In accordance with the applicable Building Code, the Contractor shall notify the Director of the responsible regulatory agency at least 24 hours in advance of pile driving.

1.4 SUBMITTALS

A. Splice Data: Submit descriptive data for pile splice connector, including evidence of approval by the responsible regulatory agency.

1.5 QUALITY ASSURANCE

A. Vibration Monitoring: The Owner shall employ and pay an independent agency to monitor the vibrations during the pile driving. Modify operations with the Architect's concurrence as necessary to assure that vibrations are such that adjacent property is not damaged or impaired structurally.

B. Building Code: Comply with applicable provisions of the governing Building Codes.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Delivery: Deliver materials to Project site in such quantities and at such times to ensure continuity of pile driving operations and adherence to project schedule.

B. Storage: Store piles in orderly groups above ground and blocked to prevent distortion of piles.

C. Handling: Handle piles carefully without dropping, breaking, or abrading the surface. Repair damage or replace with new material.

1.7 PROJECT CONDITIONS

A. Basis for Bids: Bids shall be based on indicated number of piles and dimensions from point to cut-off, plus not less than 1 ft. of extra length for cutting piles at required cut-off elevations.

B. Cost Adjustment: In order to fix the cost to the Owner on longer or shorter piles, if conditions should require change in pile lengths, the Contractor shall submit in his proposal the following unit cost:

1. Cost per foot in 1'-0" increments for increase or decrease in pile length up to 5'-0".

C. No payment will be made for rejected piles including piles driven out of place, imperfect piles, or piles damaged in driving or handling.

D. Site Information: Data for subsurface conditions is available through the Owner and is not intended as a representation or warranty of continuity of conditions. It is expressly understood that the Owner, the Architect, and the Architect's consultants will not be responsible for interpretations or conclusions drawn by Contractor from the data, which is made available for the information and convenience of Contractor.

E. Protection: Protect structures, utilities, and other improvements and construction from damage caused by pile driving operations.

F. Control: Establish surveyed elevation bench marks on structures where directed by Architect before commencing work when structures are within 10 feet of pile driving operations. Record and report elevation of each bench mark at least twice a day while pile driving is in

progress and at completion of driving. If bench mark readings indicate displacement, halt driving operations until corrective action has been provided and is acceptable to Architect.

PART 2 – PRODUCTS

2.1 TREATED TIMBER PILES

A. Piles: Southern Pine smooth peeled conforming to ASTM D 25 with dimensions as follows:

1. Treated Timber Foundation Piles.
   a. Minimum tip diameter 7".
   b. Minimum butt diameter 12" measured 3'-0" from the end.
   c. Minimum length: as noted on drawings.

B. Preservative Treatment: Comply with AWPA Standards C1 and C3 for foundation piles using Grade 1 creosote (AWPA P1) with a minimum wet retention of 12 lbs. per cu. foot of wood, or CCA with a minimum wet retention of .8 lbs. per cu. foot of wood. Testing of retention by the gauge method will be acceptable.

2.2 DRIVING EQUIPMENT

A. General: Provide pile-driving equipment of type generally used in standard pile driving practice, operated at manufacturer's specified rate, to develop required rated energy per blow.

B. Hammer: Employ pile driving hammers of sufficient capacity, size, and type to be able to deliver consistently effective dynamic energy, suitable to piles to be driven and to sub-grade material into which they are to be driven, when operating at not more than 75 percent efficiency of rated driving energy.

C. Driving Caps: Equip hammer with cast steel or structural steel driving cap conforming to pile shape, to prevent damage to pile during driving.

D. Accessory Equipment: Provide necessary mandrels, drills and other acceptable equipment, suitable for the pile types and driving conditions involved.

PART 3 – EXECUTION

3.1 PRELIMINARY WORK

A. Investigation of Utilities: Investigate locations of underground utilities to identify possible interferences, before starting pile driving. Notify Architect of any interference discovered before or during driving and obtain instructions before proceeding.

B. Site Conditions: Do not drive piles until earthwork in area which piles are to be driven has been completed, as follows:

1. Excavations: Earth excavation shall be stopped at an elevation of 6" to 12" above bottom of footing before piles are driven. Final excavation of footing bottoms shall be done as part of earthwork, after piles have been driven and tested.
2. Fills: Fills will be constructed and compacted to elevation or grade indicated.

3.2 STATIC PILE LOAD TEST - 98245

3.3 STATIC PILE TESTS

A. General: Static pile tests will be used to verify design pile lengths and to confirm design load capacity of piles.

1. Furnish test piles 60 inches longer than production piles.
2. Actual length of piles will be based on results of static pile tests.

B. Pile Tests: Arrange and perform the following pile tests:

1. Axial Compressive Static Load Test: ASTM D 1143.

C. Drive test piles at locations indicated on the drawing and to a tip elevation below final cutoff elevation equal to pile length specified as basis of bid or, to refusal, whichever occurs first. Piles will be considered as driven to refusal when five blows of hammer are required to produce a total penetration of 1/4 inch or less.

1. Allow a minimum of seven days to elapse after driving test piles before starting pile testing.

D. Provide pile reaction frame, anchor piles, equipment, and instrumentation with sufficient reaction capacity to perform tests. Notify Construction Manager and Architect/ Engineer at least 48 hours in advance of performing tests. On completion of testing, remove testing structure, anchor piles, equipment, and instrumentation.

1. Number of Probe/Test Piles: As indicated on drawing

E. Driving Test Piles: Use test piles identical to those required for Project and drive with appropriate pile-driving equipment operating at rated driving energy to be used in driving permanent piles.

1. Pile Design Load: 25 tons.

F. Approval Criteria: Allowable design capacity of test piles shall be one-half of the load that results in the lesser of the following two values:

1. Net settlement, after deducting rebound, has not more than 0.01 inch/ton of test load.
2. Gross settlement of not more than 1 inch provided that load-settlement curve shows no sign of failure.

G. Driving Records: Prepare driving records for each test pile, compiled and attested to by a qualified professional engineer. Include same data as required for driving records of permanent piles.

H. Test piles that comply with requirements, including location tolerances, may be used on Project.

3.4 DRIVING PILES

I. General: Continuously drive piles to elevations or penetration resistance indicated or established by static load testing of piles. Establish and maintain axial alignment of leads and pile before and during driving.

J. Predrilling: Refer to Geotechnical report.

K. Pile Splices: Splices will only be allowed between the timber and steel section of pile.

L. Driving Tolerances: Drive piles without pile heads exceeding the following tolerances:

1. Location: 4 inches from location indicated after initial driving, and 6 inches after pile driving is completed.
2. Plumb: Maintain 1 inch in 10 feet from vertical, or a maximum of 4 inches, measured when pile is above ground in leads.
3. Batter Angle: Maximum 1 inch in 10 feet from required angle, measured when pile is above ground in leads.

M. Withdraw damaged or defective piles and piles that exceed driving tolerances and install new piles within driving tolerances. Fill holes left by withdrawn piles as directed by Construction Manager and Architect/Engineer.

1. Rejected piles may be abandoned and cut off as directed by Construction Manger and Architect/Engineer.
2. Leave rejected piles in place and install new piles in locations as directed by Architect/Engineer.
3. Fill holes left by withdrawn piles that will not be filled by new piles gravel-sand mixtures. Place and compact in lifts not exceeding 72 inches.

N. Cutting Off: Cut off butts of driven piles square with pile axis and at elevations indicated.

O. Driving Record: Maintain accurate driving records for each pile, compiled and attested to by a qualified testing laboratory Include the following data:

1. Project name and number.
2. Name of Contractor.
3. Pile species.
4. Pile location in pile group and designation of pile group.
5. Pile dimensions.
6. Final tip and cutoff elevations of pile after driving pile group.
7. Records of redriving.
8. Type, make, model, and rated energy of hammer.
9. Weight and stroke of hammer.
10. Cushion material and thickness.
11. Actual stroke and blow rate of hammer.
12. Record of number of blows for each 12 inches of penetration, and number of blows per 1 inch for the last 6 inches of driving.
13. Record preboring, jetting, or special procedures used.
14. Record of unusual occurrences during pile driving.

3.5 DRIVING PILES

A. General: Continuously drive piles at locations indicated.

1. Maintain center of gravity for each group or cluster of piles to conform to locations shown on drawings.
2. Plumb leads and pile before driving. Take care during driving to prevent, and to correct, any tendency of piles to twist or rotate.

B. Driving Tolerances: Drive piles within following maximum variance:

1. 3 inches from location indicated in not more than 10% of the total number of piles in a cluster.
2. Maintain 1 inch in 10 feet from vertical (or from required alignment if batter piles are required), or a maximum of 4 inches.

C. Corrections for Misdriven Piles: If variations exceed the tolerances specified above, unless limiting and controlling conditions as determined by the Architect make it impossible to maintain positions more accurately, the Contractor shall furnish and drive additional piles and/or modify pile caps, as instructed by the Architect, without additional cost to the Owner.

1. The Contractor shall plot the pile locations in each cluster and submit data to the Architect, who will then issue instructions for corrective action.
2. Additional piles and/or alterations to pile caps to compensate for or rectify failures to achieve proper locations will be the Contractor's responsibility, whether defects are discovered before or after cutting off.

D. Damaged Piles: Damaged piles will not be accepted. Any pile which is damaged, broken or deflected, or which cannot be driven to required penetration because of underground obstructions, shall be rejected.

1. Withdraw piles rejected after driving and replace with new piles at the location directed by the Architect.
2. Piles rejected after driving, which cannot be withdrawn shall be abandoned and cut-off and additional piles driven to replace rejected units at designated locations.
3. Solidly fill spaces left by withdrawn piles that will not be filled by new piles using cohesion less soil material such as gravel, broken stone, and gravel-sand mixtures. Place and compact throughout length of space in lifts not exceeding 6 feet.

E. Over-Driven Piles: Any piles driven too low to permit proper cut-off shall be corrected without additional cost to the Owner, as instructed by the Architect.

END OF SECTION 31 62 00

SECTION 316223 - COMPOSITE PILES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes concrete-filled steel shell piles.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: Show fabrication and installation details for piles, including splices and tip details.

1. Indicate welds by standard AWS symbols, distinguishing between shop and field welds, and show size, length, and type of each weld.
2. Indicate locations, sizes, type, and arrangement of reinforcement.

1.3 INFORMATIONAL SUBMITTALS

A. Welding certificates.

B. Concrete design mixes.

C. Material certificates.

D. Material test reports.

E. Pile-Driving Equipment Data: Include type, make, and rated energy range; weight of striking part of hammer; weight of drive cap; and, type, size, and properties of hammer cushion. Include mandrel type and details.

F. Pile-driving records.

G. Field quality-control reports.

1.4 QUALITY ASSURANCE

A. Comply with requirements in ACI 301, "Specifications for Structural Concrete."

B. Welding Qualifications: Qualify procedures and personnel according to the following:

1. AWS D1.1/D1.1M, "Structural Welding Code - Steel".

2. AWS D1.3, "Structural Welding Code - Sheet Steel."

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Helically Corrugated Pile Shells:

a. CONTECH Construction Products Inc.

2.2 STEEL SHELL PILES

A. Fluted Pile Shells: Manufacturer's standard, vertically fluted pile shells; cold formed from steel sheet; 50,000-psi minimum yield strength after forming. Fabricate watertight, uniformly tapered sections with forged-steel conical nose welded to tip.

1. Constant Diameter Extensions: Fabricate with splice overlap capable of telescoping into tapered section.
2. Taper: 0.14 inch in 12 inches
3. Thickness: 0.276 inch

B. Helically Corrugated Pile Shells: Manufacturer's standard, helically corrugated, uniform-diameter, steel sheet shell piles; of sufficient strength and thickness to remain watertight and resist distortion and buckling due to soil pressure, internal mandrel operation, or redriving. Fabricate in one-piece lengths with 0.276-inch thick, minimum steel-plate boot continuously welded to tip and as follows:

2.3 PILE ACCESSORIES

A. Driving Points: Manufacturer's standard 60-degree conical driving point, with integral reinforcing ribs, to provide full bearing of pipe pile tip. Fabricate from steel castings as follows:

B. Inside Cutting Shoes: Manufacturer's standard, inside-flanged, open-ended cutting shoe, to provide full bearing of pipe pile tip. Fabricate from steel castings as follows:

C. Outside Cutting Shoes: Manufacturer's standard, outside-flanged, open-ended cutting shoe, to provide full bearing of pipe pile tip. Fabricate from steel castings as follows:

D. Splice Coupling: Manufacturer's standard splice coupling, rolled from ASTM A 36/A 36M, carbon-steel bar or cast from heat-treated carbon steel, ASTM A 27/A 27M, Grade 65-35 with interior stop and internally tapered for friction fit driving.

2.4 FABRICATION

A. Fabricate full-length piles to eliminate splicing during driving.

B. Fabricate full-length piles by splicing pile lengths together. Maintain axial alignment of pile lengths. Maintain structural properties of pile across splice.

C. Fit and weld to tip of pile according to manufacturer's written instructions and AWS D1.1/D1.1M for procedures, appearance and quality of welds, and methods used in correcting welding work.

PART 3 - EXECUTION

3.1 DRIVING PILES

A. General: Continuously drive piles to elevations or penetration resistance indicated. Establish and maintain axial alignment of leads and piles before and during driving.

B. Heaved Piles: Redrive heaved piles to tip elevation at least as deep as original tip elevation with a driving resistance at least as great as original driving resistance.

C. Pile Splices: Splice piles during installation and align pile segments concentrically.

D. Driving Tolerances: Drive piles without exceeding the following tolerances, measured at pile heads:

1. Location: 4 inches from location indicated after initial driving, and 6 inches after pile driving is completed.
2. Plumb: Maintain 1 inch in 4 feet from vertical, or a maximum of 4 inches, measured when pile is aboveground in leads.

E. Excavation: Clean out steel pipe pile by removing soil and debris from inside pile before placing steel reinforcement or concrete.

F. Cutting Off: Cut off tops of driven piles square with pile axis and at elevations indicated.

G. Pile-Driving Records: Maintain accurate driving records for each pile.

3.2 FIELD QUALITY CONTROL

A. Special Inspections: Owner will engage a qualified special inspector to perform the following special inspections:

1. Pile foundations.

B. Testing Agency: Owner will engage a qualified independent testing agency to perform tests and inspections.

C. Tests and Inspections:

1. Dynamic Pile Testing: High-strain dynamic monitoring shall be performed and reported according to ASTM D 4945 during initial driving and during restriking on 5 single piles.
2. Low-strain integrity measurement shall be performed and reported for each pile.
3. Weld Testing: In addition to visual inspection, welds shall be tested and inspected according to AWS D1.1/D1.1M.

END OF SECTION 316223

DIVISION 32

SECTION 321443 - POROUS UNIT PAVING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Permeable Concrete Pavers and aggregates
2. Edge restraints.

1.2 ACTION SUBMITTALS

A. Product Data: For materials other than aggregates.

B. Sustainable Design Submittals:

1. <Double click to insert sustainable design text for regional materials.>

C. Sieve Analyses: For aggregate materials, according to ASTM C136.

D. Samples:

1. Full-size units of each type of unit paver indicated.
2. Exposed edge restraints.
3. Aggregate fill.
4. Aggregate setting bed materials.

1.3 QUALITY ASSURANCE

Retain "Installer Qualifications" Paragraph below if required. See Section 014000 "Quality Requirements" for general installer qualifications. Verify availability of qualified personnel in Project area before retaining.

A. Installer Qualifications: A qualified porous unit paving installer. Installer's [**field supervisor**] [**personnel assigned to the Work**] shall have Concrete Paver Installer Certification from the Interlocking Concrete Pavement Institute (ICPI) with PICP (Permeable Interlocking Concrete Pavement) Specialist Designation.

If "Mockups" Paragraph below is retained, indicate location, size, and other details of mockups on Drawings or by inserts. Revise wording if only one mockup is required.

B. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.

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1. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

PART 2 - PRODUCTS

2.1 CONCRETE UNIT PAVERS

A. Basis of Design: Subject to compliance with requirements, provide product indicated on Drawings or comparable product product by one of the following:
1. Unilock Eco-Priora- Chicago
2. Approved equal

B. Concrete Grid Pavers: Grid paving units complying with ASTM C1319, made from normal-weight aggregates.

1. Thickness: [**3-1/8 inches (80 mm)**] [**3-1/2 inches (90 mm)**] [**4 inches (100 mm)**] <**Insert dimension**>.
2. Face Size and Shape: [**As indicated**] <**Insert size and shape**>.
3. Opening Percentage: <**Insert number**>percent.
4. Color: [**As indicated by manufacturer's designations**] [**Match Architect's sample**] [**As selected by Architect from manufacturer's full range**] <**Insert color**>.

C. Solid Concrete Pavers for Porous Paving: Solid interlocking paving units of shapes that provide openings between units, complying with ASTM C936/C936M[**, resistant to freezing and thawing when tested according to ASTM C67**], and made from normal-weight aggregates.

1. Thickness: [**2-3/8 inches (60 mm)**] [**3-1/8 inches (80 mm)**] [**3-1/2 inches (90 mm)**] [**4 inches (100 mm)**] <**Insert dimension**>.
2. Face Size and Shape: [**As indicated**] <**Insert size and shape**>.
3. Opening Percentage: <**Insert number**>percent.
4. Color: [**As indicated by manufacturer's designations**] [**Match Architect's sample**] [**As selected by Architect from manufacturer's full range**] <**Insert color**>.

2.2 EDGE RESTRAINTS

A. Plastic Edge Restraints: Triangular PVC extrusions, [**1-3/4 inches (45 mm) high by 3-1/2 inches (90 mm) wide**] [**3-1/8 inches (80 mm) high by 9-1/2 inches (240 mm) wide**], designed to serve as edge restraints for unit pavers; rigid type for straight edges and flexible type for curved edges, with pipe connectors and 3/8-inch- (9.5-mm-) diameter by 12-inch- (300-mm-) long steel spikes.

1. <Double click here to find, evaluate, and insert list of manufacturers and products.>

B. Steel Edge Restraints: Painted steel edging, [**3/16 inch (4.8 mm) thick by 4 inches (100 mm) high**] [**1/4 inch (6.4 mm) thick by 5 inches (125 mm) high**], with loops pressed from or welded to face to receive stakes at 36 inches (900 mm) o.c., and with steel stakes 15 inches (380 mm) long for each loop.

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1. <Double click here to find, evaluate, and insert list of manufacturers and products.>
2. Color: [**As indicated by manufacturer's designations**] [**Match Architect's sample**] [**As selected by Architect from manufacturer's full range**] <**Insert color**>.

Aluminum edge restraints are generally installed below grade, so color is usually not a concern. Aluminum edging normally has a mill finish.

C. Aluminum Edge Restraints: [**Straight, 1/8 inch (3.2 mm) thick by 4 inches (100 mm) high**] [**Straight, 3/16 inch (4.8 mm) thick by 4 inches (100 mm) high**] [**L-shaped, 1/8 inch (3.2 mm) thick by 1-3/8 inches (35 mm) high**] [**L-shaped, 3/16 inch (4.8 mm) thick by 2-1/4 inches (57 mm) high**] extruded-aluminum edging, with loops pressed from face to receive stakes at 12 inches (300 mm) o.c., and with aluminum stakes 12 inches (300 mm) long for each loop.

1. <Double click here to find, evaluate, and insert list of manufacturers and products.>

2.3 AGGREGATE SETTING-BED MATERIALS

A. <Double click to insert sustainable design text for aggregate and soil.>

B. Graded Aggregate for Subbase: Sound crushed stone or gravel complying with [**ASTM D448 for Size No. 57**] [**ASTM D448 for Size No. 5**] [**ASTM D2940/D2940M, subbase material**] [**requirements in Section 312000 "Earth Moving" for subbase material**].

C. Graded Aggregate for Base Course: Sound crushed stone or gravel complying with [**ASTM D448 for Size No. 8**] [**ASTM D448 for Size No. 57**] [**ASTM D2940/D2940M, base-course material**] [**requirements in Section 312000 "Earth Moving" for base-course material**].

D. Sand for Leveling Course: Sound, sharp, washed, natural sand or crushed stone complying with gradation requirements in ASTM C33/C33M for fine aggregate.

E. Soil Mix for Leveling Course: Sound, sharp, washed, natural sand or crushed stone complying with gradation requirements in ASTM C33/C33M for fine aggregate blended with planting soil <**Insert drawing designation**> according to [**Section 329113 "Soil Preparation."**] [**Section 329115 "Soil Preparation (Performance Specification)."**] Use blend consisting of [**1/2 sand and 1/2 planting soil mix**] [**2/3 sand and 1/3 planting soil mix**] <**Insert proportions**>.

F. Graded Aggregate for Leveling Course: Sound crushed stone or gravel complying with ASTM D448 for Size No. [**8**] [**9**].

G. Drainage Geotextile: Nonwoven needle-punched geotextile, manufactured for subsurface drainage applications, made from polyolefins or polyesters; with elongation greater than 50 percent; complying with AASHTO M 288 and the following, measured according to test methods referenced:

1. Survivability: Class 2; AASHTO M 288.
2. Apparent Opening Size: No. 40 (0.425-mm) sieve, maximum; ASTM D4751.

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3. Permittivity: 0.5 per second, minimum; ASTM D4491.
4. UV Stability: 50 percent after 500 hours' exposure; ASTM D4355.

2.4 FILL MATERIALS

A. Soil Fill for Porous Paving: Planting soil <**Insert drawing designation**> according to [**Section 329113 "Soil Preparation."**] [**Section 329115 "Soil Preparation (Performance Specification)."**]

B. Aggregate Fill for Porous Paving: Graded, sound, crushed stone or gravel complying with ASTM D448 for Size No. [**8**] [**9**].

1. Color: [**As indicated**] [**Match Architect's sample**].

C. Grass Seed: Comply with requirements in Section 329200 "Turf and Grasses."

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Do not use unit pavers with chips, cracks, voids, discolorations, and other defects that might be structurally unsound or visible in finished work.

B. Cut unit pavers with motor-driven masonry saw equipment[**or a block splitter**] to provide clean, sharp, unchipped edges. Cut units to provide pattern indicated and to fit adjoining work neatly. Use full units without cutting where possible. Hammer cutting is not acceptable.

C. Tolerances:

1. Variation in Plane between Adjacent Units (Lipping): Do not exceed 1/16-inch (1.5-mm) unit-to-unit offset from flush.
2. Variation from Level or Indicated Slope: Do not exceed 1/8 inch in 24 inches (3 mm in 600 mm) and 1/4 inch in 10 feet (6 mm in 3 m) or a maximum of 1/2 inch (13 mm).

D. Provide edge restraints as indicated. Install edge restraints before placing unit pavers.

3.2 INSTALLATION OF SETTING-BED

A. Compact subgrade uniformly to at least [**95**] <**Insert number**> percent of [**ASTM D698**] [**ASTM D1557**] laboratory density.

B. Place drainage geotextile over prepared subgrade, overlapping ends and edges at least 12 inches (300 mm).

C. Place aggregate [**subbase**] [**and**] [**base**], compact by tamping with plate vibrator, and screed to depth indicated.

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D. Place aggregate [**subbase**] [**and**] [**base**], compact to [**100**] <**Insert number**> percent of ASTM D1557 maximum laboratory density, and screed to depth indicated.

E. Place drainage geotextile over compacted subbase, overlapping ends and edges at least 12 inches (300 mm).

F. Place drainage geotextile over compacted base course, overlapping ends and edges at least 12 inches (300 mm).

G. Place leveling course, and screed to a thickness of [**1 to 1-1/2 inches (25 to 38 mm)**] [**2 to 2-1/2 inches (50 to 64 mm)**] [**3 inches (76 mm)**] <**Insert dimension**>, taking care that moisture content remains constant and density is loose and constant until pavers are set and compacted.

3.3 INSTALLATION OF PAVERS

A. Set unit pavers on leveling course, being careful not to disturb leveling base. If pavers have lugs or spacer bars to control spacing, place pavers hand tight against lugs or spacer bars. If pavers do not have lugs or spacer bars, place pavers with a 1/16-inch- (1.6-mm-) minimum and 1/8-inch- (3.2-mm-) maximum joint width

B. Compact pavers into leveling course with a low-amplitude plate vibrator capable of a 3500- to 5000-lbf (16- to 22-kN) compaction force at 80 to 90 Hz.

C. Place soil fill immediately after vibrating pavers into leveling course. Spread and screed soil fill level with tops of pavers. Vibrate pavers and add soil fill until porous paving is filled to about 3/4 inch (19 mm) from top surface; remove excess soil fill if any.

D. After filling pavers with soil, sow seed according to Section 329200 "Turf and Grasses," except sow seed at half the rate specified for seeding lawns. Sweep seed from surfaces of pavers into voids and water with fine spray.

E. Place graded aggregate fill immediately after vibrating pavers into leveling course. Spread and screed aggregate fill level with tops of pavers.

F. As work progresses, remove and replace pavers that are loose, chipped, broken, stained, or otherwise damaged or that do not match adjoining units. Provide new units to match adjoining units and install in same manner as original units, with same joint treatment and with no evidence of replacement.

3.4 MAINTENANCE AND PROTECTION

Retain this article if porous paving is planted with grass or ground cover. Retain first paragraph below only if pavers are planted with grass. Maintenance of ground covers after planting is specified in Section 329300 "Plants".

A. Water newly planted grass and keep moist until grass is established. Maintain grass that is planted in paving to comply with requirements in Section 329200 "Turf and Grasses."

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B. Erect barricades and warning signs as required to protect newly planted areas from traffic. Maintain barricades for [**60**] <**Insert number**> days after planting.

END OF SECTION 321443

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321313 CONCRETE PAVING

PART 1 - GENERAL

1.1 SUMMARY

A. All work performed under this section shall be in accordance with Sections 601, 706, 707, 901 and 1005 of the Louisiana Standard Specifications for Roads and Bridges 2016 Edition (and latest revisions) unless herein specified or indicated on the plans. This Section includes Portland Cement Concrete Pavement for the following applications:

1. Pavement, Curbs and Walkways.
2. Joints.
3. Playground Surfacing Substrates

1.2 SUBMITTALS

A. Product Data: For each manufactured material and product indicated.

B. Design Mixes: For each concrete mix indicated.

C. Material certificates.

1.3 QUALITY ASSURANCE

A. Manufacturer Qualifications: Manufacturer of ready-mixed concrete products complying with ASTM C 94 requirements for production facilities and equipment.

B. ACI Publications: Comply with ACI 301, "Specification for Structural Concrete," unless modified by the requirements of the Contract Documents.

PART 2 - PRODUCTS

2.1 STEEL REINFORCEMENT

A. Steel reinforcement shall be in accordance with Sections 806 and 1009 of the Louisiana Standard Specifications for Roads and Bridges 2016 Edition (and latest revisions).

2.2 CONCRETE MATERIALS

A. Concrete Materials shall be in accordance with Sections 901 of the Louisiana Standard Specifications for Roads and Bridges 2016 Edition (and latest revisions).

2.3 TRAFFIC PAINT

A. Traffic paint shall be alkyd-resin ready-mixed complying with AASHTO M 248, Type S.

1. Color: White (Parking)
2. Color: Yellow (Traffic control)
3. Color: Blue (Handicapped)
4. Color: Red (Fire zone and no parking)

PART 3 - EXECUTION

3.1 CURBS

A. Curbs. If slip-formed, the concrete shall have not more than a 1-1/2" slump and an air entraining admixture in accordance with the Standard Specifications referred to above.

3.2 SIDEWALKS

A. The concrete shall be deposited on a moist sub-grade, struck off and compacted to the required thickness. The surface shall be finished with a wood float or steel trowel, provided that the surface is finally brushed in order to leave a slightly rough finish.

B. The sidewalk shall be divided into sections by control joints, spaced 5 no more than feet apart, which shall extend into the concrete for at least 1/4 of the depth and shall be approximately 1/8" wide. Construction joints of 1/4" pre-molded expansion joint shall be installed around all appurtenances; such as manholes, utility poles, etc., extending and through sidewalk. Expansion joints of ½" thick performed joint filler (non-extruding type) or redwood shall be installed every 20 feet or fraction thereof, between intersecting sidewalks, and any fixed structure such as building, bridge or curbing. This expansion joint material shall extend for the full depth of the walk.

C. Wire fabric where required shall conform to ASTM A-185.

3.3 CONCRETE PAVEMENT

A. The P.C.C. Pavement thickness shown on the plans are minimum thickness. There will be no tolerance for thickness deficiencies. The Owner reserves the right to require removal and replacement of all pavement that does not meet the minimum required thickness. There will be no adjustment of payment for pavement exceeding the minimum required thickness. Concrete surface shall be finished with a light to medium broom to leave a slightly rough finish.

3.4 CONCRETE SUBSTRATES

A. Provide and verify substrate conditions per playground manufacturers requirements for installation.

3.5 JOINTS

A. All joints shall be installed in accordance with the details in the plans and using materials in accordance with Section 1005 of the Louisiana Standard Specifications for Roads and Bridges, 2016 Edition

3.6 TESTING

A. All testing and inspection shall be in accordance with Louisiana Standard Specifications for Roads and Bridges, 2016 Edition, and latest revisions.

3.7 REPAIRS AND PROTECTION

A. Remove and replace concrete pavement that is broken, damaged, or defective, or does not meet requirements in this Section.

B. Protect concrete from damage. Exclude traffic from pavement for at least 14 days after placement.

C. Maintain concrete pavement free of stains, discoloration, dirt, and other foreign material. Sweep concrete pavement not more than two days before date scheduled for Substantial Completion inspections.

3.8 TRAFFIC PAINT

A. Traffic Paint: Apply traffic paint for striping and other markings with mechanical equipment to produce uniform straight edges. Apply at manufacturer's recommended rates to provide a 15-mil minimum wet film thickness.

END OF SECTION 32 13 13

SECTION 32 13 73 – PAVEMENT JOINT SEALANTS

PART 1 - GENERAL

1.1 SUMMARY

A. Scope: The work included in this section of the specifications includes all labor, materials, equipment, and services necessary for furnishing and installing pavement joint sealants as indicated on the drawings and as herein specified.

B. This Section includes the following:

1. Expansion and contraction joints within portland cement concrete pavement.
2. Joints between portland cement concrete and asphalt pavement.

C. Related Sections include the following:

1. Division 32 Section "Concrete Paving" for constructing joints between concrete and concrete pavement.

1.2 SUBMITTALS

A. Product Data: For each type and color of joint sealant required. Install joint-sealant samples in 1/2 inch- (13 mm-) wide joints formed between two 6-inch- (150 mm-) long strips of material matching the appearance of exposed surfaces adjacent to joint sealants.

1.3 DELIVERY. STORAGE. AND HANDLING

A. Deliver materials to Project site in original unopened containers or bundles with labels indicating manufacturer, product name and designation, color, expiration date, pot life, curing time, and mixing instructions for multi-component materials.

B. Store and handle materials to comply with manufacturer's written instructions to prevent their deterioration or damage due to moisture, high or low temperatures, contaminants, or other causes.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

A. Compatibility: Provide joint sealants, backing materials, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint sealant m manufacturer based on testing and field experience.

2.2 COLD-APPLIED JOINT SEALANTS

A. Multi-component Jet-Fuel Resistant Sealant for Concrete: Pourable, chemically curing elastomeric formulation complying with the following requirements for formulation and with ASTM C 920 for type, grade, class, and uses indicated:

1. Coal-Tar Modified Polymer Formulation: Type M; Grade P; Class 25; Uses T and, as applicable to joint substrates indicated, O.
2. Product: Dow Corning or Sonneborn.

2.3 HOT-APPLIED JOINT SEALANTS

A. Sealant for Concrete and Asphalt: Single-component formulation complying with ASTM D 3405.

B. Available Products: Subject to compliance with requirements, hot-applied joint sealants that may be incorporated into the Work include, but are not limited to, the following:

1. Sealant for Concrete and Asphalt:

a. ROADSAVER 221; CraDco Inc.
b. Product #9005; Koch Materials Company.
c. Product #9030; Koch Materials Company.
d. SEALTIGHT HI-SPEC; W.R. Meadows, Inc.

2.4 JOINT-SEALANT BACKER MATERIALS

A. General: Provide joint-sealant backer materials that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by joint sealant manufacturer based on field experience and laboratory testing.

B. Backer Strips for Cold- and Hot-Applied Sealants: ASTM D 5249; Type 2; of thickness and width required to control sealant depths, prevent bottom-side adhesion of sealant, and fill remainder of joint opening under sealant.

2.5 PRIMERS:

A. Primers: Product recommended by joint sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint- sealant-substrate tests and field tests.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint-sealant performance.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint sealant manufacturer's written instructions.

B. Joint Priming: Prime joint substrates where indicated or where recommended in writing by joint sealant manufacturer, based on preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.

3.3 INSTALLATION OF JOINT SEALANTS

A. General: Comply with joint sealant manufacturer's written installation instructions applicable to products and applications indicated, unless more stringent requirements apply.

B. Sealant Installation Standard: Comply with recommendations of ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.

C. Install backer materials of type indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.

1. Do not leave gaps between ends of backer materials.
2. Do not stretch, twist, puncture, or tear backer materials.
3. Remove absorbent backer materials that have become wet before sealant application and replace them with dry materials.

D. Install sealants by proven techniques to comply with the following and at the same time backings are installed:

1. Place sealants so they directly contact and fully wet joint substrates.
2. Completely fill recesses provided for each joint configuration.
3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.

E. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.

1. Remove excess sealants from surfaces adjacent to joint.
2. Use tooling agents that are approved in writing by joint sealant manufacturer and that do not discolor sealants or adjacent surfaces.

F. Provide joint configuration to comply with joint sealant manufacturer's written instructions, unless otherwise indicated.

3.4 CLEANING

A. Clean off excess sealants or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved by manufacturers of joint sealants and of products in which joints occur.

3.5 PROTECTION

A. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from the original work.

END OF SECTION 32 13 73

SECTION 321713 - PARKING BUMPERS

TIPS:

To view non-printing **Editor's Notes** that provide guidance for editing, click on MasterWorks/Single-File Formatting/Toggle/Editor's Notes.

To read **detailed research, technical information about products and materials, and coordination checklists**, click on MasterWorks/Supporting Information.

Content Requests:

<Double click here to submit questions, comments, or suggested edits to this Section.>

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Precast concrete wheel stops.
2.

1.2 ACTION SUBMITTALS

A. Product Data:

1. Precast concrete wheel stops.

PART 2 - PRODUCTS

2.1 PARKING BUMPERS

A. Precast Concrete Wheel Stops: Precast, steel-reinforced, air-entrained concrete; 4000-psi (27.6-MPa) minimum compressive strength; manufacturer's standard height and width by 72 inches long. Provide chamfered corners, transverse drainage slots on underside, and a minimum of three factory-formed or -drilled vertical holes through wheel stop for anchoring to substrate.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. American Eagle Precast, LLC.
b. American Precast Concrete Inc.
c. Dura-Crete, Inc.
d. Oldcastle Precast, Inc.

2. Surface Appearance: Smooth, free of pockets, sand streaks, honeycombs, and other obvious defects. Corners shall be uniform, straight, and sharp.
3. Surface Sealer: Manufacturer's standard salt-resistant, clear sealer < applied at precasting location.
4. Mounting Hardware: Galvanized-steel hardware as standard with wheel-stop manufacturer.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Verify that pavement is in suitable condition to begin installation in accordance with manufacturer's written instructions.

B. Install wheel stops in accordance with manufacturer's written instructions unless otherwise indicated.

C. Install wheel stops in bed of adhesive before anchoring to substrate.

D. Securely anchor wheel stops to substrate with hardware in each preformed vertical hole in wheel stop as recommended in writing by manufacturer. Recess head of hardware beneath top of wheel stop.

END OF SECTION 321713

SECTION 321726 - TACTILE WARNING SURFACING

TIPS:

To view non-printing **Editor's Notes** that provide guidance for editing, click on MasterWorks/Single-File Formatting/Toggle/Editor's Notes.

To read **detailed research, technical information about products and materials, and coordination checklists**, click on MasterWorks/Supporting Information.

Content Requests:

<Double click here to submit questions, comments, or suggested edits to this Section.>

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Cast-in-place detectable warning tiles.
2. Surface-applied detectable warning tiles.
3. Detectable warning mats.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Sustainable Design Submittals:

1. <Double click to insert sustainable design text for recycled content.>
2. <Double click to insert sustainable design text for regional materials.>

C. Samples for each type of exposed finish requiring color selection.

PART 2 - PRODUCTS

2.1 TACTILE WARNING SURFACING, GENERAL

A. Accessibility Requirements: Comply with applicable provisions in [**the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines for Buildings and Facilities**] [**and**] [**ICC A117.1**] for tactile warning surfaces.

1. For tactile warning surfaces composed of multiple units, provide units that when installed provide consistent side-to-side and end-to-end dome spacing that complies with requirements.

B. <Double click to insert sustainable design text for recycled content.>

C. <Double click to insert sustainable design text for regional materials.>

2.2 DETECTABLE WARNING TILES

A. Cast-in-Place Detectable Warning Tiles: Accessible truncated-dome detectable warning tiles[**with replaceable surface**] configured for setting flush in new concrete walkway surfaces, with slip-resistant surface treatment on domes and field of tile.

1. <Double click here to find, evaluate, and insert list of manufacturers and products.>
2. Material: [**Cast-fiber-reinforced polymer concrete tile**] [**Molded glass- and carbon-fiber-reinforced polyester**].
3. Color: [**Safety yellow**] [**Red brick**] [**Black**] [**Gray**] [**As selected by Architect from manufacturer's full line**].
4. Shapes and Sizes:
    a. Rectangular panel, [**12 by 12 inches (305 by 305 mm)**] <**Insert dimensions**>.
    b. Radius panel, nominal 24 inches (610 mm) deep by [**6-foot (1829-mm)**] <**Insert dimension**> outside radius.
5. Dome Spacing and Configuration: [**1.67-inch (42.4-mm) spacing**] [**2.35-inch (59.7-mm) spacing**] [**Manufacturer's standard compliant spacing**] <**Insert spacing**>, in [**square**] [**diamond**] [**manufacturer's standard**] pattern.
6. Mounting:
    a. Permanently embedded detectable warning tile wet-set into freshly poured concrete.
    b. Detectable warning tile set into formed recess in concrete and adhered with [**mortar**] [**adhesive**].
    c. Replaceable detectable warning tile wet-set into freshly poured concrete and surface-fastened to permanently embedded anchors.

B. Surface-Applied Detectable Warning Tiles: Accessible truncated-dome detectable warning concrete tiles configured for surface application on existing concrete walkway surfaces, with slip-resistant surface treatment on domes, field of tile, and beveled outside edges.

1. <Double click here to find, evaluate, and insert list of manufacturers and products.>
2. Material: [**Cast-fiber-reinforced polymer concrete tile**] [**Molded glass- and carbon-fiber-reinforced polyester**].
3. Color: [**Safety yellow**] [**Red brick**] [**Black**] [**Gray**] [**As selected by Architect from manufacturer's full line**].
4. Shapes and Sizes:
    a. Rectangular panel, [**12 by 12 inches (305 by 305 mm)**] <**Insert dimensions**>.
    b. Radius panel, nominal 24 inches (610 mm) deep by [**6-foot (1829-mm)**] <**Insert dimension**> outside radius.
5. Dome Spacing and Configuration: [**1.67-inch (42.4-mm) spacing**] [**2.35-inch (59.7-mm) spacing**] [**Manufacturer's standard compliant spacing**] <**Insert spacing**>, in [**square**] [**diamond**] [**manufacturer's standard**] pattern.
6. Mounting: Adhered[**and fastened**] to existing concrete walkway.

2.3 DETECTABLE WARNING MATS

A. Surface-Applied Detectable Warning Mats: Accessible truncated-dome detectable warning resilient mats, UV resistant, manufactured for adhering to existing concrete walkway surfaces, with slip-resistant surface treatment on domes, field of mat, and beveled outside edges.

1. <Double click here to find, evaluate, and insert list of manufacturers and products.>
2. Material: Modified rubber compound, UV resistant.
3. Color: [**As indicated by manufacturer's designations**] [**Match Architect's sample**] [**As selected by Architect from manufacturer's full range**] <**Insert color**>.
4. Shapes and Sizes:

    a. Rectangular panel, [**24 by 36 inches (610 by 914 mm)**] [**24 by 48 inches (610 by 1219 mm)**] [**24 by 60 inches (610 by 1524 mm)**] <**Insert dimensions**>.

5. Dome Spacing and Configuration: [**1.67-inch (42.4-mm) spacing**] [**2.35-inch (59.7-mm) spacing**] [**Manufacturer's standard compliant spacing**] <**Insert spacing**>, in [**square**] [**diamond**] [**manufacturer's standard**] pattern.
6. Mounting: Adhered to pavement surface with adhesive[**and fastened with fasteners**].

2.4 ACCESSORIES

A. Fasteners and Anchors: Manufacturer's standard as required for secure anchorage of tactile warning surfaces, noncorrosive and compatible with each material joined, and complying with the following:

1. Furnish [**Type 304**] [**Type 316**] stainless-steel fasteners for exterior use.
2. Fastener Heads: For nonstructural connections, use flathead or oval countersunk screws and bolts with tamper-resistant heads, colored to match tile.

B. Adhesive: As recommended by manufacturer for adhering tactile warning surfacing unit to pavement.

C. Sealant: As recommended by manufacturer for sealing perimeter of tactile warning surfacing unit.

PART 3 - EXECUTION

3.1 INSTALLATION OF TACTILE WARNING SURFACING

A. General: Prepare substrate and install tactile warning surfacing according to manufacturer's written instructions unless otherwise indicated.

B. Place tactile warning surfacing units in dimensions and orientation indicated. Comply with location requirements of AASHTO MP 12.

C. Cast-in-Place Detectable Warning Tiles: Set each detectable warning tile accurately and firmly in place and completely seat tile back and embedments in wet concrete by tamping or vibrating. Set surface of tile flush with surrounding concrete and adjacent tiles. Remove concrete from tile surfaces and clean using methods recommended in writing by manufacturer.

D. Removable Cast-in-Place Detectable Warning Tiles: Set each detectable warning tile accurately and firmly in place with embedding anchors and fasteners attached, and firmly seat tile back in wet concrete by tamping or vibrating. Set surface of tile flush with surrounding concrete and adjacent tiles. Remove concrete from tile surfaces and clean tiles using methods recommended in writing by manufacturer.

E. Surface-Applied Detectable Warning Tiles: Prepare existing paving surface by grinding and cleaning as recommended by manufacturer. Apply adhesive to back of tiles in amounts and pattern recommended by manufacturer, and set tiles in place. Install anchor devices through face of tiles and into pavement using anchors located as recommended by manufacturer. Apply sealant in continuous bead around perimeter of installation.

F. Surface-Applied Detectable Warning Mats: Prepare existing paving surface by grinding and cleaning as recommended by manufacturer. Apply adhesive to back of mat and set mat in place. Firmly seat mat in adhesive bed. Install anchor devices through face of mat and into pavement using anchors located as recommended by manufacturer. Set heads of anchors flush with mat surface. Apply sealant in continuous bead around perimeter of mat.

G. Remove and replace tactile warning surfacing that is broken or damaged or does not comply with requirements in this Section. Remove in complete sections from joint to joint unless otherwise approved by Architect. Replace using tactile warning surfacing installation methods acceptable to Architect.

H. Protect tactile warning surfacing from damage and maintain free of stains, discoloration, dirt, and other foreign material.

END OF SECTION 321726

SECTION 321816 - PLAYGROUND PROTECTIVE SURFACING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Unitary, seamless surfacing.
2. Unitary, tile surfacing.

B. Related Requirements:
1. Section 321313 “Concrete Paving” for protective surfacing substrates

1.2 DEFINITIONS

A. Critical Height: Standard measure of shock attenuation according to ASTM F2223; same as "critical fall height" in ASTM F1292.

B. Unitary Surfacing: A protective surfacing of one or more material components bound together to form a continuous surface; same as "unitary system" in ASTM F2223.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For each type of protective surfacing.

1. Include plans, sections, placement and penetration details, and attachment to substrates.
2. Include accessories and edge terminations.
3. Include patterns made by varying colors of surfacing

C. Samples: For each exposed product and for each color and texture specified.

1.4 INFORMATIONAL SUBMITTALS

A. Material certificates.

B. Product certificates.

C. Field quality-control reports.

D. Sample warranty.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance data.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.

1.7 WARRANTY

A. Special Warranty: Manufacturer and Installer agree to repair or replace components of protective surfacing that fail in materials or workmanship within specified warranty period.

1. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Impact Attenuation: Critical fall height tested according to ASTM F1292.

B. Accessibility Standard: Minimum surfacing performance according to ASTM F1951.

2.2 UNITARY, SINGLE-DENSITY, SEAMLESS SURFACING

A. Description: Manufacturer's standard, site-mixed and applied, single-layer material in thickness as required, tested for impact attenuation according to ASTM F1292and for accessibility according to ASTM F1951.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

a. GameTime; a PlayCore, Inc. company.
b. No Fault Sport Group, LLC.
c. Play Safe Surfacing, Inc.

2.
3. Critical Height: 7 feet
4. Overall Thickness: Not less than as required for critical height indicated
5. Primer/Adhesive: Manufacturer's standard primer and weather-resistant, moisture-cured polyurethane adhesive suitable for unit, substrate, and location.
6. Color(s): As selected by Architect from manufacturer's full range

B. Leveling and Patching Material: Portland cement-based grout or epoxy- or polyurethane-based formulation suitable for exterior use and approved by protective surfacing manufacturer.

2.3 UNITARY, TILE SURFACING

A. Description: Manufacturer's standard blend of rubber or PVC particles forming an integral wearing and cushioning material, with overall thickness as required, tested for impact attenuation according to ASTM F1292and for accessibility according to ASTM F1951.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

   a. BCI Burke Company, LLC.
   b. GameTime; a PlayCore, Inc. company.
   c. No Fault Sport Group, LLC.
2. Unit Size: 24 by 24 inches Retain "Base Profile" Subparagraph below if this water-draining feature is important; revise to suit Project.
3. Base Profile: Integral ribbed or grid-patterned underside forming channels for water drainage between protective surfacing and substrate.
4. Edging and Corner Units: Tapered, bevel-edged units that transition from top surface of protective surfacing to the adjacent, lower surface; size compatible with field units maintaining layout pattern continuity. Provide edging and corner units where protective surfacing does not abut vertical surfaces.
5. Critical Height: 7 feet
6. Overall Thickness: Not less than as required for critical height indicated [Generally, retain "Primer/Adhesive" or "Anchors" Subparagraph below to suit Project.
7. Primer/Adhesive: Manufacturer's standard primer and weather-resistant, moisture-cured polyurethane adhesive suitable for unit, substrate, and location.
8. Anchors: Manufacturer's standard for unit, substrate, and location.
9. Tile Color(s): As selected by Architect from manufacturer's full range
10. Filler/Sealant: Manufacturer's standard clear silicone or polyurethane filler/sealant suitable for exterior use.

B. Leveling and Patching Material: Portland cement-based grout or epoxy- or polyurethane-based formulation suitable for exterior use and approved by protective surfacing manufacturer.

PART 3 - EXECUTION

3.1 PREPARATION

A. Prepare substrates to receive surfacing products according to protective surfacing manufacturer's written instructions.

1. Repair: Fill holes and depressions in unsatisfactory surfaces with leveling and patching material.
2. Terminal Edges: Saw cut concrete for terminal edges of protective surfacing.

Concrete Substrates: Verify that substrates are dry, free from surface defects, and free of laitance, glaze, efflorescence, curing compounds, form-release agents, hardeners, dust, dirt, loose particles, grease, oil, and other contaminants incompatible with playground surface system or that may interfere with adhesive bond. Determine adhesion, dryness, and acidity characteristics by performing procedures recommended in writing by playground surface system manufacturer.

3.2 INSTALLATION OF SEAMLESS SURFACING

A. Mix and apply components of seamless surfacing according to manufacturer's written instructions to produce uniform, monolithic, and impact-attenuating protective surfacing of required overall thickness.

1. Substrate Primer: Apply over prepared substrate at manufacturer's standard spreading rate for type of substrate.
2. Poured Cushioning Layer: Spread evenly over primed substrate in one continuous operation, with a minimum of cold joints.
3. Intercoat Primer: Over cured cushioning layer, apply primer at manufacturer's standard spreading rate.
4. Wearing Layer: Spread over primed base course in one continuous operation and, except where color changes, with a minimum of cold joints.
5. Edge Treatment: Flush

3.3 INSTALLATION OF TILE SURFACING

A. Apply components of tile surfacing according to manufacturer's written instructions to produce a uniform wearing surface with no unaligned units, raised edges (lipping), or other surface imperfections.

B. Lay out units from center marks established between principal perimeter edges, discounting minor offsets, so units at opposite sides of installation are of equal width. Adjust as necessary to avoid using cut widths that equal less than one-half of a unit.

C. Edging: Maintain fully cushioned thickness required to comply with performance requirements.

D. Filler/Sealant: Mask area surrounding cutouts around playground equipment supports and other obstructions. Apply a full bead of filler/sealant, filling cutouts immediately after laying tile around cutout.

3.4 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests.

B. Perform the following tests with the assistance of a factory-authorized service representative:

1. Perform "Installed Surface Performance Test" according to ASTM F1292 for each protective surfacing type and thickness in each playground area.

C. Playground protective surfacing will be considered defective if it does not pass tests.

D. Prepare test reports.

END OF SECTION 321816.13

SECTION 323115 – WOOD FENCES & GATES

PART 1 – GENERAL

1.1 SECTION INCLUDES

A. Requirements regarding wood fencing and gates at parking lot

1.2 SUBMITTALS

A. Drawings: Indicate plan layout, grid, size and spacing of components, accessories, fittings, anchorage, and post section.

B. Data: Submit manufacturer's installation instructions and procedures, including details of fence and gate installation.

PART 2 – PRODUCTS

2.1 GENERAL

A. All wood materials shall be treated wood, or wood of a natural resistance to decay. Materials shall be free from loose knots, cracks, and other imperfections.

B. Cast-in-place Concrete: Class 3000 minimum, Section 03300.

2.2 WOOD BOARDS OR SLATS

A. Wood boards or slats shall be pine and as indicated in the drawings

2.3 POSTS

A. Fence and Man Gate posts shall be as indicated in the drawings

B. Buried post ends should be treated with an approved wood preservative product.

2.4 GATES

A. Provide additional horizontal, vertical, and diagonal members to ensure proper gate operation and for attachment of wood, hardware and accessories. Consult manufacturer as necessary.

B. Accessibility: Gate stops, latches and locks shall be accessible from either side of gate.

C. Gate designs shall be approved by Architect prior to installation.

2.5 GATE HARDWARE

A. Gate hardware including, but not limited to, latches, hinges, stops and bolts shall be stainless steel, powder coated black, or galvanized.

B. Hinges and Pins shall be heavy duty and sized as per manufacturer's recommendations.

C. Dual access (accessible and lockable from either side) latch and lock systems are required on all gates.

PART 3 – EXECUTION

3.1 INSTALLATION

A. Examine areas and conditions, with Installer present, for compliance with requirements for a verified survey of property lines and legal boundaries, site clearing, earthwork, pavement work, and other conditions affecting performance of the Work.

1. Do not begin installation before final grading is completed unless otherwise permitted by Architect.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

C. Stake locations of fence lines, gates, and terminal posts. Do not exceed intervals of 500 feet or line of sight between stakes. Indicate locations of utilities, lawn sprinkler system, underground structures, benchmarks, and property monuments.

D. Post Excavation: Drill or hand-excavate holes for posts to diameters and spacings indicated, in firm, undisturbed soil.

E. Post Setting: Set posts in concrete at indicated spacing into firm, undisturbed soil.

1. Verify that posts are set plumb, aligned, and at correct height and spacing, and hold in position during setting with concrete or mechanical devices.
2. Concrete Fill: Place concrete around posts to dimensions indicated and vibrate or tamp for consolidation. Protect aboveground portion of posts from concrete splatter.

a. Exposed Concrete: Extend 2 inches above grade; shape and smooth to shed water.

F. Line Posts: Space line posts uniformly at 10 feet o.c.

G. Gates: Adjust gates to operate smoothly, easily, and quietly, free of binding, warp, excessive deflection, distortion, nonalignment, misplacement, disruption, or malfunction, throughout entire operational range. Confirm that latches and locks engage accurately and securely without forcing or binding.

SECTION 323119 - DECORATIVE METAL FENCES AND GATES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Decorative metallic-coated-steel tubular picket fences.
2. Decorative steel fences.
3. Swing gates.

1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For fencing and gates.

1. Include plans, elevations, sections, and attachment details.
2. Include diagrams for power, signal, and control wiring.

C. Samples: For each fence material and for each color specified.

1.4 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

B. Product test reports.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance data.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: Fabricator of products.

2.1 PERFORMANCE REQUIREMENTS

A. Wind Loading: Comply with ASCE/SEI 7 requirements for fence height, wind exposure, design wind speed, and design wind pressure.

2.2 DECORATIVE METALLIC-COATED-STEEL TUBULAR PICKET FENCES

Fences in this article are made from tubular components formed from metallic-coated steel sheet or uncoated steel sheet that is hot-dip galvanized after forming. See the Evaluations.

A. Decorative Metallic-Coated-Steel Tubular Picket Fences: Comply with ASTM F2408 for light-(commercial) application (class) unless otherwise indicated.

1. <Double click here to find, evaluate, and insert list of manufacturers and products.>

B. Post Caps: **Formed from steel sheet and hot-dip galvanized after forming**

C. Pickets: Square tubes.

1. [**Terminate tops of pickets at top rail for flush top appearance**] [**Extend pickets beyond top rail as indicated and terminate with UV-resistant plastic caps**] [**Extend pickets beyond top rail as indicated and terminate with galvanized-steel caps**] [**Extend pickets beyond top rail as indicated and press flat and trim to produce spear point shape**].
2. Picket Spacing: [**6 inches (152.4 mm)**] [**4 inches (101.6 mm)**] [**1-3/4 inches (44 mm)**] <**Insert dimension**> clear, maximum.

D. Metallic-Coated Steel Sheet: Galvanized-steel sheet

E. Finish: [**Organic coating complying with requirements in ASTM F2408**] [**Powder coating**].

2.3 DECORATIVE STEEL FENCES

A. Decorative Steel Fences: Fences made from steel tubing[**bars**] and shapes[**, hot-dip galvanized**].

1. <Double click here to find, evaluate, and insert list of manufacturers and products.>

B. Posts: Square steel tubing. [**2 by 2 inches (51 by 51 mm)**] [**2-1/2 by 2-1/2 inches (64 by 64 mm)**] [**3 by 3 inches (76 by 76 mm)**] <**Insert dimensions**> with [**1/8-inch (3.2-mm)**] [**3/16-inch (4.76-mm)**] <**Insert dimension**> wall thickness.

C. Post Caps: [**Formed from steel sheet**] [**Formed from steel sheet and hot-dip galvanized after forming**]

D. Rails:

1. Steel Tube Rails: Square steel tubing [**2 by 2 inches (51 by 51 mm)**] [**2-1/2 by 2-1/2 inches (64 by 64 mm)**] <**Insert dimensions**> with [**1/8-inch (3.2-mm)**] <**Insert dimension**> wall thickness.
2. Steel Channel Rails: Steel channels [**2 by 1 inch (51 by 25 mm)**] [**1-1/2 by 3/4 inch (38 by 19 mm)**] [**1-1/2 by 1/2 inch (38 by 13 mm)**] <**Insert dimensions**>.

E. Pickets: [**1/2-inch- (13-mm-) square steel bars**] [**3/4-inch- (19-mm-) square steel bars**] [**Decorative steel bars of pattern and size indicated**] [**5/8 inch (16 mm) square by 0.065-inch (1.65-mm) steel tubes**] [**5/8 inch (16 mm) square by 0.083-inch (2.11-mm) steel tubes**] [**3/4 inch (19 mm) square by 0.065-inch (1.65-mm) steel tubes**] [**3/4 inch (19 mm) square by 0.083-inch (2.11-mm) steel tubes**] [**1 inch (25 mm) square by 0.065-inch (1.65-mm) steel tubes**] [**1 inch (25 mm) square by 0.083-inch (2.11-mm) steel tubes**].

1. Picket Spacing: [**6 inches (152.4 mm)**] [**4 inches (101.6 mm)**] [**1-3/4 inches (44 mm)**] <**Insert dimension**> clear, maximum.

F. Infill: Forge-welded-steel bar grating.

Before retaining options in five subparagraphs below, verify availability of resulting design with manufacturers. Other spacings are also available.

1. Perimeter Bars: Steel flat bars [**1 by 1/8 inch (25 by 3.2 mm)**] <**Insert dimensions**>.
2. Vertical Main Bars: Steel flat bars [**1 by 1/8 inch (25 by 3.2 mm)**] [**1-3/16 by 5/32 inch (30 by 4 mm)**] <**Insert dimensions**>.
3. Vertical Main Bar Spacing: [**1-21/32 inches (42 mm)**] [**1-7/8 inches (48 mm)**] [**2-7/16 inches (62 mm)**] <**Insert dimension**> o.c.
4. Horizontal Cross Rods: [**3/16-inch- (4.8-mm-)**] [**1/4-inch- (6.4-mm-)**] diameter, steel rods.
5. Horizontal Cross Rod Spacing: [**1-3/4 inches (45 mm)**] [**2-19/32 inches (66 mm)**] [**5-3/16 inches (132 mm)**] <**Insert dimension**> o.c.

G. Fasteners: Stainless-steel carriage bolts and [**tamperproof**]nuts.

Retain one of two "Fabrication" paragraphs below.

H. Fabrication: Assemble fences into sections by welding pickets to rails.

I. Fabrication: Fabricate bar grating infill into sections of size indicated.

J. Galvanizing: For items other than hardware that are indicated to be galvanized, hot-dip galvanize to comply with ASTM A123/A123M. For hardware items, hot-dip galvanize to comply with ASTM A153/A153M.

1. Hot-dip galvanize posts[**and rails**].
2. Hot-dip galvanize rail and picket assemblies after fabrication.

A & T and Ametco provide hot-dip galvanized gratings; BarnettBates provides ungalvanized gratings.

3. Hot-dip galvanize bar grating infill after fabrication.

Retain one or more of three paragraphs below.

K. Finish for Bar Grating Infill: Powder coating.

L. Finish for Steel Items[**Other Than Bar Grating Infill**]: [**Primed**] [**Shop painted**] [**High-performance coating**].

M. Finish for Metallic-Coated-Steel Items[**Other Than Bar Grating Infill**]: [**High-performance coating**] [**Galvanized finish**].

2.4 SWING GATES

A. Galvanized-Steel Frames and Bracing: Fabricate members from square tubes [**1-1/2 by 1-1/2 inches (38 by 38 mm)**] [**1-3/4 by 1-3/4 inches (45 by 45 mm)**] [**2 by 2 inches (51 by 51 mm)**] [**2-1/2 by 2-1/2 inches (64 by 64 mm)**] formed from 0.108-inch (2.74-mm) nominal-thickness, metallic-coated steel sheet or formed from 0.105-inch (2.66-mm) nominal-thickness steel sheet and hot-dip galvanized after fabrication.

B. Steel Frames and Bracing: Fabricate members from square steel tubing [**1-1/2 by 1-1/2 inches (38 by 38 mm)**] [**2 by 2 inches (51 by 51 mm)**] [**2-1/2 by 2-1/2 inches (64 by 64 mm)**] <**Insert dimensions**> with [**1/8-inch (3.2-mm)**] <**Insert dimension**> wall thickness.[**Hot-dip galvanize frames after fabrication.**]

C. Hardware: Latches permitting operation from both sides of gate, hinges, and keepers for each gate leaf more than 5 feet (1.52 m) wide. Provide [**center gate stops**] [**and**] [**cane bolts**] for pairs of gates.[**Fabricate latches with integral eye openings for padlocking; padlock accessible from both sides of gate.**]

1. <**Insert requirements for padlocks and chains if not Owner furnished**>.

D. Galvanizing: For items other than hardware that are indicated to be galvanized, hot-dip galvanize to comply with ASTM A123/A123M. For hardware items, hot-dip galvanize to comply with ASTM A153/A153M.

E. Metallic-Coated-Steel Finish: [**High-performance coating**] [**Galvanized finish**].

F. Steel Finish: [**Primed**] [**Shop painted**] [**High-performance coating**].

2.5 STEEL AND IRON

A. Plates, Shapes, and Bars: ASTM A36/A36M.

B. Bars (Pickets): Hot-rolled, carbon steel complying with ASTM A29/A29M, Grade 1010.

C. Tubing: ASTM A500/A500M, cold-formed steel tubing.

D. Bar Grating: NAAMM MBG 531.

E. Uncoated Steel Sheet: [**Hot-rolled steel sheet, ASTM A1011/A1011M, Structural Steel, Grade 45 (Grade 310)**] [**or**] [**cold-rolled steel sheet, ASTM A1008/A1008M, Structural Steel, Grade 50 (Grade 340)**].

First option in "Galvanized-Steel Sheet" Paragraph below is specified for industrial and light-industrial (commercial) fences in ASTM F2408; second option is specified for residential fences.

F. Galvanized-Steel Sheet: ASTM A653/A653M, structural quality, Grade 50 (Grade 340), with [**G90 (Z275)**] [**G60 (Z180)**] coating.

2.6 COATING MATERIALS

A. Epoxy Zinc-Rich Primer for Uncoated Steel: Complying with MPI #20 and compatible with coating specified to be applied over it.

B. Epoxy Primer for Galvanized Steel: Epoxy primer recommended in writing by topcoat manufacturer.

C. Intermediate Coat for Uncoated Steel: Epoxy or polyurethane intermediate recommended in writing by primer and topcoat manufacturer.

Retain "Polyurethane(Intermediate Coat and) Topcoat" Paragraph below for high-performance coating on either uncoated or galvanized steel. Retain option only for galvanized steel.

D. Polyurethane[**Intermediate Coat and**] Topcoat: Complying with MPI #72 and compatible with undercoat.

2.7 MISCELLANEOUS MATERIALS

A. Concrete: Normal-weight, air-entrained, ready-mix concrete complying with requirements in Section 033000 "Cast-in-Place Concrete" with a minimum 28-day compressive strength of 3000 psi (20 MPa), 3-inch (75-mm) slump, and 1-inch (25-mm) maximum aggregate size[**or dry, packaged, normal-weight concrete mix complying with ASTM C387/C387M mixed with potable water according to manufacturer's written instructions**].

2.8 GROUNDING MATERIALS

Retain first paragraph below if Section 260526 "Grounding and Bonding for Electrical Systems" will be included in Project. Otherwise, delete paragraph and retain remaining paragraphs in this article. Materials below match those specified in Section 260526.

A. Comply with requirements of Section 260526 "Grounding and Bonding for Electrical Systems."

Retain both paragraphs below to specify grounding for fences and gates. See the Evaluations. Products described may exceed local code requirements.

B. Grounding Conductors: Size as indicated on Drawings. Bare, solid wire for No. 6 AWG and smaller; stranded wire for No. 4 AWG and larger.

1. Material above Finished Grade: [**Copper**]
2. Material on or below Finished Grade: Copper.

C. Grounding Connectors and Grounding Rods: Comply with UL 467.

2.9 STEEL FINISHES

A. Surface Preparation: Clean surfaces according to [**SSPC-SP 5/NACE No. 1, "White Metal Blast Cleaning."**] [**SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."**] After cleaning, apply a conversion coating compatible with the organic coating to be applied over it.

"Powder Coating" Paragraph below may be retained for fences that are specified in "Decorative Steel Fences" Article and that are manufacturers' standard products.

B. Powder Coating: Immediately after cleaning, apply manufacturer's standard two-coat finish consisting of epoxy primer and TGIC polyester topcoat to a minimum total dry film thickness of not less than 8 mils (0.20 mm). Comply with coating manufacturer's written instructions.

1. Color and Gloss: [**As indicated by manufacturer's designations**] [**Match Architect's sample**] [**As selected by Architect from manufacturer's full range**] <**Insert color and gloss**>.

C. Primer Application: Apply zinc-rich epoxy primer immediately after cleaning, to provide a minimum dry film thickness of 2 mils (0.05 mm) per applied coat, to surfaces that are exposed after assembly and installation, and to concealed surfaces.

D. High-Performance Coating: Apply intermediate and polyurethane topcoats to prime-coated surfaces. Comply with coating manufacturer's written instructions and with requirements in SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting. Apply at spreading rates recommended by coating manufacturer.

1. Match approved Samples for color, texture, and coverage. Remove and refinish, or recoat work that does not comply with specified requirements.

For exact finish, insert names of coating manufacturers and products.

2.10 METALLIC-COATED-STEEL FINISHES

Retain "Galvanized Finish" Paragraph below only for uncoated, galvanized-metal finishes.

A. Galvanized Finish: Clean welds, mechanical connections, and abraded areas and repair galvanizing to comply with ASTM A780/A780M.

Retain "Surface Preparation" Paragraph below for galvanized surfaces that are to receive powder coating or high-performance coatings.

B. Surface Preparation: Clean surfaces of oil and other contaminants. Use cleaning methods that do not leave residue. After cleaning, apply a [**zinc-phosphate**]conversion coating compatible with the organic coating to be applied over it. Clean welds, mechanical connections, and abraded areas and apply galvanizing repair paint, complying with SSPC-Paint 20, to comply with ASTM A780/A780M.

First "Powder Coating" Paragraph below may be retained for fences that are specified in "Decorative Steel Fences" Article and that are manufacturers' standard products.

C. Powder Coating: Immediately after cleaning and pretreating, apply manufacturer's standard TGIC polyester powder-coat finish to a minimum dry film thickness of 2 mils (0.05 mm).

1. Color and Gloss: [**As indicated by manufacturer's designations**] [**Match Architect's sample**] [**As selected by Architect from manufacturer's full range**] <**Insert color and gloss**>.

"Powder Coating" Paragraph below may be retained for fences that are specified in "Decorative Metallic-Coated-Steel Tubular Picket Fences" Article.

D. Powder Coating: Immediately after cleaning and pretreating, apply manufacturer's standard two-coat finish consisting of [**zinc-rich**]epoxy prime coat and TGIC polyester topcoat to a minimum dry film thickness of 2 mils (0.05 mm). Comply with coating manufacturer's written instructions to achieve a minimum total dry film thickness of 4 mils (0.10 mm).

1. Color and Gloss: [**As indicated by manufacturer's designations**] [**Match Architect's sample**] [**As selected by Architect from manufacturer's full range**] <**Insert color and gloss**>.

E. High-Performance Coating: Apply epoxy primer, polyurethane intermediate coat, and polyurethane topcoat to prepared surfaces. Comply with coating manufacturer's written instructions and with requirements in SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting. Apply at spreading rates recommended by coating manufacturer.

1. Match approved Samples for color, texture, and coverage. Remove and refinish, or recoat work that does not comply with specified requirements.

For exact finish, insert names of coating manufacturers and products.

PART 3 - EXECUTION

3.1 DECORATIVE FENCE INSTALLATION

Retain one of first two paragraphs below.

A. Install fences according to manufacturer's written instructions.

B. Install fences by setting posts as indicated and fastening [**rails**] [**and**] [**infill panels**] to posts.[**Peen threads of bolts after assembly to prevent removal.**]

Revise "Post Excavation" and "Post Setting" paragraphs below as needed if conditions include unstable or rocky soils.

C. Post Excavation: Drill or hand-excavate holes for posts in firm, undisturbed soil. Excavate holes to a diameter of not less than 4 times post size and a depth of not less than 24 inches (600 mm) plus 3 inches (75 mm) for each foot (300 mm) or fraction of a foot (300 mm) that fence height exceeds 4 feet (1.2 m).

D. Post Setting: Set posts [**in concrete**] [**with mechanical anchors**] [**by mechanically driving into soil**] at indicated spacing into firm, undisturbed soil.

1. Verify that posts are set plumb, aligned, and at correct height and spacing, and hold in position during setting with concrete or mechanical devices.

Retain "Concrete Fill" Subparagraph below for concrete footings.

2. Concrete Fill: Place concrete around [**posts**] [**and**] [**sleeves**] and vibrate or tamp for consolidation. Protect aboveground portion of posts from concrete splatter.
3. Posts Set in Concrete: Extend post to within 6 inches (150 mm) of specified excavation depth, but not closer than 3 inches (75 mm) to bottom of concrete.
4. Mechanically Driven Posts: Drive into soil to depth of [**30 inches (762 mm)**] [**36 inches (914 mm)**] <**Insert dimension**>. Protect post top to prevent distortion.
5. Space posts uniformly at [**6 feet (1.83 m)**] [**8 feet (2.44 m)**] <**Insert dimension**> o.c.

3.2 GATE INSTALLATION

A. Install gates according to manufacturer's written instructions, level, plumb, and secure for full opening without interference. Attach hardware using tamper-resistant or concealed means. Install ground-set items in concrete for anchorage. Adjust hardware for smooth operation and lubricate where necessary.

3.3 GROUNDING AND BONDING

Retain this article if fences and gates require grounding. See the Evaluations for other considerations. Retain first paragraph below if Section 260526 "Grounding and Bonding for Electrical Systems" is included in Project.

A. Comply with Section 260526 "Grounding and Bonding for Electrical Systems."

Retain "Fence Grounding" Paragraph below if Section 260526 is not retained in Project and if fence other than that enclosing electrical distribution equipment is to be grounded. Items specified below are identical to those specified in Section 260526.

B. Fence Grounding: Install at maximum intervals of [**1500 feet (450 m)**] <**Insert a lesser distance if grounding resistance is high**> except as follows:

1. Fences within 100 Feet (30 m) of Buildings, Structures, Walkways, and Roadways: Ground at maximum intervals of [**750 feet (225 m)**] <**Insert a lesser distance if grounding resistance is high**>.

a. Gates and Other Fence Openings: Ground fence on each side of opening.

C. Grounding Method: At each grounding location, drive a grounding rod vertically until the top is 6 inches (150 mm) below finished grade. Connect rod to fence with No. 6 AWG conductor. Connect conductor to each fence component at grounding location.

D. Bonding Method for Gates: Connect bonding jumper between gate post and gate frame.

E. Connections: Make connections so possibility of galvanic action or electrolysis is minimized. Select connectors, connection hardware, conductors, and connection methods so metals in direct contact are galvanically compatible.

Retain "Bonding to Lightning-Protection System" Paragraph below if fencing terminates at a building or other structure equipped with lightning-protection system.

F. Bonding to Lightning-Protection System: If fence terminates at lightning-protected building or structure, ground the fence and bond the fence grounding conductor to lightning-protection down conductor or lightning-protection grounding conductor, complying with NFPA 780.

3.4 FIELD QUALITY CONTROL

A. Testing Agency: [**Owner will engage**] [**Engage**] a qualified testing agency to perform tests and inspections.

1. Grounding-Resistance Tests: Subject completed grounding system to a megger test at each grounding location. Measure grounding resistance not less than two full days after last trace of precipitation, without soil having been moistened by any means other than natural drainage or seepage and without chemical treatment or other artificial means of reducing natural grounding resistance. Perform tests by two-point method according to IEEE 81.

END OF SECTION 323119

SECTION 329200 - TURFGRASSES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:
1. Sodding.
2. Turf Renovation.

B. Related Sections

1. Division 31 Section "Earth Moving" for excavation, filling and backfilling, and rough grading.
2. Division 32 Section "Plants" for border edgings.

1.3 DEFINITIONS

A. Duff Layer: The surface layer of native topsoil that is composed of mostly decayed leaves, twigs, and detritus.

B. Finish Grade: Elevation of finished surface of planting soil.

C. Manufactured Topsoil: Soil produced off-site by homogeneously blending mineral soils or sand with stabilized organic soil amendments to produce topsoil or planting soil.

D. Planting Soil: Standardized topsoil; existing, native surface topsoil; existing, in-place surface soil; imported topsoil; or manufactured topsoil that is modified with soil amendments and perhaps fertilizers to produce a soil mixture best for plant growth.

E. Subgrade: Surface or elevation of subsoil remaining after excavation is complete, or top surface of a fill or backfill before planting soil is placed.

F. Planting Area: Areas to be planted.

G. Subsoil: All soil beneath the topsoil layer of the soil profile, and typified by the lack of organic matter and soil organisms.

H. Surface Soil: Soil that is present at the top layer of the existing soil profile at the Project site. In undisturbed areas, the surface soil is typically topsoil; but in disturbed areas such as urban environments, the surface soil can be subsoil.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated, including soils.

1. Pesticides and Herbicides: Include product label and manufacturer's application instructions specific to the Project.

B. Qualification Data: For qualified landscape Installer. Include list of similar projects completed by Installer demonstrating Installer's capabilities and experience. Include project names, addresses, and year completed, and include names and addresses of owners' contact persons.

C. Product Certificates: For each type of manufactured product, from manufacturer, and complying with the following:

1. Manufacturer's certified analysis of standard products.
2. Analysis of other materials by a recognized laboratory made according to methods established by the Association of Official Analytical Chemists, where applicable.

D. Material Test Reports: For Planting Soil.

E. Maintenance Instructions: Recommended procedures to be established by Owner for maintenance of turfgrass during a calendar year. Submit before start of required maintenance periods.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: A qualified landscape Installer whose work has resulted in successful turf establishment.

1. Experience: Five (5) years' experience as a Landscape Horticulturalist as well as five (5) years experience in landscape installation in addition to requirements in Division 01 Section "Quality Requirements."
2. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on Project site when work is in progress.
3. Personnel Certifications: Installer's field supervisor shall have certification as a Landscape Horticulturalist licensed by the Louisiana Horticulture Commission.
4. Pesticide Applicator: State licensed, commercial.

B. Soil-Testing Laboratory Qualifications: An independent or university laboratory, recognized by the State Department of Agriculture, with the experience and capability to conduct the testing indicated and that specializes in types of tests to be performed. LSU Ag Center Soil Testing Lab shall be the preferred testing facility.

C. Soil Analysis: For each unamended soil type, furnish soil analysis and a written report by a qualified soil-testing laboratory stating percentages of organic matter; gradation of sand, silt, and clay content; cation exchange capacity; deleterious material; pH; and mineral and plant-nutrient content of the soil.

1. Testing methods and written recommendations shall comply with USDA's Handbook No. 60.
2. The soil-testing laboratory shall oversee soil sampling, with depth, location, and number of samples to be taken per instructions from Architect. A minimum of three (3) representative samples shall be taken from varied locations for each soil to be used or amended for planting purposes.
3. Report suitability of tested soil for plant growth.

    a. Based upon the test results, state recommendations for soil treatments and soil amendments to be incorporated. State recommendations in weight per 1000 sq. ft. or volume per cu. yd. for nitrogen, phosphorus, and potash nutrients and soil

amendments to be added to produce satisfactory planting soil suitable for healthy, viable plants.

b. Report presence of problem salts, minerals, or heavy metals, including aluminum, arsenic, barium, cadmium, chromium, cobalt, lead, lithium, and vanadium. If such problem materials are present, provide additional recommendations for corrective action.

D. Preinstallation Conference: Conduct conference at Project site or other location approved by Architect. Contractor to notify Architect of meeting time/location at least seven (7) days in advance.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Seed and Other Packaged Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and indication of conformance with state and federal laws, as applicable.

B. Sod: Harvest, deliver, store, and handle sod according to requirements in "Specifications for Turfgrass Sod Materials" and "Specifications for Turfgrass Sod Transplanting and Installation" in TPI's "Guideline Specifications to Turfgrass Sodding." Deliver sod in time for planting within 24 hours of harvesting. Protect sod from breakage and drying.

C. Bulk Materials:

1. Do not dump or store bulk materials near structures, utilities, walkways and pavements, or on existing turf areas or plants.
2. Provide erosion-control measures to prevent erosion or displacement of bulk materials, discharge of soil-bearing water runoff, and airborne dust reaching adjacent properties, water conveyance systems, or walkways.
3. Accompany each delivery of bulk fertilizers, lime, and soil amendments with appropriate certificates.

1.7 PROJECT CONDITIONS

A. Field Measurements: Verify actual grade elevations, service and utility locations, irrigation system components, and dimensions of plantings and construction contiguous with new turf by field measurements before proceeding with turfgrass work.

B. Planting Restrictions: Plant during the following period. Coordinate planting periods with initial maintenance periods to provide required maintenance from date of Substantial Completion.

1. Planting Season: September 15th – May 1st.

C. Weather Limitations: Proceed with planting only when existing and forecasted weather conditions permit planting to be performed when beneficial and optimum results may be obtained. Apply products during favorable weather conditions according to manufacturer's written instructions.

1.8 MAINTENANCE SERVICE

A. Initial Turf Maintenance Service: Provide full maintenance by skilled employees of landscape Installer. Maintain as required in Part 3. Begin maintenance immediately after each area is

planted and continue until acceptable turf is established but for not less than the following periods:

1. Sodded Turf: Twelve (12) months from date of Substantial Completion.

B. Continuing Maintenance Proposal: From Installer to Owner, in the form of a standard yearly (or other period) maintenance agreement, starting on date initial maintenance service is concluded. State services, obligations, conditions, and terms for agreement period and for future renewal options.

PART 2 - PRODUCTS

1.9 TURFGRASS SOD

A. Turfgrass Sod: Certified and complying with "Specifications for Turfgrass Sod Materials" in TPI's "Guideline Specifications to Turfgrass Sodding." Furnish viable sod of uniform density, color, and texture, strongly rooted, and capable of vigorous growth and development when planted.

B. Turfgrass Species: Bermuda Grass (*Cynodon dactylon*).

1.10 INORGANIC SOIL AMENDMENTS

A. Add necessary inorganic soil amendments as required by the soil test.

1.11 FERTILIZERS

A. All fertilizer shall be a commercial balanced formula with at least 25% organic material, and shall conform to applicable State fertilizer laws. It shall be a slow release formula, “Osmocote”, or equal and shall be used as specified by manufacturer. Fertilizer, unless otherwise specified, shall be delivered mixed as specified, in standard size, unopened containers, showing weight, analysis and name of manufacturer

1.12 PLANTING SOILS

A. Planting Soil: Existing, in-place surface soil within pH range of 5 - 7, topdressed with a 2” layer of pump sand. Verify suitability of existing surface soil to produce viable planting soil. Remove stones, roots, plants, sod, clods, clay lumps, pockets of coarse sand, concrete slurry, concrete layers or chunks, cement, plaster, building debris, and other extraneous materials harmful to plant growth. Mix surface soil with soil amendments as recommended by the LSU Soil Analysis Lab or other approved lab.

1.13 PESTICIDES

A. General: Pesticide registered and approved by EPA, acceptable to authorities having jurisdiction, and of type recommended by manufacturer for each specific problem and as required for Project conditions and application. Do not use restricted pesticides unless authorized in writing by authorities having jurisdiction.

B. Pre-Emergent Herbicide (Selective and Non-Selective): Effective for controlling the germination or growth of weeds within planted areas at the soil level directly below the mulch layer.

C. Post-Emergent Herbicide (Selective and Non-Selective): Effective for controlling weed growth that has already germinated.

PART 3 - EXECUTION

1.14 EXAMINATION

A. Examine areas to be planted for compliance with requirements and other conditions affecting performance.

1. Verify that no foreign or deleterious material or liquid such as paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, or acid has been deposited in soil within a planting area.
2. Do not mix or place soils and soil amendments in frozen, wet, or muddy conditions.
3. Suspend soil spreading, grading, and tilling operations during periods of excessive soil moisture until the moisture content reaches acceptable levels to attain the required results.
4. Uniformly moisten excessively dry soil that is not workable and which is too dusty.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

C. If contamination by foreign or deleterious material or liquid is present in soil within a planting area, remove the soil and contamination as directed by Architect and replace with new planting soil.

1.15 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities and turf areas and existing plants from damage caused by planting operations.

1. Protect grade stakes set by others until directed to remove them.

B. Install erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.

1.16 TURF AREA PREPARATION

A. Limit turf subgrade preparation to areas to be planted.

B. Newly Graded Subgrades: Loosen subgrade to a minimum depth of 4 inches. Remove stones larger than 1 inch in any dimension and sticks, roots, rubbish, and other extraneous matter and legally dispose of them off Owner's property.

1. Apply fertilizer directly to subgrade before loosening.

a. Delay mixing fertilizer with planting soil if planting will not proceed within a few days.
b. Mix lime with dry soil before mixing fertilizer.

2. Spread pump sand to a depth of 2 inches but not less than required to meet finish grades after light rolling and natural settlement. Do not spread if subgrade is frozen, muddy, or excessively wet.

C. Unchanged Subgrades: If turf is to be planted in areas unaltered or undisturbed by excavating, grading, or surface-soil stripping operations, prepare surface soil as follows:

1. Remove existing grass, vegetation, and turf. Do not mix into surface soil.
2. Loosen surface soil to a depth of at least 6 inches. Apply soil amendments and fertilizers according to planting soil mix proportions and mix thoroughly into top 4 inches of soil. Till soil to a homogeneous mixture of fine texture.
3. Spread pump sand to a depth of 2 inches but not less than required to meet finish grades after light rolling and natural settlement. Do not spread if subgrade is frozen, muddy, or excessively wet.
4. Remove stones larger than 1 inch in any dimension and sticks, roots, trash, and other extraneous matter.
5. Legally dispose of waste material, including grass, vegetation, and turf, off Owner's property.

D. Finish Grading: Grade planting areas to a smooth, uniform surface plane with loose, uniformly fine texture. Grade to within plus or minus 1/2 inch of finish elevation. Roll and rake, remove ridges, and fill depressions to meet finish grades. Limit finish grading to areas that can be planted in the immediate future.

E. Moisten prepared area before planting if soil is dry. Water thoroughly and allow surface to dry before planting. Do not create muddy soil.

F. Before planting, obtain Architect's acceptance of finish grading; restore planting areas if eroded or otherwise disturbed after finish grading.

1.17 SODDING

A. Lay sod within 24 hours of harvesting. Do not lay sod if dormant or if ground is frozen or muddy.

B. Lay sod to form a solid mass with tightly fitted joints. Butt ends and sides of sod; do not stretch or overlap. Stagger sod strips or pads to offset joints in adjacent courses. Avoid damage to subgrade or sod during installation. Tamp and roll lightly to ensure contact with subgrade, eliminate air pockets, and form a smooth surface. Work sifted soil or fine sand into minor cracks between pieces of sod; remove excess to avoid smothering sod and adjacent grass.

1. Lay sod across angle of slopes exceeding 1:3 and use sod stakes/staples to hold in place.

C. Saturate sod with fine water spray within two hours of planting. During first week after planting, water daily or more frequently as necessary to maintain moist soil to a minimum depth of 1-1/2 inches (38 mm) below sod.

1.18 TURF RENOVATION

A. Renovate existing turf damaged by Contractor's operations, such as storage of materials or equipment and movement of vehicles.

1. Reestablish turf where settlement or washouts occur or where minor regrading is required.
2. Install new planting soil as required.

B. Remove sod and vegetation from diseased or unsatisfactory turf areas; do not bury in soil.

C. Remove topsoil containing foreign materials such as oil drippings, fuel spills, stones, gravel, and other construction materials resulting from Contractor's operations, and replace with new planting soil.

D. Mow, dethatch, core aerate, and rake existing turf.

E. Water newly planted areas and keep moist until new turf is established.

1.19 TURF MAINTENANCE

A. Maintain and establish turf by watering, fertilizing, weeding, mowing, trimming, replanting, and performing other operations as required to establish healthy, viable turf. Roll, regrade, and replant bare or eroded areas and remulch to produce a uniformly smooth turf. Provide materials and installation the same as those used in the original installation.

1. Fill in as necessary soil subsidence that may occur because of settling or other processes. Replace materials and turf damaged or lost in areas of subsidence.
2. In areas where mulch has been disturbed by wind or maintenance operations, add new mulch and anchor as required to prevent displacement.
3. Apply treatments as required to keep turf and soil free of pests and pathogens or disease. Use integrated pest management practices whenever possible to minimize the use of pesticides and reduce hazards.

B. One-Year Turf Watering: Contractor shall irrigate as required to maintain vigorous and healthy turf growth. Overwatering or flooding shall not be allowed. The Contractor shall furnish any water to ensure adequate irrigation.

C. Mow turf as soon as top growth is tall enough to cut. Repeat mowing to maintain specified height without cutting more than 1/3 of grass height. Remove no more than 1/3 of grass-leaf growth in initial or subsequent mowings. Do not delay mowing until grass blades bend over and become matted. Do not mow when grass is wet. Schedule initial and subsequent mowings to maintain the following grass height:

1. Mow Bermuda grass to a height of 1 to 2 inches.

D. Turf Postfertilization: Apply fertilizer after initial mowing and when grass is dry.

1.20 SATISFACTORY TURF

A. Turf installations shall meet the following criteria as determined by Architect:

1. Satisfactory Seeded Turf: At end of maintenance period, a healthy, uniform, close stand of grass has been established, free of weeds and surface irregularities, with coverage exceeding 90 percent over any 10 sq. ft. and bare spots not exceeding 5 by 5 inches.
2. Satisfactory Sodded Turf: At end of maintenance period, a healthy, well-rooted, even-colored, viable turf has been established, free of weeds, open joints, bare areas, and surface irregularities.

3. Use specified materials to reestablish turf that does not comply with requirements and continue maintenance until turf is satisfactory.

1.21 PESTICIDE APPLICATION

A. Apply pesticides and other chemical products and biological control agents in accordance with requirements of authorities having jurisdiction and manufacturer's written recommendations. Coordinate applications with Owner's operations and others in proximity to the Work. Notify Owner before each application is performed.

B. Post-Emergent Herbicides (Selective and Non-Selective): Apply only as necessary to treat already-germinated weeds and in accordance with manufacturer's written recommendations.

1.22 CLEANUP AND PROTECTION

A. Promptly remove soil and debris created by turf work from paved areas. Clean wheels of vehicles before leaving site to avoid tracking soil onto roads, walks, or other paved areas.

B. Erect temporary fencing or barricades and warning signs as required to protect newly planted areas from traffic. Maintain fencing and barricades throughout initial maintenance period and remove after plantings are established.

C. Remove nondegradable erosion-control measures after grass establishment period.

END OF SECTION 329200

SECTION 329300 - PLANTING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

A. Section Includes:
   1. Plants.
   2. Planting soil.
   3. Mulch.
   4. Tree Stabilization.
   5. Slow Release Watering Bags.

1.03 SUBMITTALS

A. Product Data: For each type of product indicated
   1. Plant Materials: Include quantities, sizes, quality, and sources for plant materials.
   2. Pesticides and Herbicides: Include product label and manufacturer's application instructions specific to the Project.
   3. Plant Photographs: Include color photographs in digital format of each required species and size of plant material as it will be furnished to the Project. Take photographs from an angle depicting true size and condition of the typical plant to be furnished. Include a scale rod or other measuring device in each photograph. For species where more than 20 plants are required, include a minimum of three photographs showing the average plant, the best quality plant, and the worst quality plant to be furnished. Identify each photograph with the full scientific name of the plant, plant size, and name of the growing nursery.
   4. Soils: Include source of materials and photographs of each constituent material.

B. Product Submittals: For the following product:
   1. Soil (Planting and Bioswales): Submit a 1 gallon sample of the soil after mixing to architect for approval.
   2. Mulch: Submit a 1 gallon sample
   3. Tree Stabilization: Tree Stakes; Arbor Ties (All components)

C. Plant Species and Source List: The Contractor shall submit for approval plant species and source list indicating the plant botanical and common name, size, quantity, form, rootball, identification of fall dig hazards, limb height (if applicable), nursery source, including contact information, and Landscape Architect’s seal number
   1. Plant list shall clearly indicate deviations from the specified plant list and any proposed substitutions.
   2. As the project progresses and plants are located and sealed, revise and re-submit the plant list submittal.

D. Photographs of Plants taken at the Nursery Source: Provide representative images of plants prior to scheduling tagging trips and as the basis for the Landscape Architect to select plants.
   1. Contractor shall label each photograph with the plant species botanical name, nursery name, and date of photograph.
   2. Photographs shall include images showing the full range of characteristics of each plant including detailed photographs of the bark, the base of the tree (rootball crown), leaves if present, branching structure, form, and habit.
   3. Images shall include a scale figure or measuring device to indicate true size.
   4. Photographs may be transmitted electronically but the title of electronic files must bear the plant name, nursery, and date.
   5. For container plants, also provide close up photographs of the rootball with the container removed.

E. Qualification Data: For qualified landscape Installer. Include list of similar projects completed by Installer demonstrating Installer's capabilities and experience. Include project names, addresses, and year completed, and include names and addresses of owners' contact persons.

F. Product Certificates: For each type of manufactured product, from manufacturer, and complying with the following:
   1. Manufacturer's certified analysis of standard products.
   2. Analysis of other materials by a recognized laboratory made according to methods established by the Association of Official Analytical Chemists, where applicable.

G. Warranty: Written warranty and maintenance procedures.

1.04 QUALITY ASSURANCE

A. Installer Qualifications: A qualified landscape Installer whose work has resulted in successful establishment of plants.
   1. Professional Membership: Installer shall be a member in good standing of either the Professional Landcare Network or the American Nursery and Landscape Association.
   2. Experience: Five years' experience in landscape installation in addition to requirements in Division 01 Section "Quality Requirements."
   3. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on Project site when work is in progress.
   4. Pesticide Applicator, if applicable: State licensed, commercial.

B. Provide quality, size, genus, species, and variety of plants indicated, complying with applicable requirements in ANSI Z60.1.

C. Measurements: Measure according to ANSI Z60.1. Do not prune to obtain required sizes.
   1. Trees and Shrubs: Measure with branches and trunks or canes in their normal position. Take height measurements from or near the top of the root flare for field-grown stock and container grown stock. Measure main body of tree or shrub for height and spread; do not measure branches or roots tip to tip. Take caliper measurements 6 inches above the root flare for trees up to 4-inch caliper size, and 12 inches above the root flare for larger sizes.
   2. Other Plants: Measure with stems, petioles, and foliage in their normal position.

D. Plant Material Observation: Architect may observe plant material either at place of growth or at site before planting for compliance with requirements for genus, species, variety, cultivar, size, and quality. Architect retains right to observe trees and shrubs further for size and condition of balls and root systems, pests, disease symptoms, injuries, and latent defects and to reject unsatisfactory or defective material at any time during progress of work. Remove rejected trees or shrubs immediately from Project site.

1. Notify Architect of sources of planting materials seven days in advance of delivery to site.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Packaged Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and indication of conformance with state and federal laws if applicable.

B. Bulk Materials:
1. Do not dump or store bulk materials near structures, utilities, walkways and pavements, or on existing turf areas or plants.
2. Provide erosion-control measures to prevent erosion or displacement of bulk materials, discharge of soil-bearing water runoff, and airborne dust reaching adjacent properties, water conveyance systems, or walkways.
3. Accompany each delivery of bulk fertilizers and soil amendments with appropriate certificates.

C. Do not prune trees and shrubs before delivery. Protect bark, branches, and root systems from sun scald, drying, wind burn, sweating, whipping, and other handling and tying damage. Do not bend or bind-tie trees or shrubs in such a manner as to destroy their natural shape. Provide protective covering of plants during shipping and delivery. Do not drop plants during delivery and handling.

D. Handle planting stock by root ball.

E. Store bulbs, rhizomes, corms, and tubers in a dry place at 60 to 65 deg F until planting.

F. Deliver plants after preparations for planting have been completed, and install immediately. If planting is delayed more than six hours after delivery, set plants and trees in their appropriate aspect (sun, filtered sun, or shade), protect from weather and mechanical damage, and keep roots moist.
1. Set balled stock on ground and cover ball with soil, peat moss, sawdust, or other acceptable material.
2. Do not remove container-grown stock from containers before time of planting.
3. Water root systems of plants stored on-site deeply and thoroughly with a fine-mist spray. Water as often as necessary to maintain root systems in a moist, but not overly-wet condition.

1.06 PROJECT CONDITIONS

A. Field Measurements: Verify actual grade elevations, service and utility locations, irrigation system components, and dimensions of plantings and construction contiguous with new plantings by field measurements before proceeding with planting work.

B. Interruption of Existing Services or Utilities: Do not interrupt services or utilities to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary services or utilities according to requirements indicated:
1. Notify Architect no fewer than seven days in advance of proposed interruption of each service or utility.
2. Do not proceed with interruption of services or utilities without Architect’s written permission.

C. Planting Restrictions: Plant during the following period unless temporary irrigation is installed, calibrated, operated and maintained by the contractor for a period of 6 months from planting date. Coordinate planting periods with maintenance periods to provide required maintenance from date of Substantial Completion.
   1. Planting Season: September 15th – May 1st

D. Weather Limitations: Proceed with planting only when existing and forecasted weather conditions permit planting to be performed when beneficial and optimum results may be obtained. Apply products during favorable weather conditions according to manufacturer's written instructions and warranty requirements.

E. Coordination with Turf Areas (Lawns): Plant trees, shrubs, and other plants after finish grades are established and before planting turf areas unless otherwise indicated.
   1. When planting trees, shrubs, and other plants after planting turf areas, protect turf areas, and promptly repair damage caused by planting operations.

1.07 WARRANTY

A. Warranty: Installer agrees to repair or replace plantings and accessories that fail in materials, workmanship, or growth within specified warranty period.
   1. Failures include, but are not limited to, the following:
      a. Death and unsatisfactory growth, except for defects resulting from abuse, lack of adequate maintenance, or neglect by Owner, or incidents that are beyond Contractor's control.
      b. Structural failures including plantings falling or blowing over.
      c. Faulty performance of tree stabilization.
      d. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
   2. Warranty Periods from Date of Substantial Completion of Project.
      a. Trees, Shrubs, Vines, and Ornamental Grasses: 12 months.
      b. Ground Covers, Biennials, Perennials, and Other Plants: 12 months.
   3. Include the following remedial actions as a minimum:
      a. Immediately remove dead plants and replace unless required to plant in the succeeding planting season.
      b. Replace plants that are more than 25 percent dead or in an unhealthy condition at end of warranty period.
      c. A limit of one replacement of each plant will be required except for losses or replacements due to failure to comply with requirements.
      d. Provide extended warranty for period equal to original warranty period, for replaced plant material.

1.08 MAINTENANCE SERVICE

A. Initial Maintenance Service for Trees and Shrubs: Provide maintenance by skilled employees of landscape Installer. Maintain as required in Part 3. Begin maintenance immediately after plants are installed and continue until plantings are acceptably healthy and well established but for not less than maintenance period below.
   1. Maintenance Period: 12 months from date of Substantial Completion of Project.

B. Initial Maintenance Service for Ground Cover and Other Plants: Provide maintenance by skilled employees of landscape Installer. Maintain as required in Part 3. Begin maintenance immediately after plants are installed and continue until plantings are acceptably healthy and well established but for not less than maintenance period below.

1. Maintenance Period: 12 months from date of Substantial Completion of Project.

C. Continuing Maintenance Proposal: From Installer to Owner, in the form of a standard yearly (or other period) maintenance agreement, starting on date initial maintenance service is concluded. State services, obligations, conditions, and terms for agreement period and for future renewal options.

PART 2 - PRODUCTS

2.01 PLANT MATERIAL

A. General: Furnish nursery-grown plants true to genus, species, variety, cultivar, stem form, shearing, and other features indicated in Plant Schedule or Plant Legend shown on Drawings and complying with ANSI Z60.1; and with healthy root systems developed by transplanting or root pruning. Provide well-shaped, fully branched, healthy, vigorous stock, densely foliated when in leaf and free of disease, pests, eggs, larvae, and defects such as knots, sun scald, injuries, abrasions, and disfigurement.
   1. Trees with damaged, crooked, or multiple leaders; tight vertical branches where bark is squeezed between two branches or between branch and trunk ("included bark"); crossing trunks; cut-off limbs more than 3/4 inch in diameter; with lichen, moss or other living substances growing on the bark; with cuts in the bark, whether healed or fresh; or with stem girdling roots will be rejected.
   2. Collected Stock: Do not use plants harvested from the wild, from native stands, from an established landscape planting, or not grown in a nursery unless otherwise indicated.

B. Provide plants of sizes, grades, and ball or container sizes complying with ANSI Z60.1 for types and form of plants required. Plants of a larger size may be used if acceptable to Architect, with a proportionate increase in size of roots or balls.

C. Root-Ball Depth: Furnish trees and shrubs with root balls measured from top of root ball, which shall begin at root flare according to ANSI Z60.1. Root flare shall be visible before planting.

2.02 PLANTING SOILS

A. Planting Soil: ASTM D 5268 topsoil, with pH range of 5.5 to 7, a minimum of 4 percent organic material content; free of stones one half inch (½") or larger in any dimension and other extraneous materials harmful to plant growth. Obtain topsoil displaced from naturally well-drained construction or mining sites where topsoil occurs at least 4 inches deep; do not obtain from agricultural land, bogs or marshes. Test soil for pH levels after mixing. Soil source to be approved in writing by Landscape Architect.

   1. Mix the following quantities of materials to produce Planting Soil:
      a. 1/3 Manufactured Topsoil.
      b. 1/3 Black Bark Mulch.
      c. 1/3 Course Sand.
      d. Weight of 8-8-8 Slow-Release Fertilizer per 1000 Sq. Ft.: 8 lbs.

   2. Mix the following quantities of materials to produce Rain Garden Soil Mix:
      a. 40% Existing Soil from Site.
      b. 20% Black Bark Mulch.
      c. 40% Course Sand.
      d. Weight of 8-8-8 Slow-Release Fertilizer per 1000 Sq. Ft.: 8 lbs.

2.03 MULCH

A. Organic Mulch: Free from deleterious materials and suitable as a top dressing of trees and shrubs, consisting of the following:
   1. Type: Pine Needles in bales with long needles, not crushed or chopped.
   2. Depth: Three (3) inches.
   3. Cypress Mulch will not be accepted.

B. Mulch must not be placed within three (3) inches of a tree trunk.

C. The Contractor shall be responsible for the replacement of mulch during the one-year warranty and maintenance period.

2.04 TREE STABILIZATION

A. Tree Staking
   1. Wood Stakes: 2” Ø unpeeled stakes, 8’-0” min. length, Eastern Redcedar (Juniperus virginiana) or approved equivalent. Provide three (3) stakes per tree or as otherwise indicated in the Drawings.
   2. Guying straps: ¾” wide “ArborTie” flat polypropylene strap with break strength of 900lbs (min). Color: dark green or black. As manufactured by, or approved equal.
   3. Manufacturer: Deep Root Partners, L.P., 81 Langton St., San Francisco, CA 94103, Phone: 800-458-7668, Website: www.deeproot.com
   4. Or Approved Equal

2.05 SLOW RELEASE WATERING BAGS

A. Slow Release Watering Bags: Shall be minimum twenty (20) gallon slow release by Treegator or equivalent.

B. Manufacturer: Spectrum Products, Inc., Phone: (866) 873-3428, Website: www.treegator.com

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine areas to receive plants for compliance with requirements and conditions affecting installation and performance.
   1. Verify that no foreign or deleterious material or liquid such as paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, or acid has been deposited in soil within a planting area.
   2. Do not mix or place soils and soil amendments in frozen, wet, or muddy conditions.
   3. Suspend soil spreading, grading, and tilling operations during periods of excessive soil moisture until the moisture content reaches acceptable levels to attain the required results.
   4. Uniformly moisten excessively dry soil that is not workable and which is too dusty.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

C. If contamination by foreign or deleterious material or liquid is present in soil within a planting area, remove the soil and contamination as directed by Architect and replace with new planting soil.

3.02 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities and turf areas and existing plants from damage caused by planting operations.

B. Install erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.

3.03 PLANTING AREA ESTABLISHMENT

A. Loosen subgrade of planting areas to a minimum depth of 12 inches. Remove stones larger than 1 inch in any dimension and sticks, roots, rubbish, and other extraneous matter and legally dispose of them off Owner's property.
   1. Spread planting soil to a depth of 12 inches but not less than required to meet finish grades after natural settlement. Do not spread if planting soil or subgrade is frozen, muddy, or excessively wet.

B. Finish Grading: Grade planting areas to a smooth, uniform surface plane with loose, uniformly fine texture. Roll and rake, remove ridges, and fill depressions to meet finish grades.

C. Before planting, obtain Architect's acceptance of finish grading; restore planting areas if eroded or otherwise disturbed after finish grading.

3.04 EXCAVATION FOR TREES AND SHRUBS

A. Planting Pits and Trenches: Excavate circular planting pits with sides sloping inward at a 45-degree angle. Excavations with vertical sides are not acceptable. Trim perimeter of bottom leaving center area of bottom raised slightly to support root ball and assist in drainage away from center. Do not further disturb base. Ensure that root ball will sit on undisturbed base soil to prevent settling. Scarify sides of planting pit smeared or smoothed during excavation.
   1. Excavate approximately three times as wide as ball diameter for balled and burlapped stock.
   2. Excavate at least 12 inches wider than root spread and deep enough to accommodate vertical roots for bare-root stock.
   3. Do not excavate deeper than depth of the root ball, measured from the root flare to the bottom of the root ball.
   4. If area under the plant was initially dug too deep, add soil to raise it to the correct level and thoroughly tamp the added soil to prevent settling.
   5. Maintain required angles of repose of adjacent materials as shown on the Drawings. Do not excavate subgrades of adjacent paving, structures, hardscapes, or other new or existing improvements.
   6. Maintain supervision of excavations during working hours.
   7. Keep excavations covered or otherwise protected when unattended by Installer’s personnel.

B. Subsoil and topsoil removed from excavations may not be used as planting soil.

C. Obstructions: Notify Architect if unexpected rock or obstructions detrimental to trees or shrubs are encountered in excavations.

D. Drainage: Notify Architect if subsoil conditions evidence unexpected water seepage or retention in tree or shrub planting pits.

3.05 TREE, SHRUB, AND VINE PLANTING

A. Before planting, verify that root flare is visible at top of root ball according to ANSI Z60.1. If root flare is not visible, remove soil in a level manner from the root ball to where the top-most root emerges from the trunk. After soil removal to expose the root flare, verify that root ball still meets size requirements.

B. Remove stem girdling roots and kinked roots. Remove injured roots by cutting cleanly; do not break.

C. Set balled and burlapped stock plumb and in center of planting pit or trench with root flare 2 inches above finish grades.
   1. Use planting soil for backfill.
   2. After placing some backfill around root ball to stabilize plant, carefully cut and remove burlap, rope, and wire baskets from tops of root balls and from sides, but do not remove from under root balls. Remove pallets, if any, before setting. Do not use planting stock if root ball is cracked or broken before or during planting operation.
   3. Backfill around root ball in layers, tamping to settle soil and eliminate voids and air pockets. When planting pit is approximately one-half filled, water thoroughly before placing remainder of backfill. Repeat watering until no more water is absorbed.
   4. Place planting tablets in each planting pit when pit is approximately one-half filled; in amounts recommended in soil reports from soil-testing laboratory. Place tablets beside the root ball about 1 inch from root tips; do not place tablets in bottom of the hole.
   5. Continue backfilling process. Water again after placing and tamping final layer of soil.

3.06 TREE, SHRUB, AND VINE PRUNING

A. Remove only dead, dying, or broken branches. Do not prune for shape.

B. Do not apply pruning paint to wounds.

3.07 GROUND COVER AND PLANT PLANTING

A. Set out and space ground cover and plants other than trees, shrubs, and vines as indicated in drawings in even rows with triangular spacing.

B. Use planting soil for backfill.

C. Dig holes large enough to allow spreading of roots.

D. For rooted cutting plants supplied in flats, plant each in a manner that will minimally disturb the root system but to a depth not less than two nodes.

E. Work soil around roots to eliminate air pockets and leave a slight saucer indentation around plants to hold water.

F. Water thoroughly after planting, taking care not to cover plant crowns with wet soil.

G. Protect plants from hot sun and wind; remove protection if plants show evidence of recovery from transplanting shock.

3.08 PLANTING AREA MULCHING

A. Mulch surfaces of planting areas and other areas indicated with Pine Straw Mulch only to a depth of 3”.

B. Trees without the specified depth of mulch at the end of the Warranty and Maintenance period shall be rejected.

3.09 MAINTENANCE

A. Trees and Shrubs: Contractor shall irrigate as required to maintain vigorous and healthy plant growth. Overwatering or flooding shall not be allowed. The Contractor shall furnish any water to ensure adequate irrigation.

B. Maintain plantings by pruning, cultivating, watering, weeding, fertilizing, mulching, restoring planting saucers, adjusting and repairing tree-stabilization devices, resetting to proper grades or vertical position and performing other operations as required to establish healthy, viable plantings. Spray or treat as required to keep trees and shrubs free of insects and disease.

C. Stake Removal: At the end of the Warranty and Maintenance period, the Contractor shall be responsible for removing any above ground stakes from all trees planted under this contract.

D. Documentation
1. Provide a monthly check-list in writing of maintenance tasks performed.
2. Provide monthly photos of maintenance performance.

3.010 CLEANUP AND PROTECTION

A. During planting, keep adjacent paving, construction, and work area in an orderly condition.

B. Protect plants from damage due to landscape operations and operations of other contractors and trades. Maintain protection during installation and maintenance periods. Treat, repair, or replace damaged plantings.

C. After installation and before Substantial Completion of Project remove nursery tags, nursery stakes, tie tape, labels, wire, burlap, and other debris from plant material, planting areas, and Project site.

3.011 DISPOSAL

A. Remove surplus soil and waste material including excess subsoil, unsuitable soil, trash, and debris and legally dispose of them off Owner's property.

END OF SECTION 329300

APPENDIX

EXHIBIT A

LETTER

SPACKMAN MOSSOP AND MICHAELS

1824 SOPHIE WRIGHT PLACE
NEW ORLEANS, LA 70130
(504) 218-8991

DATE NOV 15, 2018
REFERENCE 18102

REVISED 00

Existing Storm Drainage Conditions

A. Size and Location of Site and Description of Adjacent Properties
The property located at 601 S. Jefferson Davis Parkway, New Orleans 70119, is a developed site of 34,587 square feet. The property is bordered to the south by commercial use. S. Jefferson Davis Parkway runs along the East side of the property with a right-of-way of 226 feet, a 6' sidewalk, and two mature Live Oak trees. D'Hemecourt Street runs along the North side of the property with a right-of-way of 53 feet, a 5' sidewalk and two street trees. S. Clark Street runs along the West side of the property with a right-of-way of 53 feet, a 5' sidewalk and no street trees.

B. Existing Structures
There are no existing structures on the property.

C. Above Ground and Subsurface Infrastructure
Two 8" sewer lines cross the middle of the site running North/South.

D. Existing Topography
Currently, the high points on site exist in the center of the site at the private alley and slope to the East and West of the site.

E. Landcover Type
58 percent of the site has pervious cover of gravel and lawn which was previously used as vehicular parking, 33 percent of the site has cover of gravel and lawn which was previously a commercial building, and 9% of the site has impervious cover of concrete.

F. USDA NRCS Soil Type
According to the USDA NRCS, the site is defined as Schriever Clay (*Sk*). Runoff in this area is considered high.

G. Existing Drainage Infrastructure
There is no existing drainage infrastructure on the site.

H. Receiving Drainage Catch Basin
One catch basin exists mid-block at S. Jefferson Davis Pkwy, and one exists at the East side of D'Hemecourt Street. Water that flows to the East of the site drains to these two catch basin structures.

One drop inlet structure exists mid-block at S. Clark Street, and one exists at the West side of D'Hemecourt Street. Water that flows to the West of the site drains to these two catch basin structures.

Infiltration Test

Infiltration tests were not performed for this project. The BMPs do not rely on infiltration and the project assumes zero infiltration on the site.

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Proposed Storm Drainage Conditions

A. Size and Location of Site and Description of Adjacent Properties

The property located at 601 S. Jefferson Davis Parkway, New Orleans 70119, is a developed site of 34,587 square feet. The property is bordered to the south by commercial use. S. Jefferson Davis Parkway runs along the East side of the property with a right-of-way of 226 feet, the 6' sidewalk will remain, the two mature Live Oak trees will remain and one new Live Oak is proposed. D'Hemecourt Street runs along the North side of the property with a right-of-way of 53 feet, the existing 5' sidewalk will remain and ten new street trees are proposed. S. Clark Street runs along the West side of the property with a right-of-way of 53 feet, the existing 5' sidewalk will remain and four street trees are proposed.

B. Proposed Structures

There are two proposed structures for the site, the main building will have a footprint of 10,401 square feet and will be used as a YWCA. The additional structure will have a footprint of 493 square feet and will be used for storage.

C. Above Ground and Subsurface Infrastructure

New water lines, electrical connections, and sanitary sewer connections will be provided to the building.

D. Proposed Topography and Grading

The site will be regraded to drain into the proposed BMPs and meet the building FFE.

E. Landcover Type

68 percent of the proposed site has impervious cover, including the rooftop and pedestrian and vehicular use areas. 32 percent of the site is pervious, which includes pervious BMP surfacing and planting areas.

F. Landscaping Elements

The site will be planted with planting beds containing trees, shrubs, and groundcover including the required parking lot landscaping.

G. USDA NRCS Soil Type

According to the USDA NRCS, the site is defined as Schriever Clay (*Sk*). Runoff in this area is considered high and is handled by site-specific drainage configurations where soil infiltration does not occur.

H. Proposed Drainage Infrastructure

There are 4 BMPs proposed for the site. Two BMPs will be permeable pavers with profile type A which has a depth of 25.8" and storage volume of 1,678 CF. The other two BMPs will be permeable pavers with profile type B which has a depth of 11.8" and proposed storage volume of 672 CF. Please refer to attached Nola GI Calculator for additional information. The proposed total amount of water stored is 2,349 CF, which is 132 CF over the 2,217 CF of storage required.

There are 2 proposed drainage areas. All water from Drainage Area 1 will drain into the BMPs. All water from Drainage Area 2 will bypass the stormwater system.

In Drainage Area 1, water from the roof is routed through booted downspouts into subsurface piping which connects to the first two BMPs. The playground, lawn, and driveway slopes to

EXHIBIT A

flow into drain inlets and also connect to the first two BMPs. The subsurface piping from the booted downspouts and drain inlets connect to 8" perforated pipes in the first two BMPs allowing water to enter the gravel detention areas. Water which falls onto the parking lot drive aisles and parking stalls will flow into all four BMPs through the permeable paving surface. A 4" underdrain runs under each BMP to allow water to slowly drain. Four drain inlets are located at the low points within the permealbe paving BMPs to act as emergency overflows. These inlets and the 4" underdrain connect to 12" piping which connects to the outfall point. The 12" outfall pipe will connect to the existing catch basin at the corner of D'Hemecourt and S Clark streets.

The BMPs are sized according to the worst case scenario infiltration rates. The BMPs are sized for detention of the first 1.25 inches of a 10 yr 24 hr storm.

I. Receiving Drainage Catch Basin
The existing catch basin on the the West side of D'Hemecourt Street near S Clark Street will serve as the outfall for the proposed BMPs and will receive water from 95% of the site. The 5% of the site to bypass the BMPs will drain to the existing catch basins on S Jefferson Davis and the East side of D'Hemecourt Street.

J. Description of Safeguards to Prevent Short-circuiting of Stormwater BMPs
The Maintenance Plan will call for annual inspection of the BMPs for performance.

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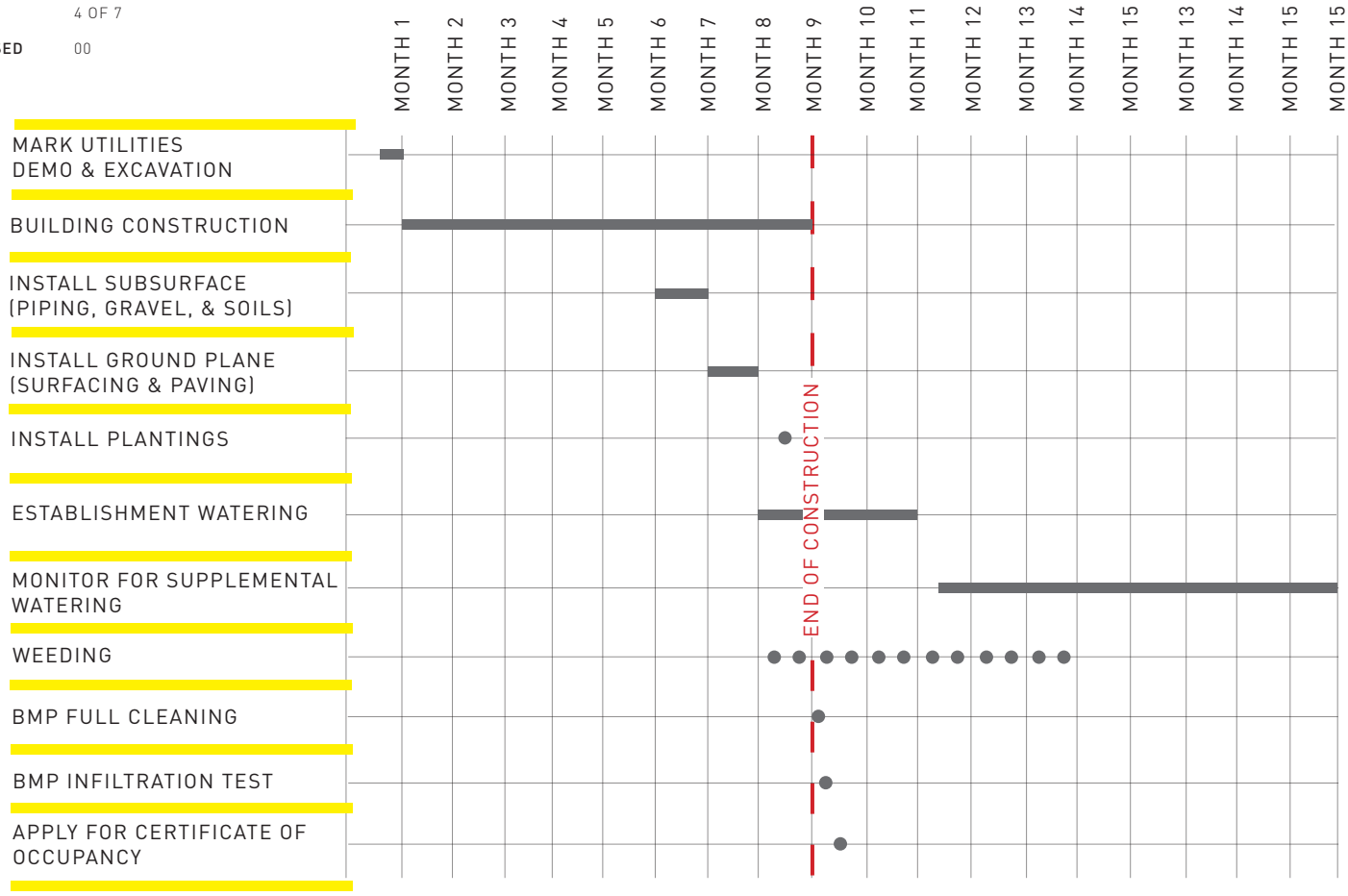
Implementation & Establishment Timeline



Construction Methods

Prior to construction, silt fencing will be installed in all required locations to prevent sediment and pollutants from leaving the site or building up in catch basins or drain lines.

Estimated Drainage Infrastructure Costs

Pipe:	$10,948	Booted Downspouts:	$7,500
Gravel:	$32,575	Catch Basin Tie-In:	$1,000
Permeable Pavers:	$46,010		

Total Installation Costs:	$100,333
Design Contingency (15%):	$15,050
Contractor Overhead (10%):	$10,033
Total Stormwater Management Cost:	$125,416
Anticipated Bond Value (25%):	$31,354
Anticipated Bond Payment (5%):	$1,568
Maintenance Costs for 2 yrs:	$2,400

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Stormwater System - Required Maintenance Standards

The Owner is required to monitor and maintain the installed Stormwater System in a way that ensures full performance. The following shall items shall be follow in order to ensure full performance:

- Immediately following the end of building construction, the Stormwater System shall undergo a full system inspection and clean before applying for Certificate of Occupancy.
- One time per year following completion, the Owner shall perform a full system inspection. Any hindrances to the full performance of the Stormwater System shall be rectified. If sediment, debris, or other materials hinder the flow of water within the system it shall be removed.
- The Owner shall follow the following Indications of Failure and Required Maintenance requirements.

Stormwater System - Indications of Failure and Required Maintenance

If any of the following defects or failures are found on site, the Owner is responsible to perform the rectification to the system in order to restore the full performance of the Stormwater System.

Stormwater System Component	DEFECT OR FAILURE	INDICATOR	RECTIFICATION
Total System	Partial or Complete Blockage of Drainage System	BMPs are not draining within 48 hours.	Manually remove and flush out all debris and sediment from the downspouts, drains, catch basins, and pipes.
Permeable Gravel Paver	Permeable Paver Gravel is Clogged by Sediment in Gravel	Water ponding on Surface Immediately Following Rain Event	Test surface infiltration rate using ASTM C1701. Vacuum to remove top layer of clogged gravel, refill pavers with clean gravel and test infiltration rate per C1701 to achieve a minimum permeability increase of 50%.
Permeable Gravel Paver	Weed Growth Clogging Permeable Gravel Pavers	Weeds are visibly causing water ponding on Surface Immediately Following Rain Event	Weeds must be removed from permeable paving monthly. Remove weeds with a weed flamer or by hand to avoid introducing pesticides into the groundwater.
Permeable Gravel Paver	Localized surface depressions and mosquitos	Shallow ponding water, mosquitoses or mosquito larvae visible.	Maintenance responses include: Employ local mosquito sprayers, Remove clogged gravel material, Repair system to remove surface depressions,
Overflow Drains in Parking Lot Islands and Area Drains	Partial or Complete Blockage of Drains	Drains are not receiving water	Manually remove debris or sediment from drain grate or cover, Manually remove debris and sediment from inside area drain sump and connecting pipes.
Pipes, Drains, Downspouts	Physical Damage	Evidence of trampling, vandalism, or other types of physical damage	Minor physical damage shall require repairs or replacement of impacted drainage element. Severe damage will require further investigation.

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Overall Site - Operations and Maintenance Plan

1. Vegetation Establishment - New plantings will require additional watering during the first 90 days of establishment. The need for supplemental watering will continue to be monitored for an additional 15 months to identify extreme drought conditions. New plantings will have a protective 3" covering of pine straw mulch.

2. Weed Control - New plantings will be monitored for invasive weeds monthly for the first year. Weeds will be removed by hand. As new plantings become established, weeding will be reduced, and will become a component of a common landscape maintenance plan.

3. Plant Maintenance - Woody plants (trees and shrubs) will require regular plant maintenance for good health and appearance. This includes monitoring for insect and disease infestations, as well as proper pruning to remove dead or diseased growth. Herbaceous plants (perennials) will go through a period of senescence during winter months, and may go dormant. Brown dormant leaves will be pruned and removed from herbaceous plants seasonally.

4. Lawn Care - Lawn areas should be mown 1 time a month from October to February and 2 times a month from March to September.

5. Post Storm Inspection - Immediately following a significant storm event, the entire system will be inspected for sediment and debris build up. Debris removal and necessary repairs will be made to emulate pre-event conditions.

6. BMP Surfacing Maintenance
To evaluate the permeability of the BMP surfacing immediately after construction perform ASTM C1701 – Standard Test Method for Infiltration. Perform the test in 2 locations to establish a benchmark, and re-test at similar locations after a year to evaluate the rate of clogging with time. Check infiltration annually. When rate has decreased by 50%, remove necessary clogged elements and restore to original infiltration rate.

7. Permeable Paving Maintenance
If there is water ponding on the surface immediately after a storm, test surface infiltration rate using ASTM C1701. Vacuum clean to remove surface sediment and soiled aggregate, refill pavers with clean aggregate and test infiltration rate per C1701 to minimum 50% increase. Weeds must be removed from pervious paving monthly. Remove weeds with a weed flamer or by hand to avoid introducing pesticides into the groundwater. Inspect surface annually, adjusting vacuuming schedule per sediment loading. Use Elgin Whirlwind for annual or semiannual vacuuming.

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Overall Site - Annual Maintenance By Frequency

January	Weed (1x per month) Mow (1x per month)
February	Weed (1x per month) Mow (1x per month)
March	Weed (1x per month) Mow (2x per month)
April	Weed (1x per month) Mow (2x per month) Remove brown leaves from herbaceous plants (2x per year) Replace pine straw (2x per year) Permable Surface BMPs - Inspect permeable gravel pavers and adopt necessary vacuum and weeding schedule (1x per year)
May	Weed (2x per month) Mow (2x per month)
June	Weed (2x per month) Mow (2x per month) Prune woody plants (2x per year)
July	Weed (2x per month) Mow (2x per month)
August	Weed (2x per month) Mow (2x per month)
September	Weed (2x per month) Mow (2x per month)
October	Weed (1x per month) Mow (1x per month) Remove brown leaves from herbaceous plants (2x per year) Prune woody plants (2x per year) Replace pine straw (2x per year) Inspect BMPs and Perform Necessary Cleaning (1x per year)
November	Weed (1x per month) Mow (1x per month)
December	Weed (1x per month) Mow (1x per month)

Contact Information

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Trapolin-Peer Architects
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30 November 2011

Trapolin-Peer Architects, APC
539 Julia Street
New Orleans, Louisiana 70130

Attention Ms. Gabriel Virdure

Ladies and Gentlemen:

Geotechnical Investigation
YWCA of New Orleans
601-605 South Jefferson Davis Parkway and
600 South Clark Street
New Orleans, Louisiana
Eustis Engineering Project No. 21576

Transmitted are three copies (two bound and one unbound) of our engineering report covering a geotechnical investigation for the subject project. Electronic copies are also being provided to you and Kyle Associates, LLC, to the attention of Mr. Michael Bailey, P.E.

Thank you for asking us to perform these services.

Yours very truly,

EUSTIS ENGINEERING SERVICES, L.L.C.

GWENDOLYN P. SANDERS, P.E.

STATE OF LOUISIANA
GWENDOLYN P. SANDERS
REG NO. 27104
PROFESSIONAL ENGINEER
IN
CIVIL ENGINEERING

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GEOTECHNICAL INVESTIGATION

YWCA OF NEW ORLEANS

601-605 SOUTH JEFFERSON DAVIS PARKWAY AND

600 SOUTH CLARK STREET

NEW ORLEANS, LOUISIANA

EUSTIS ENGINEERING PROJECT NO. 21576

FOR
TRAPOLIN-PEER ARCHITECTS, APC
NEW ORLEANS, LOUISIANA

By
Eustis Engineering Services, L.L.C.
Metairie, Louisiana

30 NOVEMBER 2011

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YWCA OF NEW ORLEANS
601-605 SOUTH JEFFERSON DAVIS PARKWAY
AND 600 SOUTH CLARK STREET
NEW ORLEANS (ORLEANS PARISH), LOUISIANA
EUSTIS ENGINEERING PROJECT NO. 21576

INTRODUCTION

1. This report contains the results of a geotechnical investigation performed for the YWCA of New Orleans to be located between South Jefferson Davis Parkway and South Clark Street at Tulane Avenue in New Orleans, Louisiana. The work was performed in general accordance with the scope outlined in Eustis Engineering Services, L.L.C.'s proposal dated 11 November 2010. Authorization to proceed with the investigation was given by signed acceptance of our proposal by Ms. Gabriel Virdure representing Trapolin-Peer Architects, APC, of New Orleans, Louisiana, on 3 October 2011. Kyle Associates, LLC, is the structural engineer of record.

2. This report has been prepared in accordance with generally accepted geotechnical engineering practice for the exclusive use of Trapolin-Peer Architects for specific application to the subject site. In the event of any changes in the nature, design, or location of the proposed structures, the conclusions and recommendations contained in this report shall not be considered valid unless the changes are reviewed and the conclusions of this report are modified and verified in writing. Should these data be used by anyone other than Trapolin-Peer Architects, they should contact Eustis Engineering for interpretation of data and to secure any other information pertinent to this project.

3. Further note, the analyses and recommendations contained in this report are based, in part, on data obtained from the soil borings. The individual boring logs are considered representative of subsurface conditions at the boring locations on the

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dates completed. No warranty is given that the boring logs are representative of subsurface conditions at other locations or times. The nature and extent of variations in subsurface conditions between and away from the boring locations may not become evident until construction. If such variations then appear, it will be necessary to reevaluate the recommendations contained in this report.

4. Recommendations and conclusions contained in this report are to some degree subjective having partial basis in engineering judgment and experience particular to the design engineer. For this reason, this report should not be included in the contract plans and specifications.

SCOPE

5. The investigation included the drilling of soil test borings to evaluate subsoil conditions and stratification, and to obtain samples of the various substrata. Soil mechanics laboratory tests, performed on samples obtained from the borings, were used to evaluate the physical properties of the subsoils. Engineering analyses, based on the soil borings and laboratory test results, were made to determine recommendations regarding site preparation, drainage, placement and compaction of fill, pile foundations, and components and thicknesses for flexible and rigid pavements.

SOIL BORINGS

6. Six soil test borings were made at the site on 12 through 14 October 2011. Undisturbed borings, B-1 through B-4, were each made to the 80-ft depth below the existing ground surface. Auger Borings, A-1 and A-2, were each made to the 10-ft depth below the existing ground surface. The approximate locations of the borings are shown on Figure 1. These locations were furnished with AIA Document G602-1993 provided with the original proposed request. Note, demolition operations were

performed at the site prior to drilling and the background image provided on Figure 1 is not up to date. Detailed descriptive logs of the borings and laboratory tests are shown in both tabular and graphical form in the Appendix. Upon completion of drilling the borings, the holes were backfilled in accordance with current regulatory requirements.

Undisturbed Borings

7. The undisturbed borings were made with a truck mounted rotary type drill rig. Samples of cohesive or semi-cohesive subsoils were obtained at close intervals or changes in stratum using a 3-in. diameter thinwall Shelby tube sampling barrel. The samples were immediately extruded from the sampling barrel, inspected, and visually classified by Eustis Engineering's soil technician. Pocket penetrometer tests were performed on the soil samples to give a general indication of their shear strength or consistency. The results of these tests are shown on the boring logs under the column heading "PP." Representative portions were then promptly placed in moisture proof containers and sealed for preservation of their natural moisture content.

8. Samples of cohesionless and semi-cohesive materials were obtained during the performance of in situ Standard Penetration Tests. This test consists of driving a 2-in. diameter sampler 1 foot into the soil after first seating it 6 inches. A 140-lb weight dropped 30 inches is used to advance the sampler. The number of blows required to drive the sampler is indicative of the relative density of cohesionless soils and the consistency of cohesive soils. The samples were retained in moisture proof containers for preservation of their natural moisture content. The results of the Standard Penetration Tests are shown on the boring logs under the column heading “SPT.”

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Auger Borings

9. The auger borings were made with an auger attached to the rear of the drill rig. The subsoils were sampled directly from the auger blades at close intervals or changes in strata. These samples were sealed in plastic bags to preserve their natural moisture content.

LABORATORY TESTS

10. Soil mechanics laboratory tests, consisting of natural water content, unit weight, unconfined compression shear (UC), and unconsolidated undrained triaxial compression shear (OB), were performed on samples obtained from the borings. The results of the laboratory tests are summarized on the boring logs in the Appendix.

DESCRIPTION OF SITE CONDITIONS

Site Conditions

11. As previously noted, demolition operations were performed prior to our field investigation. We understand some grading was performed subsequent to the demolition. However, it is not apparent if grades were changed by the operations. The site comprises Lot Z-2 on South Jefferson Davis Parkway (Borings 3 and 4) and Lot Z-4 along South Clark Street (Borings 1 and 2 and A-1 and A-2). The lots are generally level, although detailed topographic survey data have not been furnished for points within the lots. Lot Z-2 is at a lower existing grade than Lot Z-4. Lot Z-4 is currently being used as parking and large potholes were observed.

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Geology and Stratigraphy

12. The borings encountered Holocene deposits overlying Pleistocene deposits. The Holocene unit consists of swamp/marsh deposits over interdistributary deposits which, in turn, overlie marine deposits. The Pleistocene soils are undifferentiated. Our interpretation of the stratigraphy at each of the boring locations is shown on the individual boring logs in the Appendix.

13. Approximately 1 to 2 feet of sand fill was encountered at the auger borings and at Borings 1 and 4. Fill materials are also present within the upper soft to stiff gray, brown, and black clay and sandy clay and consist of brick and shell fragments and gravel. The fill materials were present to depths up to 7 feet below the existing ground surface. The swamp/marsh deposits are extremely soft to very soft gray and dark gray organic clay, clay, and peat with layers of wood, decayed wood, and roots. These deposits continue to the termination of the auger borings at the 10-ft depth and to approximately 12 feet below grade at the undisturbed borings. Beneath the swamp/marsh deposits, the interdistributary deposits are initially medium dense gray clayey sand and silty sand, loose gray clayey silt, and very soft to medium stiff gray clay and silty clay that extend to depths of 16 to 22 feet below existing grades. These deposits are underlain by very soft to soft gray clay with sand and silt pocket and lenses to the approximate 46-ft depth.

14. Below the 46-ft depth, marine deposits were encountered. At Boring 1 and 2, the marine deposits are very loose gray clayey sand and soft gray sandy clay to the 50-ft depth followed by loose to very dense gray fine sand that continues to depths of 56 to 61 feet. At Borings 3 and 4, loose to medium dense gray clayey sand and extremely soft to soft gray sandy clay continue to the 53 to 58-ft depths. These marine deposits at all four undisturbed borings contain shell fragments.

15. The Pleistocene interface at the site appears to be located at the approximate 66-ft depth below existing grade. Just above the Pleistocene interface, the marine sands, clayey sands, and sandy clays are underlain by soft to stiff gray and tan clay. From the 66-ft depth, the upper Pleistocene soils appear to be reworked and include very soft to medium stiff gray and greenish-gray clay and silty clay that continue to depths of 71 to 77 feet below grade. Boring 1 is terminated in a stratum of stiff greenish-gray clay. Boring 4 is terminated in a stratum of stiff light gray sandy clay. Borings 2 and 3 are terminated in strata of loose to very dense gray silty sand. All of the undisturbed borings were made to the 80-ft depth.

Ground Water

16. In order to determine the ground water conditions at the time of the field investigation, observations were made during the drilling of Boring A-2. This boring was advanced without the addition of water to a depth of 10 feet below existing grade. Ground water was initially observed at a depth of 9 feet below grade during drilling. After an observation period of approximately 24 hours, the depth to ground water was measured to be 6 feet below the existing ground surface in Boring A-2. The depth to ground water will vary with climatic conditions, drainage improvements, and other factors. The depth to ground water should be determined by those persons responsible for construction immediately prior to beginning work.

ENGINEERING ANALYSES

Furnished Information

17. A survey of Lots Z-2 and Z-4 performed by Gandolfo Kuhn, LLC, on 8 July 2011 was provided. The survey includes topographic information along the perimeter of the lots, although it appears building demolition was complete at the time of the survey. Existing grades shown on the survey generally vary between el 15 and el

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17 Cairo Datum. The proposed finished floor elevation and site grades were not available for preparation of this report. Fill heights will vary across the site but are anticipated to be less than 3 feet in any one area. The amount of site grading fill placed after demolition operations is not known.

18. Lot Z-2 will be developed first. The improvements will consist of a two-story structural steel building with parking on the roof. Future improvements would consist of a building on Lot Z-4 and grade level parking. A site plan of the proposed current and future building locations, including their plan dimensions, was not available for preparation of this report.

19. Information provided by Mr. Michael Bailey of Kyle Associates, indicates the new structure will be supported on piles. Small pile caps consisting of two to three piles each are anticipated. Loads per cap for the metal building will be relatively light, approximately 20 to 40 kips each. Pile types being considered include small timber composite piles and larger timber piles.

Foundation Recommendations

20. Soil bearing values have not been considered due to the nature of the soils present at the site. The New Orleans Building Code requires a minimum pile tip embedment of 30 feet below grade. Deeper embedments will be required for this site depending on the fill heights planned. All structural loads (floors, walls, and columns) should be supported on piles having the same approximate tip embedment below the existing ground surface to minimize differential settlement. However, for pile embedments over 46 feet, foundation conditions vary between the two lots investigated. Thus, a comprehensive test pile program should be implemented to verify installation requirements and capacities for each of the proposed structures. A discussion of pile foundations follows in this report. Once site grading plans are finalized, Eustis Engineering should be contacted to verify our assumptions.

Site Preparation

21. Drainage. The initial step to prepare the site for construction should be to establish adequate temporary and permanent drainage to prevent ponding of water and ensure immediate runoff of all rainfall. We recommend the contractor maintain adequate surface drainage away from all foundations during and after construction. This may be accomplished by setting grades to ensure positive drainage of water away from the foundation areas and providing adequate surface and subsurface drainage structures as required. All gutters draining rainfall from the structure should be connected to downspouts which discharge away from the foundation or into a drainage system. Water should not be allowed to collect near the foundation or pavements.

22. Clearing and Stripping. The existing ground surface at the site should be stripped of any vegetation, loose topsoil, debris, stumps, organic matter, loose fill, and any other deleterious materials. Stripping should be to the minimum depth necessary to remove any vegetation and roots. Deeper excavations may be required in the vicinity of stumps or demolition debris. The exact depth of stripping should be determined during construction.

23. Demolition. We understand previous structures have been demolished and removed from the site. Provisions should be made to locate any abandoned underground utilities and foundations which could impact new construction. Existing footings or abandoned pipes should be excavated and removed from the site. These structures could impact the performance of new foundations if not properly removed, proofrolled, and backfilled with structural fill material. Existing piles, if applicable, should not be incorporated into the new structure. In general, these features should not be removed but should be cut off 5 feet below the existing ground surface or grade beams, whichever is greater. Removal and relocation of structures and obstructions should also conform to the requirements outlined in

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Section 202 of the Louisiana Standard Specifications for Roads and Bridges, 2000 edition (LSSRB).

24. Subgrade Preparation. After the stripping and clearing, the exposed surface should be proofrolled with a bulldozer or tracked vehicle exerting a ground pressure between 10 and 15 psi. The vibratory system on the compactor, if present, should not be used during proofrolling. Alternative proofrolling techniques may be proposed, but these methods should be approved by Eustis Engineering prior to their use at the site. Any depressions, stump holes, or weak areas identified should be thoroughly cleaned out to the surface of firm undisturbed soil and backfilled with a select structural fill material placed and compacted under controlled conditions. All clearing and compaction operations should only be performed during periods of dry weather.

25. Structural Fill. A select granular material, such as locally available sand (AASHTO A-3), should be used as backfill and/or fill required to reach design grade. Sand fill should be non-plastic (plasticity index = 0) and free of roots, clay lumps, and other deleterious materials with no more than 10% by weight of material passing a U.S. Standard No. 200 mesh sieve. The maximum organic content should not exceed 5% by weight. Prior to transporting structural fill on site, a sample should be tested to verify its conformance to these recommendations.

26. Compaction. Structural fill beneath the pile supported structure should be placed in lifts of 8 to 10 inches and compacted to at least 95% of its maximum dry density near optimum moisture in accordance with ASTM D 698. Fill beneath pavements should be placed in 6 to 8-in. lifts and compacted to at least 95% of its maximum dry density in accordance with ASTM D 1557. Select fill or general fill used for non-structural grading should be spread in loose lifts of 10 to 12 inches and compacted by several passes of a bulldozer.

27. Fill Settlement. We understand the site will require no more than 3 feet of fill to reach finished grade. Estimates of settlement of the ground surface, due to the placement of new fill (weighing 120 pcf) and covering an area approximately 120' x 300' in plan dimensions were made for this site. The results of these analyses are provided in Table 1 for fill heights of 1 to 3 feet.

TABLE 1: ESTIMATED FILL SETTLEMENT

FILL HEIGHT IN FEET	ESTIMATED SETTLEMENT IN INCHES
1	2¾ to 4
2	5 to 7
3	7½ to 11

These estimates of settlement are at the center of the filled area. The corners and edges of the filled area should be anticipated to settle approximately 25% and 50%, respectively, of the maximum settlement at the center of the filled area. Similar magnitudes of settlement were computed for fill areas of 120' x 120' or 120' x 160' for the individual lots. Our estimates of settlement do not include settlement due to existing fill, improperly compacted fill, or poor quality fill.

28. Placement of fill will also affect pile foundations as discussed subsequently in this report. Also, fill settlement may result in differential settlement between grade supported structures, such as pavements, and the pile supported building. Your design should recognize this potential. If more than 3 feet of fill is required to raise grades at the site, or if a larger fill area is required, Eustis Engineering should be contacted to reevaluate settlement. Once site grading plans are finalized, Eustis Engineering should be contacted to verify our assumptions.

29. Areal Subsidence. The project area is being affected by ongoing areal subsidence that is the result of past filling, drawdown of ground water levels due to drainage improvements, and biodegradation of near surface organic soils subsequent to

ground water drawdown. The amount of future subsidence cannot be estimated from information developed for our report. Settlement of surface founded structures and pavements due to subsidence can be several inches and differential over short lengths with respect to pile supported structures.

Pile Foundations

30. Estimated Pile Load Capacities. We have performed analyses to estimate the allowable compressive and tensile capacities for treated ASTM D 25 quality timber piles and small timber composite piles for support of the proposed building. However, as previously noted, variations in the subsoil conditions within the marine deposits below the 46-ft depth have been identified by the borings. The allowable pile load capacities, based upon Borings 1 and 2, where medium dense to very dense sand deposits are present, are provided on Figure 2. For conditions at Borings 3 and 4, the allowable pile load capacities are provided on Figure 3. ***The borings do not identify the transition between these two stratigraphies which may not be confined to a particular lot or structure***. Thus, a comprehensive test pile program is recommended for each site to verify installation conditions and allowable capacities. Further, the selection of pile tip embedment should consider settlement potential due to filling as discussed subsequently.

31. Our estimated capacities neglect the skin friction along the top 2 feet of the pile for embedment within the pile cap and assume the piles are driven vertically. Our estimates contain an estimated factor of safety of 2 against failure of a single pile through the soil. Use of this factor of safety assumes a static load test will be performed.

32. Timber Piles. We recommend the treatment of timber piles meet the current American Wood Preservers Association Standards as outlined in Section 1014 of the LSSRB for both preservative and quality assurance. Treatment should also

follow Section 812.06 where applicable. Furthermore, we recommend the timber piles meet the quality (clean peeled, straightness, etc.) requirements outlined in ASTM D 25 and size requirements outlined in Table X1.5 of ASTM D 25 for minimum pile tips. The pile dimensions assumed in our analyses are shown on Figures 2 and 3.

33. Small Timber Composite Piles. We recommend composite piles consist of an untreated ASTM D 25 quality timber pile having a minimum 6-in. tip and 8-in. butt lower section and a nominal 8-in. diameter concrete filled metal shell upper section. Alternate to this corrugated metal section, open end steel pipe piles having an outer diameter of 6⅝ inches have also been used as the upper metal shell. The metal shell upper section should extend a minimum distance of 10 feet below the existing ground surface to protect the untreated timber section. The metal shell section should be of sufficient thickness to withstand handling stresses and soil and water pressures. We recommend a maximum shell length of 15 feet. A mandrel impacting the timber pile butt should be used to install the metal shell. Prior to placing concrete, the metal shell should be inspected to ensure it is free of water. Concrete placed in the metal shell should have a minimum compressive strength of 2,500 psi or as dictated by structural requirements. ***Timber composite piles should not be used to resist lateral or tensile loads. We do not recommend the use of timber-timber composite piles or other non-mandrel driven composite sections.***

34. Structural Capacity. Analyses for pile capacities are based only on a soil-pile relationship. Therefore, the structural capacity of the piles and their connections to transmit these loads should be determined by a structural engineer. In particular, composite pile connections should be designed to handle driving stresses as well as permanent loads.

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35. Pile Group Capacity and Spacing. The estimated allowable single pile load capacities described in this report will derive the majority of their compressive capacity through skin friction. Therefore, consideration of group effects is required. In this regard, the supporting value of the piles driven in groups should be investigated on the basis of the group perimeter shear by the formula shown on Figure 4. The minimum spacing between individual timber piles should be at least 3 feet or 5% of the embedment, whichever is greater. This relationship is also shown on Figure 4. The minimum spacing between rows or groups of piles should also meet the requirements outlined below regarding settlement.

36. Estimated Settlement due to Structural Loads. If piles are used in small isolated groups or rows, we estimate settlement of pile foundations due to sustained structural loads supported on vertical piles will be ½ inch or less for pile embedments of 40 feet or more. This estimate is based on the assumptions that the largest group dimension will be no greater than 20% of the pile embedment, the center to center spacing between groups will be no closer than twice the largest group dimension, and the center to center spacing between rows of piles will be no closer than 8 feet.

37. These estimates do not include elastic deformation of the piles which should be added to the settlement estimates. Elastic settlement of the piles may be estimated as 75% of the static column strain of a pile acting as a column. These estimates of settlement are only due to structural loads and are additive to settlement due to filling as addressed subsequently.

38. All piles for the building should be driven to the same approximate tip elevation, and concrete for the pile caps should be structurally integrated with the concrete for the grade beams. These recommendations are made to minimize the potential for differential movements. Eustis Engineering should be contacted to reevaluate pile settlement if any of our assumptions are not met.

39. Effects of Fill Placement on Piles. As the fill settles from consolidation of the underlying subsoils, negative skin friction (drag loads) are induced on the piles as the soil settles along the pile. These drag loads may result in additional pile settlement and/or an increase in the load applied to the pile. Our estimates of the additional settlement of piles due to the placement of fill is provided in Table 2.

TABLE 2: ESTIMATED SETTLEMENT OF PILES DUE TO FILLING

PILE EMBEDMENT IN FEET	ESTIMATED SETTLEMENT IN INCHES DUE TO FILLING	
	2 FEET	3 FEET
40	1¾ to 2¼	2¾ to 3½
50 (Borings 1 and 2)	½ to ¾*	¾ to 1*
50 (Borings 3 and 4)	1½ to 2	2½ to 3
60	¾ to 1¼	1½ to 1¾
70	½ to ¾	¾ to 1

*For piles firmly embedded in sand strata.

These estimates of settlement are only due to new fill placement and should be added to settlements due to structural loads and existing fill. Eustis Engineering should be contacted to verify our assumptions once site grading plans are finalized. The magnitude of drag load settlement can be reduced by preloading the site prior to pile installations or reducing fill heights/loads.

40. End bearing piles firmly embedded in the medium dense to very dense sand strata encountered in Borings 1 and 2 at the approximate 51 to 55-ft depths will have an additional compressive load imposed upon them due to the negative skin friction (drag loads) forces on the surface of the piles caused by the fill placement. The estimated additional load due to fill placement imposed on the piles is 7½ tons for the small timber composite piles and 9¾ tons for the larger timber piles. These piles should also be evaluated for their structural adequacy. This evaluation should consider the additional compressive loads presented above. These loads should

be added to the applied load (long term, sustained) at the pile butt. Short term live loads need not be included in the applied load by this assessment. This load should be used to evaluate the fiber stresses for timber piles near the pile tip, but not to reduce the allowable capacities provided in this report.

41. Differential Settlement. Your design should recognize the potential for differential settlement between pile supported features and grade supported features, including pavements. Therefore, appropriate architectural or structural features should be incorporated in your design to accommodate differential settlement. We recommend flexible type connections be specified for all piping and utilities going to and from the proposed structure supported by pile foundations.

42. Utilities. We recommend flexible type connections be specified for all piping and utilities going to and from the proposed pile supported structure. These connections should be designed to accommodate the settlement associated with filling and areal subsidence.

Installation of Driven Piles

43. Quality Control. All pile driving operations should be supervised by experienced personnel to ensure proper procedures are followed and accurate records are kept during all pile driving operations. The driving records should include the date, type of pile, pile tip and butt diameters, overall pile length, hammer model, driving energy, and number of blows per foot of penetration for the full embedment of the pile. An accurate driving record is especially important to verify piles are installed to the required tip embedment and to give an indication of any unusual driving characteristics which may include pile breakage. We recommend Eustis Engineering be retained to observe, record, and evaluate all pile driving operations with respect to our recommendations presented in this report.

44. Hammers. Small treated ASTM D 25 quality timber piles and timber composite piles with minimum tip diameters of 6 inches may be driven with a drop hammer or a single acting air hammer having a manufacturer's rated energy of approximately 7,250 ft-lbs per blow. If a drop hammer is used, the ram weight should not exceed 2,500 pounds and the drop should not exceed 3 feet. Larger treated ASTM D 25 quality timber piles with minimum tip diameters of 7 inches may be driven with a single acting air hammer having a rated energy of 15,000 ft-lbs per blow.

45. Pile Refusal. Refusal criteria for the timber piles may be taken as 25 blows per foot with the recommended hammers. If the piles are driven with the aid of a follower, or if the pile driving helmet is allowed to impact the ground surface, Eustis Engineering should be consulted to adjust this refusal criteria. If piles do not achieve their intended embedments, Eustis Engineering should be contacted.

46. Predrilling. For pile embedments above 50 feet, predrilling of fill materials, wood, and silty sand or clayey sand deposits may be necessary to avoid damage to timber piles and minimize vibrations. This predrilling should extend no deeper than 22 feet below grade. For pile embedments over 50 feet, refusal of piles within the marine sand deposits may occur. In the vicinity of Borings 1 and 2, refusal within the sands may be desired and would provide a substantial end bearing component for the piles' capacity. At Borings 3 and 4, the thickness of the sand deposits are not sufficient to increase the allowable pile capacity. However, refusal could occur during driving at areas away from the boring locations. As a result, predrilling to the 55-ft depth may be necessary in the vicinity of Borings 3 and 4 for piles longer than 55 feet. If pile embedments below the sands are desired at Borings 1 and 2, predrilling should be planned and may extend to 60 feet. Predrilling, when required, should be made using a bit no larger than 75% of the tip diameter of timber piles. Predrilling should be by wet rotary methods using a fishtail bit. Requirements should be determined during the test pile program. Piles not achieving their design tip embedment should be evaluated.

Probe Piles and Load Tests

47. Eustis Engineering considers a test pile program and load test as an extension of our geotechnical investigation. Therefore, Eustis Engineering should be retained to perform these services. We recommend a comprehensive test pile program be planned for the site. Depending on the pile embedment selected and final building dimensions, we anticipate at least three probe piles be installed within the footprint of each of the proposed structures. Additional probe piles may be needed depending on the number of piles planned for the project, selected embedments and loads, and on the findings of the program. The probe piles may be installed at job pile locations.

48. The probe piles should be the same type and embedment anticipated for the job piles and installed with the same equipment and techniques proposed for the job piles. The probe piles can be used to evaluate installation methods. A driven probe pile will provide more definitive information regarding the anticipated driving resistance, need for predrilling, and vibrations from pile driving. At least one probe pile should be selected for testing. The test pile should be allowed to set for 14 days subsequent to installation of the reaction system. The test pile should then be load tested to failure in accordance with ASTM D 1143 and the New Orleans Building Code. Results should be evaluated by Eustis Engineering to verify the estimated pile load capacities presented in this report.

Vibrations

49. Pile driving, as well as other construction activities, has the potential to generate vibrations that may affect nearby structures, pavements, and underground utilities. Eustis Engineering recommends vibrations be monitored during the test pile program and during subsequent construction activities of concern. This monitoring should evaluate peak particle velocities during pile driving at critical structures with

a seismograph, as well as other construction activities generating vibrations (hauling fill, moving heavy equipment, etc.). The record of peak particle velocities will provide information in assessing potential damage and the need for changes in construction operations.

50. Peak particle velocities (measured at a structure) exceeding 0.5 in./sec may induce damage to the structure, particularly when this structure has been previously stressed by settlement or other movements. Peak particle velocities between 0.25 and 0.5 in./sec may be sensed as being detrimental by human perception. In addition, sustained peak particle velocities of 0.25 in./sec have been documented to densify cohesionless materials. Deposits of this nature exist at the site. Such densification can result in settlement of structures, pavements, and utilities founded over or in these deposits. Therefore, if sustained vibration levels of 0.25 in./sec are measured at a structure, pavement, or utility of concern, Eustis Engineering should be notified, the construction operations generating these vibrations suspended, and consideration given to altering these procedures.

Pavement Recommendations

51. Traffic. We have assumed the parking area will experience 30 automobiles per day and 25 vans and pickup trucks per day. We have assumed driveways and serviceways, will experience twice this amount of traffic along with two sanitation trucks per week and three delivery trucks per week. Our assumed axle weights are provided in Table 3.

TABLE 3: TRAFFIC LOAD ASSUMPTIONS

VEHICLE	AXLE LOAD IN KIPS	
	FRONT	REAR
Automobiles	2 (S)	2 (S)
Vans or Pickup Trucks	2 (S)	5 (S)
Sanitation Truck	20 (S)	40 (T)
Delivery Truck	12 (S)	20 (S) / 34 (T)

(S) = Single; (T) = Tandem

Pavement components were estimated for both flexible and rigid pavements. A 20-year design life and a terminal serviceability index (P_t) of 2.0 were used for the analyses.

52. The assumed traffic was converted to equivalent 18-kip single axle loads (E_{18}) using AASHTO equivalency factors for flexible and rigid pavements. Assumed traffic loadings and applications should be verified prior to implementation of design. If traffic conditions are significantly different than those presented, Eustis Engineering should be contacted to reevaluate the pavement recommendations contained in this report.

53. Method of Analysis. The pavement components and thicknesses were determined using methods presented in the 1986 AASHTO Guide for Design of Pavement Structures. In addition, the resilient soil modulus (M_r) of the subgrade was estimated based on the type of soil, probable drainage conditions, and engineering experience. For these estimates, we have assumed the subgrade is prepared as recommended in this report. In particular, proper drainage during construction and adequate permanent drainage should be provided so the subgrade is not allowed to become saturated. Prolonged saturation of the pavement components will result in a reduced service life.

54. Flexible Pavement. Our analyses assume all paving materials will conform to the LSSRB. For the parking areas, we recommend 3 inches of hot mix asphaltic surface course consisting of at least 1.5 inches of Type 3 wearing course and 1.5 inches of Type 3 binder course. In addition, we recommend 6 inches of stone base course and 8 inches of sand subbase. For the driveways and serviceways, we recommend 4 inches of hot mix asphaltic surface course consisting of at least 1.5 inches of Type 3 wearing course and 2.5 inches of Type 3 binder course. In addition, we recommend 8 inches of stone base course and 12 inches of sand subbase.

55. The asphaltic surface course should conform with Section 501 of the LSSRB. The material for the crushed stone base course should conform to the material requirements of Section 1003.03(d) of the LSSRB. The stone base course should be placed and compacted in accordance with Section 302 of the LSSRB for a Class II base course. Sand subbase should meet the material requirements given in "Structural Fill" of this report. Structural fill used as subbase should be placed in 6 to 8-in. loose lifts and compacted to at least 95% of its maximum dry density in accordance with ASTM D 1557.

56. Grades should provide for adequate drainage to prevent saturation of the subgrade and base course materials. Otherwise, adequate subsurface drainage or edge drains should be provided to maintain drainage. If the type and thickness for pavement components are changed, Eustis Engineering should be consulted to determine the suitability of these materials and the structural number of the pavement.

57. Rigid Pavement. Using the same soil and traffic conditions, Eustis Engineering recommends rigid pavement for the parking areas comprise 5 inches of Portland Cement Concrete. For the driveways and serviceways, we recommend the rigid pavement consist of at least 7 inches of Portland Concrete Cement. We

recommend trash container pads be at least 8 inches thick. Portland Cement Concrete should conform to the material requirements for pavement Type B concrete as specified in Section 901 of the LSSRB. The concrete should have a specified 28-day compressive strength of 4,000 psi to give the pavement adequate flexural strength. The concrete pavement design should consider the need for reinforcement against temperature and shrinkage. The pavement should be constructed in accordance with the provisions of the LSSRB, Section 601. The concrete should be underlain by at least 6 inches of compacted sand fill. The sand fill should conform to the material requirements given in "Structural Fill." The sand subbase should be compacted to at least 95% of its maximum dry density near optimum water content using ASTM D 1557.

58. Grades should provide for adequate drainage to prevent saturation of sand fill beneath the pavement. Otherwise, adequate subsurface drainage or edge drains should be provided to maintain drainage. All joints should be sealed to prevent infiltration of water. All pavement details, such as reinforcement, dowels, joints, curbs, etc., should be designed by a pavement design engineer.

GEOTECHNICAL SERVICES DURING CONSTRUCTION

59. In order to provide continuity among the investigation, design, and construction phases, Eustis Engineering should be retained to review plans and specifications developed for the project. Eustis Engineering can provide additional geotechnical services which may include consultation during design and construction. We can also provide steel, concrete, and asphalt inspection services, and compaction and inplace density determinations on fill materials. We can perform appropriate laboratory tests to determine the gradation and quality of material proposed as structural fill or backfill. Eustis Engineering can also log the installation of test piles and job piles, perform and evaluate pile load tests, and monitor vibrations.

EXHIBIT B

60. Eustis Engineering should be retained to monitor the geotechnical related work performed by the contractor. This permits the geotechnical engineer that prepared the report to be on hand and quickly evaluate unanticipated conditions, conduct additional tests if required, and, when necessary, recommend alternative solutions to problems. This is recommended to avoid major construction cost overruns or contractual disputes on the project.

EXHIBIT B

YWCA OF NEW ORLEANS
601-605 SOUTH JEFFERSON DAVIS PARKWAY
AND 600 SOUTH CLARK STREET
NEW ORLEANS, LOUISIANA
EUSTIS ENGINEERING PROJECT NO. 21576

ESTIMATED ALLOWABLE SINGLE PILE LOAD CAPACITIES
TREATED ASTM D 25 QUALITY TIMBER PILES
AND TIMBER COMPOSITE PILES
BASED ON SOIL BORINGS 1 AND 2

PILE DIAMETER	ESTIMATED PILE TIP EMBEDMENT BELOW EXISTING GROUND SURFACE	ESTIMATED ALLOWABLE SINGLE PILE LOAD CAPACITIES IN TONS[1] FACTOR OF SAFETY ≈ 2[2]	
		COMPRESSION	TENSION
6-In. Tip, 8-In. Butt	30 35 40	4 4½ 5½	2½ 3 3½
6-In. Tip, 8-In. Butt Composite[3]	45 50 51 - 55[4]	6 7½ 15	N/A[3] N/A[3] N/A[3]
8-In. Tip, 12-In. Butt	30 35	5½ 6½	3½ 4½
7-In. Tip, 12-In. Butt	40 45 50 51 - 55[4]	7 8½ 10 25[4]	5 5½ 6½ 10
7-In. Tip, 13-In. Butt	70	24	16

[1] These estimated capacities do not include limitations on structural capacity or imposed by some building codes.

[2] Use of a factor of safety of 2 assumes a static pile load test is performed.

[3] Timber composite piles should not be used to resist tensile or lateral loads. Timber composite piles should meet the size and installation requirements given in the report.

[4] Assumes piles firmly embedded in medium dense to very dense sand strata as indicated by penetration resistance.

EXHIBIT B

YWCA OF NEW ORLEANS
601-605 SOUTH JEFFERSON DAVIS PARKWAY
AND 600 SOUTH CLARK STREET
NEW ORLEANS, LOUISIANA
EUSTIS ENGINEERING PROJECT NO. 21576

ESTIMATED ALLOWABLE SINGLE PILE LOAD CAPACITIES
TREATED ASTM D 25 QUALITY TIMBER PILES
AND TIMBER COMPOSITE PILES
BASED ON SOIL BORINGS 3 AND 4

PILE DIAMETER	ESTIMATED PILE TIP EMBEDMENT BELOW EXISTING GROUND SURFACE	ESTIMATED ALLOWABLE SINGLE PILE LOAD CAPACITIES IN TONS[1] FACTOR OF SAFETY ≈ 2[2]	
		COMPRESSION	TENSION
6-In. Tip, 8-In. Butt	30 35 40	3½ 4½ 5½	2½ 3 3½
6-In. Tip, 8-In. Butt Composite[3]	45 50 55	6 7½ 9½	N/A[3] N/A[3] N/A[3]
8-In. Tip, 12-In. Butt	30 35	5 6½	3½ 4
7-In. Tip, 12-In. Butt	40 45 50 55[4]	7 8 10 12½	4½ 5½ 6½ 8½
7-In. Tip, 13-In. Butt	60[4] 65 70	15 17 20	10 11½ 14

[1] These estimated capacities do not include limitations on structural capacity or imposed by some building codes.

[2] Use of a factor of safety of 2 assumes a static pile load test is performed.

[3] Timber composite piles should not be used to resist tensile or lateral loads. Timber composite piles should meet the size and installation requirements given in the report.

[4] Should predrilling to the 55-ft depth be necessary, these embedments should not be used.

EXHIBIT B

CAPACITY OF PILE GROUPS

The maximum load carrying capacity of a pile group is no greater than the sum of the single pile load capacities, but may be limited to a lower value if so indicated by the result of the following formula.

Q_{group} = Perimeter shear + End bearing

Perimeter Shear = $2 (B_g + L_g) D c_{ave}$

End Bearing = $N_c C_b L_g B_g$

Where:

Q_{group}	=	Ultimate group capacity
B_g	=	Width of pile group
L_g	=	Length of pile group
D	=	Depth of pile group
c_{ave}	=	Weighted average of undrained shear strength over the depth of pile embedments. c_{ave} should be reduced by alpha (α) from Figure 4-5 of EM 1110-2-2906.
C_b	=	Undrained shear strength at the base of the pile group
N_c	=	$5(1+\frac{D}{5B_g})\quad(1+\frac{B_g}{5L_g}) \leq 9$

A minimum factor of safety of 2 and 3 should be applied to the computed ultimate perimeter shear and end bearing, respectively.

Note: See pages 4-21 and 4-22 of EM 1110-2-2906 for complete discussion of pile group capacity.

SPACING WITHIN PILE GROUPS

SPAC = $0.05 (L_1) + 0.025 (L_2) + 0.0125 (L_3)$

In Which:

SPAC	=	Center to center of piles, feet
L_1	=	Pile penetration up to 100 feet
L_2	=	Pile penetration from 101 to 200 feet
L_3	=	Pile penetration beyond 200 feet

NOTE: Minimum pile spacing = 3 feet or 3 pile diameters, whichever is greater

EXHIBIT B

APPENDIX

EXHIBIT B

LEGEND AND NOTES FOR
LOG OF BORING AND TEST RESULTS

PP Pocket penetrometer: Resistance in tons per square foot

SPT Standard Penetration Test: Number of blows of a 140-lb hammer dropped 30 inches required to drive 2-in. O.D., 1.4-in. I.D. sampler a distance of 1 foot into the soil after first seating it 6 inches

SPLR Type of Sampling Shelby SPT Auger No sample

SYMBOL Clay Silt Sand Peat/Humus Shells Stone/Gravel

Predominant type shown heavy; Modifying type shown light

USC Unified Soil Classification

DENSITY Unit weight in pounds per cubic foot

SHEAR TESTS

TYPE

- UC Unconfined compression shear
- OB Unconsolidated undrained triaxial compression shear on one specimen confined at the approximate overburden pressure
- UU Unconsolidated undrained triaxial compression shear
- CU Consolidated undrained triaxial compression shear
- DS Direct shear

Ø Angle of internal friction in degrees

c Cohesion in pounds per square foot

ATTERBERG LIMITS

- LL Liquid Limit
- PL Plastic Limit
- PI Plasticity Index

OTHER TESTS

- CON Consolidation
- PD Particle size distribution (sieve and/or hydrometer)
- k Coefficient of permeability in centimeters per second
- SP Swelling pressure in pounds per square foot

Other laboratory test results reported on separate figures

GENERAL NOTES

(1) If a ground water depth is shown on the boring log, these observations were made at the time of drilling and were measured below the existing ground surface. These observations are shown on the boring logs. However, ground water levels may vary due to seasonal fluctuations and other factors. If important to construction, the depth to ground water should be determined by those persons responsible for construction immediately prior to beginning work.

(2) While the individual logs of borings are considered to be representative of subsurface conditions at their respective locations on the dates shown, it is not warranted that they are representative of subsurface conditions at other locations and times.

EUSTIS ENGINEERING

LOG OF BORING AND TEST RESULTS

YWCA OF NEW ORLEANS
601-605 SOUTH JEFFERSON DAVIS PARKWAY AND 600 SOUTH CLARK STREET
NEW ORLEANS, LOUISIANA

(Sheet 1 of 2)

EXHIBIT B

Ground Elev.: **Datum:** **Gr. Water Depth:** **Job No.:** 21576 **Date Drilled:** 10/13/11 **Boring:** 1 Refer to "Legends & Notes"

Scale In Feet	PP	SPT	SPLR	Symbol	Visual Classification	USC	Sample Number	Depth In Feet	Water Content Percent	Density Dry	Density Wet	Shear Tests Type	Shear Tests ø	Shear Tests C	Atterberg Limits LL	Atterberg Limits PL	Atterberg Limits PI		Other Tests
0					Loose gray & brown silty sand w/shell fragments & clay pockets	SM	1	0-0.5	6										
	0.50				Soft dark gray & brown sandy clay w/organic matter, roots, & shell fragments	CL	2	2-3	50	58	86	UC	--	211					
					Very soft dark gray silty clay w/wood & humus	CL	3	5-6											
					Wood	Wd	4	6-7											
10					Extremely soft gray organic clay w/wood & roots	OH	5	8-9	146	30	75	UC	--	100					
							6	11-12											
					Medium dense gray clayey sand w/decayed wood	SC	7	14-15	29	92	119	UC	--	729					
20							8	18-19											
					Soft gray clay w/fine sand pockets & lenses	CH	9	23-24	51	69	105	UC	--	173					
30							10	28-29											
							11	33-34	60	63	101	UC	--	326					
40							12	38-39											
							13	43-44	69	59	99	UC	--	377					
	0.50				Soft gray sandy clay w/clay layers & shell fragments	CL	14	48-49	41	78	110	UC	--	449					
50																			

Comments: Latitude: 29° 57.972' N
Longitude: 90° 05.948' W

EUSTIS ENGINEERING

LOG OF BORING AND TEST RESULTS

YWCA OF NEW ORLEANS
601-605 SOUTH JEFFERSON DAVIS PARKWAY AND 600 SOUTH CLARK STREET
NEW ORLEANS, LOUISIANA

EXHIBIT B

Ground Elev.: **Datum:** **Gr. Water Depth:** **Job No.:** 21576 **Date Drilled:** 10/13/11 **Boring:** 1 **Refer to "Legends & Notes"**

Scale In Feet	PP	SPT	SPLR	Symbol	Visual Classification	USC	Sample Number	Depth In Feet	Water Content Percent	Density Dry	Density Wet	Shear Tests Type	Shear Tests ø	Shear Tests C	Atterberg Limits LL	Atterberg Limits PL	Atterberg Limits PI		Other Tests
50		23			Medium dense gray fine sand w/shells & clay pockets	SP	15	51-52											
		23					16	54-55	23										
60							17	58-59	29	85	110	UC	--	879					
	0.50				Stiff gray & tan clay w/shell fragments & fine sand pockets	CH	18	63-64											
	0.50						19	68-69	60	64	103	UC	--	1246					
70					Very soft gray silty clay w/wood (disturbed)	CL	20	73-74											
	0.50				Stiff greenish-gray clay w/fine sand pockets	CH	21	78-79	43	80	114	UC	--	1448					
80																			
90																			
100																			

Comments: Latitude: 29° 57.972' N
Longitude: 90° 05.948' W

EUSTIS ENGINEERING

LOG OF BORING AND TEST RESULTS

YWCA OF NEW ORLEANS
601-605 SOUTH JEFFERSON DAVIS PARKWAY AND 600 SOUTH CLARK STREET
NEW ORLEANS, LOUISIANA

EXHIBIT B

Ground Elev.: **Datum:** **Gr. Water Depth:** **Job No.:** 21576 **Date Drilled:** 10/14/11 **Boring:** 2 Refer to "Legends & Notes"

Scale In Feet	PP	SPT	S P L R	Symbol	Visual Classification	USC	Sample Number	Depth In Feet	Water Content Percent	Density Dry	Density Wet	Shear Tests Type	Shear Tests ø	Shear Tests C	Atterberg Limits LL	Atterberg Limits PL	Atterberg Limits PI		Other Tests
0		21			Medium stiff gray clay w/shell fragments, brick fragments, silty sand pockets, & roots	CH	1	0-1.5	56										
	0.50						2	1.5-3											
	0.25						3	4-5	60										
					Extremely soft to very soft gray & dark gray organic clay w/roots	OH	4	7-8											
10							5	10-11	183	28	79	UC	--	44					
					Very soft gray clay w/sandy silt pockets & decayed wood	CH	6	13-14	63	63	102	UC	--	197					
	0.50				Medium dense gray silty sand w/clay pockets	SM	7	18-19	33	92	122	OB	0	532					
20					Very soft to soft gray clay w/silt & silty sand pockets & lenses	CH	8	23-24											
							9	28-29	60	65	104	UC	--	278					
30							10	33-34											
							11	38-39	69	59	100	UC	--	318					
40							12	43-44											
					Very loose gray clayey sand w/shell fragments	SC													
	0.25						13	48-49	28	94	120	UC	--	107					
50																			

Comments: Latitude: 29° 57.983' N
Longitude: 90° 05.942' W

EUSTIS ENGINEERING

LOG OF BORING AND TEST RESULTS

YWCA OF NEW ORLEANS
601-605 SOUTH JEFFERSON DAVIS PARKWAY AND 600 SOUTH CLARK STREET
NEW ORLEANS, LOUISIANA

EXHIBIT B

Ground Elev.: **Datum:** **Gr. Water Depth:** **Job No.:** 21576 **Date Drilled:** 10/14/11 **Boring:** 2 Refer to "Legends & Notes"

Scale In Feet	PP	SPT	S P L R	Symbol	Visual Classification	USC	Sample Number	Depth In Feet	Water Content Percent	Density Dry	Density Wet	Shear Tests Type	Shear Tests ø	Shear Tests C	Atterberg Limits LL	Atterberg Limits PL	Atterberg Limits PI		Other Tests
50		25			Medium dense gray fine sand w/shell fragments	SP	14	50.5-52	21										
		51			Very dense gray fine sand w/silty sand	SP	15	53.5-55											
	0.25				Soft gray clay w/silty sand pockets & lenses & shell fragments	CH	16	58-59	57	68	106	UC	--	393					
60	0.25						17	63-64											
	2.00				Medium stiff greenish-gray & tan clay w/silt pockets	CH	18	68-69	46	78	113	UC	--	828					
70	1.75						19	73-74	49	74	110	UC	--	869					
					Loose gray silty sand	SM	20	78-79											
80																			
90																			
100																			

Comments: Latitude: 29° 57.983' N
Longitude: 90° 05.942' W

EUSTIS ENGINEERING

LOG OF BORING AND TEST RESULTS

YWCA OF NEW ORLEANS
601-605 SOUTH JEFFERSON DAVIS PARKWAY AND 600 SOUTH CLARK STREET
NEW ORLEANS, LOUISIANA

EXHIBIT B

Ground Elev.: **Datum:** **Gr. Water Depth:** **Job No.:** 21576 **Date Drilled:** 10/12/11 **Boring:** 3 Refer to "Legends & Notes"

Scale In Feet	PP	SPT	S P L R	Symbol	Visual Classification	USC	Sample Number	Depth In Feet	Water Content Percent	Density Dry	Density Wet	Shear Tests Type	Shear Tests ø	Shear Tests C	Atterberg Limits LL	Atterberg Limits PL	Atterberg Limits PI		Other Tests
0	1.00				Stiff black sandy clay w/brick & rock	CL	1	1-2											
					Extremely soft dark brown humus w/clay layers, roots, & wood	Pt	2	5-6	185	27	76	UC	--	91					
10					Very soft brown humus w/gray clay & trace of wood	Pt	3	8-9	271	18	68	UC	--	121					
					Very soft gray clay w/wood	CH	4	10-11											
	0.50				Medium dense gray silty sand w/wood & roots	SM	5	13-14	30	93	120	OB	0	714					
	0.50				Medium stiff gray silty clay	CL	6	18-19											
20					Very soft to soft gray clay w/silt & fine sand pockets & lenses	CH	7	23-24	52	69	105	UC	--	302					
30							8	28-29											
							9	33-34	58	66	104	UC	--	295					
	0.25						10	38-39											
40							11	43-44	75	55	96	UC	--	386					
					Loose to medium dense gray clayey sand w/shell fragments	SC													
50							12	49-50											

Comments:

EUSTIS ENGINEERING

LOG OF BORING AND TEST RESULTS

YWCA OF NEW ORLEANS
601-605 SOUTH JEFFERSON DAVIS PARKWAY AND 600 SOUTH CLARK STREET
NEW ORLEANS, LOUISIANA

EXHIBIT B

Ground Elev.: **Datum:** **Gr. Water Depth:** **Job No.:** 21576 **Date Drilled:** 10/12/11 **Boring:** 3 **Refer to "Legends & Notes"**

Scale In Feet	PP	SPT	S P L R	Symbol	Visual Classification	USC	Sample Number	Depth In Feet	Water Content Percent	Density Dry	Density Wet	Shear Tests Type	Shear Tests ø	Shear Tests C	Atterberg Limits LL	Atterberg Limits PL	Atterberg Limits PI		Other Tests
50		24			Loose to medium dense gray clayey sand w/shell fragments	SC	13	50.5-52	27										
		4			Soft gray sandy clay w/clay & trace of shell fragments	CL	14	53.5-55											
	0.25				Soft gray clay w/sandy silt pockets & layers	CH	15	58-59	60	65	103	UC	--	423					
60	0.50				Medium stiff light gray clay w/silt lenses & pockets	CH	16	63-64											
	1.75						17	69-70	46	73	107	UC	--	846					
70					Loose gray silty sand	SM	18	72-73											
		35			Dense gray silty sand	SM	19	73.5-75	25										
		64			Very dense gray silty sand	SM	20	76-77.5											
		57					21	78.5-80	27										
80																			
90																			
100																			

Comments:

EUSTIS ENGINEERING

LOG OF BORING AND TEST RESULTS

YWCA OF NEW ORLEANS
601-605 SOUTH JEFFERSON DAVIS PARKWAY AND 600 SOUTH CLARK STREET
NEW ORLEANS, LOUISIANA

(Sheet 1 of 2)

EXHIBIT B

Ground Elev.: **Datum:** **Gr. Water Depth:** **Job No.:** 21576 **Date Drilled:** 10/12-13/11 **Boring:** 4 Refer to "Legends & Notes"

Scale In Feet	PP	SPT	S P L R	Symbol	Visual Classification	USC	Sample Number	Depth In Feet	Water Content Percent	Density Dry	Density Wet	Shear Tests Type	Shear Tests ø	Shear Tests C	Atterberg Limits LL	Atterberg Limits PL	Atterberg Limits PI		Other Tests
0					Loose tan sand (fill)	SP	1	1-2											
					Soft gray & brown clay w/decayed wood	CH													
	0.25						2	4-5	80	53	95	UC	--	358					
					Very soft gray & brown organic clay w/wood	OH	3	7-8	129	36	83	UC	--	182					
10							4	10-11											
					Loose gray clayey silt	ML													
	0.25						5	13-14	37	84	115	OB	0	342					
					Very soft gray clay w/silt & sandy silt pockets & lenses	CH													
							6	18-19	57	67	106	UC	--	190					
20							7	23-24											
							8	28-29	54	68	105	UC	--	218					
30							9	33-34											
					Very soft to soft gray clay w/silt pockets & lenses	CH													
							10	38-39	70	58	98	UC	--	309					
40							11	43-44											
					Extremely soft gray sandy clay w/shell fragments	CL													
50							12	48-49	36	84	114	UC	--	80					

Comments: Latitude: 29° 57.960' N
Longitude: 90° 05.901' W

EUSTIS ENGINEERING

LOG OF BORING AND TEST RESULTS

YWCA OF NEW ORLEANS
601-605 SOUTH JEFFERSON DAVIS PARKWAY AND 600 SOUTH CLARK STREET
NEW ORLEANS, LOUISIANA

(Sheet 2 of 2)

EXHIBIT B

Ground Elev.: **Datum:** **Gr. Water Depth:** **Job No.:** 21576 **Date Drilled:** 10/12-13/11 **Boring:** 4 Refer to "Legends & Notes"

Scale In Feet	PP	SPT	S P L R	Symbol	Visual Classification	USC	Sample Number	Depth In Feet	Water Content Percent	Density Dry	Density Wet	Shear Tests Type	Shear Tests ø	Shear Tests C	Atterberg Limits LL	Atterberg Limits PL	Atterberg Limits PI		Other Tests
50		17			Medium dense gray clayey sand w/trace of shell fragments	SC	13	51-52	26										
		6			Soft gray clay	CH	14	54-55											
	0.50				Medium stiff gray clay w/silt pockets & lenses, & shell fragments	CH	15	58-59	66	60	100	UC	--	536					
60	0.50						16	63-64											
	2.50				Medium stiff greenish-gray clay w/silt pockets	CH	17	68-69	36	83	113	UC	--	879					
70	2.00						18	73-74											
	2.00				Stiff light gray sandy clay	CL	19	78-79	22	104	126	UC	--	1246					
80																			
90																			
100																			

Comments: Latitude: 29° 57.960' N
Longitude: 90° 05.901' W

EUSTIS ENGINEERING

LOG OF BORING AND TEST RESULTS

YWCA OF NEW ORLEANS
601-605 SOUTH JEFFERSON DAVIS PARKWAY AND 600 SOUTH CLARK STREET
NEW ORLEANS, LOUISIANA

(Sheet 1 of 1)

EXHIBIT B

Ground Elev.: **Datum:** **Gr. Water Depth:** **Job No.:** 21576 **Date Drilled:** 10/14/11 **Boring:** A-1 **Refer to "Legends & Notes"**

Scale In Feet	PP	SPT	S P L R	Symbol	Visual Classification	USC	Sample Number	Depth In Feet	Water Content Percent	Density		Shear Tests			Atterberg Limits				Other Tests
										Dry	Wet	Type	ø	C	LL	PL	PI		
0					½" Shell fragments (fill)	SP	NS	0-0.05											
					Loose tan fine sand w/shell fragments (fill)		1	0.05-1	5										
	0.75				Soft to medium stiff dark gray & black sandy clay w/shell fragments & gravel	CL	2	1-2	23										
	0.25						3	3-4	24										
5	0.25				Very soft to soft gray & dark gray clay w/shell fragments & gravel	CH	4	5-6	76										
					Very soft brown & gray organic clay w/decayed wood & roots	OH	5	7-8											
10							6	9-10	233										
15																			
20																			
25																			

Comments: Latitude: 29° 54.962' N
Longitude: 90° 05.934' W

EUSTIS ENGINEERING

LOG OF BORING AND TEST RESULTS

YWCA OF NEW ORLEANS
601-605 SOUTH JEFFERSON DAVIS PARKWAY AND 600 SOUTH CLARK STREET
NEW ORLEANS, LOUISIANA

(Sheet 1 of 1)

EXHIBIT B

Ground Elev.: **Datum:** **Gr. Water Depth:** **Job No.:** 21576 **Date Drilled:** 10/12/11 **Boring:** A-2 **Refer to "Legends & Notes"**

Scale In Feet	PP	SPT	S P L R	Symbol	Visual Classification	USC	Sample Number	Depth In Feet	Water Content Percent	Density Dry	Density Wet	Shear Tests Type	Shear Tests ø	Shear Tests C	Atterberg Limits LL	Atterberg Limits PL	Atterberg Limits PI		Other Tests
0					Loose gray fine sand w/shell fragments & gravel	SP	1	0-0.5	4										
							2	0.5-1	4										
	0.50				Medium stiff gray clay w/decayed wood, sandy silt pockets, & shell fragments	CH	3	1-2	53										
	0.50						4	3-4	59										
5					Very soft gray clay w/sandy silt pockets, roots, & shell fargments	CH	5	5-6	80										
					Very soft brown & gray organic clay w/decayed wood & roots	OH	6	7-8	201										
					Very soft gray clay w/organic matter, roots, & decayed wood	CH	7	9-10	124										
10																			
15																			
20																			
25																			

Comments: Latitude: 29° 57.962' N
Longitude: 90° 05.927' W

EXHIBIT C

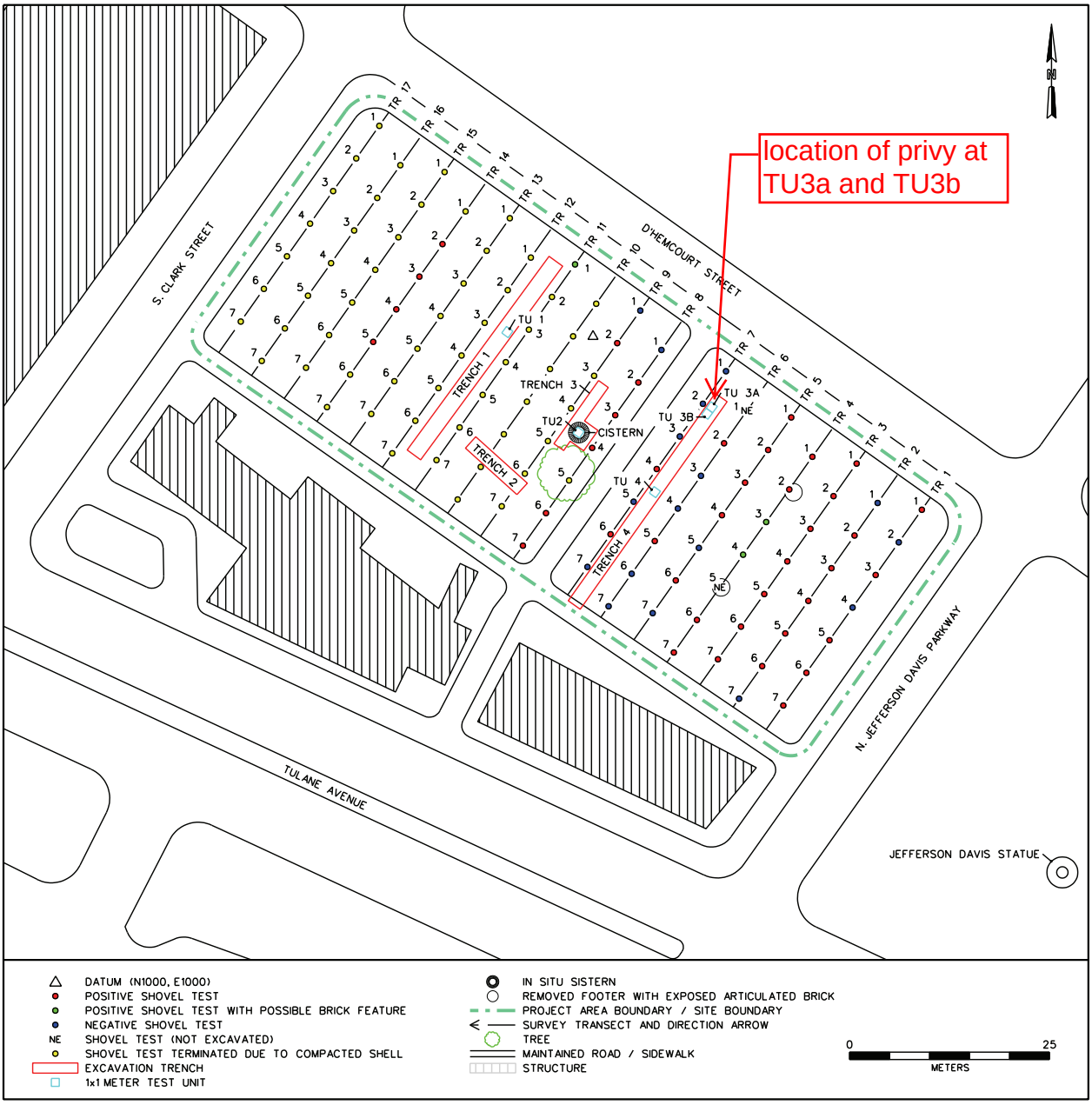
location of privy at TU3a and TU3b
S. CLARK STREET
D'HEMCOURT STREET
N. JEFFERSON DAVIS PARKWAY
TULANE AVENUE
JEFFERSON DAVIS STATUE
TU 1
TU 2
TU 3A
TU 3B
TU 4
CISTERN
TRENCH 1
TRENCH 2
TRENCH 3
TRENCH 4
DATUM (N1000, E1000)
POSITIVE SHOVEL TEST
POSITIVE SHOVEL TEST WITH POSSIBLE BRICK FEATURE
NEGATIVE SHOVEL TEST
SHOVEL TEST (NOT EXCAVATED)
SHOVEL TEST TERMINATED DUE TO COMPACTED SHELL
EXCAVATION TRENCH
1x1 METER TEST UNIT
IN SITU SISTERN
REMOVED FOOTER WITH EXPOSED ARTICULATED BRICK
PROJECT AREA BOUNDARY / SITE BOUNDARY
SURVEY TRANSECT AND DIRECTION ARROW
TREE
MAINTAINED ROAD / SIDEWALK
STRUCTURE
0
25
METERS

EXHIBIT C

EXHIBIT C

EXHIBIT D

STRATUM ENGINEERING, LLC

Transmittal of Pile Load Test Report

Client: YWCA Greater New Orleans
Mr. Christopher Chimento
c/o Trapolin-Peer Architects
850 Tchoupitoulas Street
New Orleans, LA 70130

Project: Test Pile Program - YWCA Day Care, Education & Counseling Bldg., 601-605 S. Jefferson Davis, New Orleans, LA

Work Order Date: 12/30/2019 **Project No:** C19-079

Report Date: 01/02/2020 **Work Order No:** 38700 **Report No:** 001

Please find attached a copy of our Pile Load Test Report for the referenced project. We appreciate the opportunity to provide our services. If you should have any questions, please give us a call.

Respectfully Submitted,
Stratum Engineering, LLC

Gregory J. Richards, Senior Project Manager

1-ec YWCA Greater New Orleans
Attn: Mr. Christopher Chimento
1-cc Laboratory

THIS REPORT APPLIES ONLY TO THE STANDARDS OR PROCEDURES INDICATED AND TO THE SAMPLE(S) TESTED AND/OR OBSERVED AND ARE NOT NECESSARILY INDICATIVE OF THE QUALITIES OF APPARENTLY IDENTICAL OR SIMILAR PRODUCTS OR PROCEDURES, NOR DO THEY REPRESENT AN ONGOING QUALITY ASSURANCE PROGRAM UNLESS SO NOTED. THESE REPORTS ARE FOR THE EXCLUSIVE USE OF THE ADDRESSED CLIENT AND ARE NOT TO BE REPRODUCED WITHOUT WRITTEN PERMISSION.

EXHIBIT D

STRATUM
ENGINEERING, LLC

EXHIBIT D

REPORT OF PILE LOAD TEST
FOR PILES UNDER STATIC AXIAL
COMPRESSIVE LOAD

FOR
YWCA DAY CARE, EDUCATION, & COUSELING BUILDING
NEW ORLEANS, LOUISIANA

TESTED FOR
YWCA GREATER NEW ORLEANS
C/O
TRAPOLIN-PEER ARCHITECTS
850 TCHOUPITOULAS STREET
NEW ORLEANS, LOUISIANA 70130

ATTN: MR. CHRISTOPHER CHIMENTO

REPORT NO: C19-079-001

DECEMBER 30, 2019

EXHIBIT D

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Scope of Work 1
Load Test Procedure 1
Pile Driving Data 2
Vibration Monitoring 3
Loading Schedule and Record of Settlement 4
Summary and Conclusion 7

APPENDIX:
Test Pile Location Plan
Load versus Settlement Curve
Vibration Monitoring Report
Vibration Monitoring Location Plan
Calibration of Jacking Set

EXHIBIT D

PROJECT INFORMATION

Stratum Engineering, LLC (SE) was authorized to perform one (1) pile load test for the YWCA Day Care, Education & Counseling Building in New Orleans, Louisiana. Authorization to perform the pile load test was provided by Mr. Loyce Wright of YWCA Greater New Orleans. The work was performed in accordance with SE's Test Pile Program Proposal C19-059, dated May 28, 2019.

SCOPE OF WORK

The scope of work included monitoring the driving of two (2) large treated timber piles (TP-1 and TP-2) and loading the pile which exhibited the least resistance to driving to 3 times the design load or to failure, whichever occurs first in accordance with ASTM D1143 Standard Procedure. In addition, our scope of services included vibration monitoring during pile driving to document the level of vibration recorded at nearby structures. The purpose of the load test was to verify the design capacity of the proposed pile estimated to be 25 tons.

LOAD TEST PROCEDURE

One (1) static axial compressive load test was performed on a large timber test pile TP-2 selected by the structural engineer. The pile was driven within the building footprint at a non-permanent location to a depth of about 55 feet below the existing ground surface. The pile was load tested after a set up period of 14 days. The load was applied to the test pile with a calibrated hydraulic jack placed on the test pile and jacked against a steel beam extending over the top of the test pile. The steel beam was secured in place by six (6) reaction piles. The load was applied in 2 ton increments up to failure in general accordance with ASTM D1143, "Quick Load Method". The load was then removed in four (4) equal decrements and the settlement after rebound was monitored for 5 minutes.

Settlement of the pile was determined by securing readings with an engineer's level trained on scales calibrated in 100ths of an inch. A second measuring system consisted of a piano wire, a mirror and a scale calibrated to 100ths of an inch set on one side of the pile and conforming to the requirements of the governing standard. A benchmark was also established for the test pile, which was verified each time the pile settlement was checked. Records of the pile settlement are included in subsequent sections of the report. The pile load versus settlement curve is included in the appendix.

EXHIBIT D

PILE DRIVING DATA

A total of eight (8) piles were driven by Crescent Foundations, LLC including two (2) large treated timber test piles and six (6) reaction piles. The test piles were inspected at the site prior to driving. The piles were driven in the building footprint at non-permanent locations on December 9, 2019. They were advanced using a Vulcan 01 air activated hammer delivering 15,000 ft.-lbs. of energy per blow. The dimensions and penetration resistance are tabulated below:

Pile No.	TP-1	TP-2	RP-1	RP-2	RP-3	RP-4	RP-5	RP-6
Tip Diameter, in.	7 ¼"	7 ½"	8	8 ½	8	7 ½	7 ½	8
Butt Diameter, in.	15	14 ½	14 ½	15	14 ½	12 ½	13 ½	12 ½
Length, ft.	60	60	60	60	60	60	60	60
Penetration Depth, ft.	53	55	53	52	51	53	52	50
0	WOH	WOH	WOH	WOH	WOH	WOH	WOH	WOH
1								
2								
3								
4								
5								
6								
7				1	1			
8				1	1			
9				1	1			
10			1	2	1			
11			1	2	2			
12			2	2	2	1	1	
13		2	2	3	2	1	1	
14	2	2	2	3	2	1	2	
15	1	2	4	4	2	3	3	4
16	2	1	3	3	2	3	3	2
17	2	2	2	2	2	2	2	2
18	2	3	2	2	2	2	3	2
19	2	2	4	5	3	3	7	2
20	4	2	3	5	2	5	4	2
21	3	3	2	6	2	4	3	2
22	2	2	3	4	3	4	3	2
23	2	3	4	5	3	3	4	2
24	2	2	3	4	4	4	4	2
25	2	2	3	4	2	4	3	3
26	2	2	3	4	2	5	4	2
27	2	2	3	4	3	4	4	2
28	2	2	4	4	2	4	4	4
29	3	2	4	5	3	6	4	5
30	3	2	5	4	3	6	5	3
31	3	2	3	3	2	4	6	5
32	3	3	3	4	4	6	6	6
33	4	2	4	5	3	6	5	4

WOH – Weight of Hammer

EXHIBIT D

PILE DRIVING DATA (Continued)

Pile No.	TP-1	TP-2	RP-1	RP-2	RP-3	RP-4	RP-5	RP-6
Tip Diameter, in.	7 ¼"	7 ½"	8	8 ½	8	7 ½	7 ½	8
Butt Diameter, in.	15	14 ½	14 ½	15	14 ½	12 ½	13 ½	12 ½
Length, ft.	60	60	60	60	60	60	60	60
Penetration Depth, ft.	53	55	53	52	51	53	52	50
34	3	2	4	6	3	6	5	5
35	3	3	6	6	4	6	5	6
36	3	3	4	7	4	7	4	4
37	3	3	5	7	5	6	4	5
38	4	3	4	6	4	6	5	7
39	3	3	5	6	6	6	6	8
40	6	2	4	6	6	9	4	8
41	4	4	5	6	6	8	6	6
42	5	3	6	6	5	9	4	7
43	6	3	4	9	6	8	7	8
44	5	4	6	7	6	10	7	6
45	5	3	8	10	6	10	6	7
46	4	3	6	8	6	8	8	6
47	5	3	7	8	5	8	7	8
48	6	5	9	7	6	7	13	12
49	12	10	6	8	11	6	16	24
50	23	15	6	15	18	9	24	37 @ 9
51	24	18	13	20	23	15	24	
52	23	18	19	13 @ 9		22	29	
53	28	22	14 @ 9			12 @ 6		
54		12						
55		11						

VIBRATION MONITORING

Vibration was monitored during installation of the piles. Pile driving induced vibrations were measured using Mini-Seis Seismograph, serial number 5605. The monitor was placed at the east corner of Russel's Cleaning Services building located about 60 to 115 feet from the rig. A maximum peak particle velocity of 0.100 inch per second (ips) was recorded at that location. Detailed records of vibration are included in the Appendix.

EXHIBIT D

LOADING SCHEDULE AND RECORD OF SETTLEMENT

TEST PILE NO: TP-2 **DATE TESTED: December 23, 2019**

TIME, HOURS	ELAPSED TIME, MIN	LOAD, TONS	SETTLEMENT IN INCHES		REMARKS
			ENGINEER'S LEVEL	PIANO WIRE	
9:15 am	0	0	0.00	0.00	
					Increment 1
9:16 am	1	2	0.00	0.00	
9:18 am	3	2	0.00	0.00	
9:20 am	5	2	0.00	0.00	
					Increment 2
9:21 am	1	4	0.00	0.00	
9:23 am	3	4	0.00	0.00	
9:25 am	5	4	0.00	0.00	
					Increment 3
9:26 am	1	6	0.01	0.01	
9:28 am	3	6	0.01	0.01	
9:30 am	5	6	0.01	0.01	
					Increment 4
9:31 am	1	8	0.01	0.01	
9:33 am	3	8	0.01	0.01	
9:35 am	5	8	0.01	0.01	
					Increment 5
9:36 am	1	10	0.02	0.02	
9:38 am	3	10	0.02	0.02	
9:40 am	5	10	0.02	0.02	
					Increment 6
9:41 am	1	12	0.02	0.02	
9:43 am	3	12	0.02	0.02	
9:45 am	5	12	0.02	0.02	
					Increment 7
9:46 am	1	14	0.03	0.03	
9:48 am	3	14	0.03	0.03	
9:50 am	5	14	0.03	0.03	
					Increment 8
9:51 am	1	16	0.05	0.05	
9:53 am	3	16	0.05	0.05	
9:55 am	5	16	0.05	0.05	
					Increment 9
9:56 am	1	18	0.06	0.06	
9:58 am	3	18	0.06	0.06	
10:00 am	5	18	0.06	0.06	
					Increment 10
10:01 am	1	20	0.08	0.07	
10:03 am	3	20	0.08	0.07	
10:05 am	5	20	0.08	0.07	

EXHIBIT D

LOADING SCHEDULE AND RECORD OF SETTLEMENT (Continued)

TEST PILE NO: TP-2 **DATE TESTED: December 23, 2019**

TIME, HOURS	ELAPSED TIME, MIN	LOAD, TONS	SETTLEMENT IN INCHES		REMARKS
			ENGINEER'S LEVEL	PIANO WIRE	
					Increment 11
10:06 am	1	22	0.09	0.09	
10:08 am	3	22	0.09	0.09	
10:10 am	5	22	0.09	0.09	
					Increment 12
10:11 am	1	24	0.10	0.10	
10:13 am	3	24	0.10	0.10	
10:15 am	5	24	0.10	0.10	
					Increment 13
10:16 am	1	26	0.12	0.12	
10:18 am	3	26	0.12	0.12	
10:20 am	5	26	0.12	0.12	
					Increment 14
10:21 am	1	28	0.14	0.14	
10:23 am	3	28	0.14	0.14	
10:25 am	5	28	0.14	0.14	
					Increment 15
10:26 am	1	30	0.15	0.15	
10:28 am	3	30	0.15	0.15	
10:30 am	5	30	0.15	0.15	
					Increment 16
10:31 am	1	32	0.16	0.16	
10:33 am	3	32	0.16	0.16	
10:35 am	5	32	0.16	0.16	
					Increment 17
10:36 am	1	34	0.19	0.19	
10:38 am	3	34	0.19	0.19	
10:40 am	5	34	0.19	0.19	
					Increment 18
10:41 am	1	36	0.20	0.20	
10:43 am	3	36	0.20	0.20	
10:45 am	5	36	0.20	0.20	
					Increment 19
10:46 am	1	38	0.23	0.23	
10:48 am	3	38	0.23	0.23	
10:50 am	5	38	0.23	0.23	
					Increment 20
10:51 am	1	40	0.27	0.26	
10:53 am	3	40	0.27	0.26	
10:55 am	5	40	0.27	0.26	

EXHIBIT D

LOADING SCHEDULE AND RECORD OF SETTLEMENT (Continued)

TEST PILE NO: TP-2 **DATE TESTED: December 23, 2019**

TIME, HOURS	ELAPSED TIME, MIN	LOAD, TONS	SETTLEMENT IN INCHES		REMARKS
			ENGINEER'S LEVEL	PIANO WIRE	
					Increment 21
10:56 am	1	42	0.32	0.31	
10:58 am	3	42	0.35	0.34	
11:00 am	5	42	0.35	0.34	
					Increment 22
11:01 am	1	44	0.40	0.40	
11:03 am	3	44	0.40	0.40	
11:05 am	5	44	0.55	0.55	
					Increment 23
11:06 am	1	44	1.09	1.09	
11:08 am	3	44	1.21	1.20	
11:10 am	5	44	1.90	1.90	
11:11 am	6	44	2.14	2.14	
					Decrement 1
11:11 am	1	33	2.12	2.12	
11:13 am	3	33	2.12	2.12	
11:15 am	5	33	2.12	2.12	
					Decrement 2
11:16 am	1	22	2.07	2.08	
11:18 am	3	22	2.07	2.08	
11:20 am	5	22	2.07	2.08	
					Decrement 3
11:21 am	1	11	1.99	1.99	
11:23 am	3	11	1.99	1.99	
11:25 am	5	11	1.99	1.99	
					Decrement 4
11:26 am	1	0	1.87	1.86	
11:28 am	3	0	1.87	1.86	
11:30 am	5	0	1.87	1.86	

EXHIBIT D

SUMMARY AND CONCLUSION

Test Pile TP-2 was driven on December 9, 2019 and loaded on December 23, 2019 after a fourteen (14) day set up period. The test pile was installed within the building footprint at a non-permanent location.

The large treated timber test pile TP-2 was loaded in 2 ton increments to failure. The pile maintained each load increment up to and including 40 tons with little or no movement after the initial application of each load increment. Beyond 40 tons, the pile movement accelerated and the pile eventually failed at about 44 tons where the load could not be maintained. A total of 2.14 inches of settlement was recorded at failure. The test load was then removed in four equal decrements, and the settlement was monitored for 5 minutes. The net settlement measured after the rebound period was 1.86 inches.

Based on the test results, the ultimate load capacity of the large timber test pile TP-2 is estimated at about 40 tons corresponding to an allowable capacity of 20 tons including a factor of safety of 2.0. Consequently, the pile does not meet the design load of 25 tons.

If you should have any questions, please do not hesitate to call.

Respectfully Submitted,
STRATUM ENGINEERING, LLC

Scott A. McLean
Project Manager

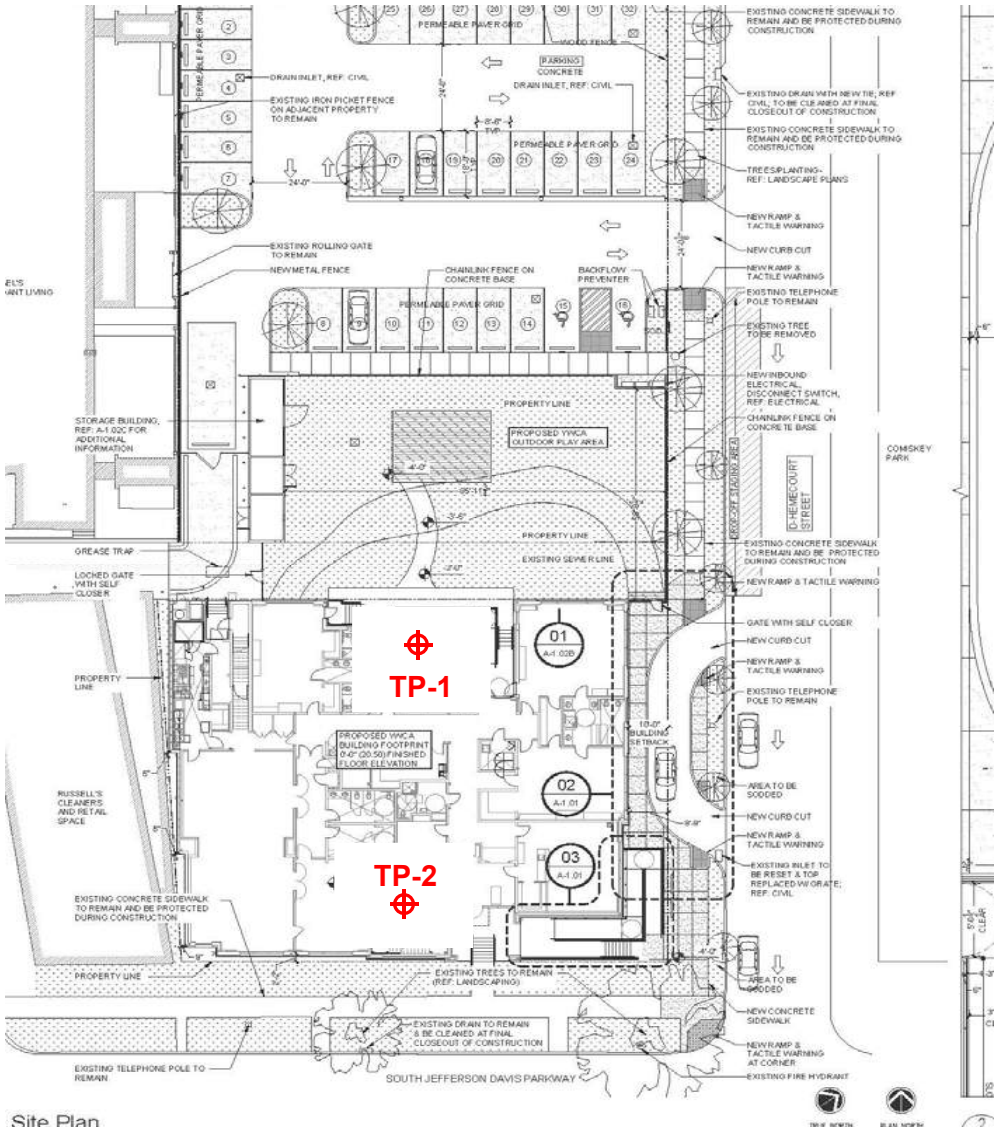
Tony Y. Maroun, P.E.
Principal

EXHIBIT D

APPENDIX

STRATUM ENGINEERING, LLC

EXHIBIT D



Site Plan

⌖ - Test Pile Locations

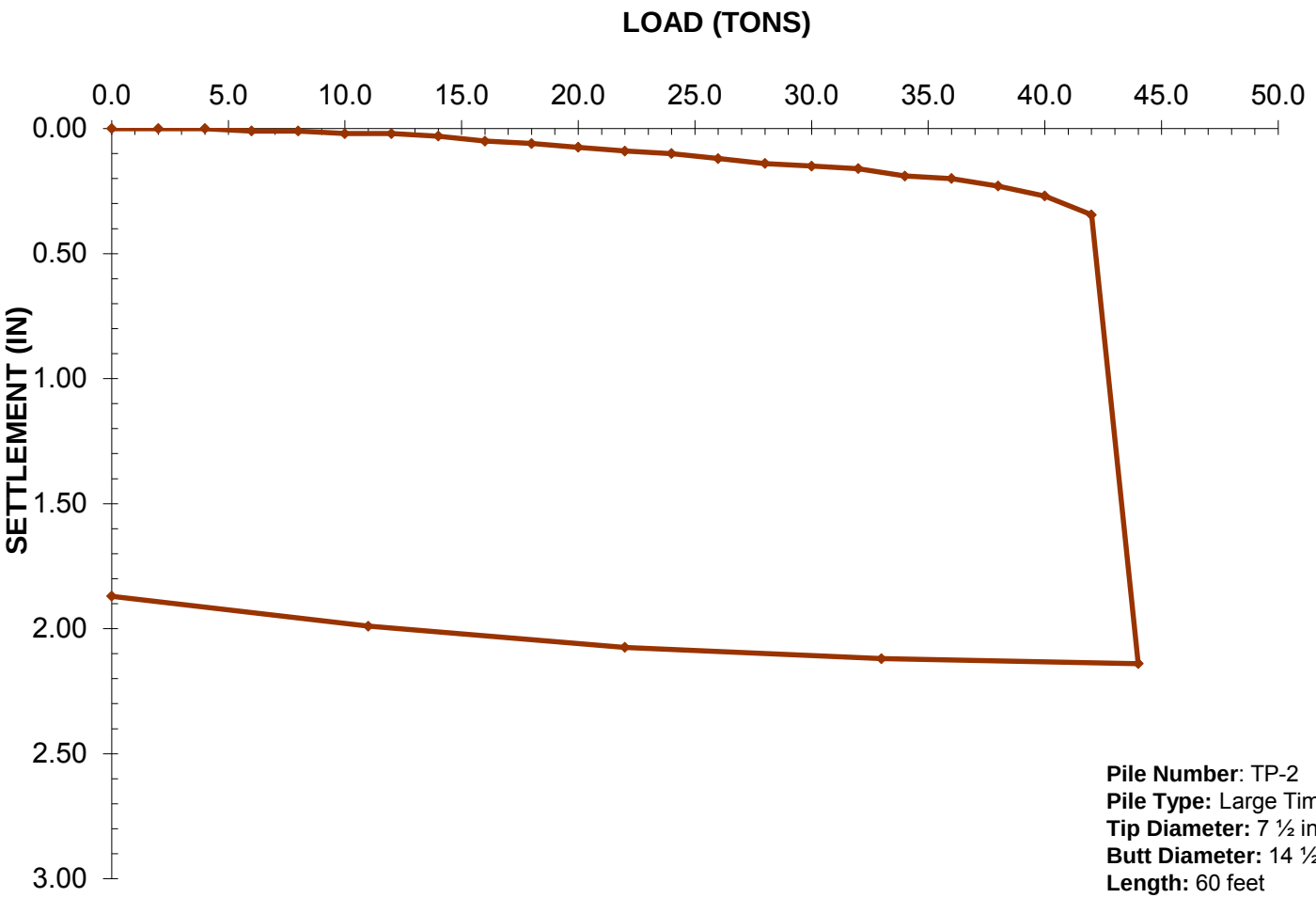
STRATUM ENGINEERING, LLC

TEST PILE LOCATON PLAN

SE PROJECT NO: C19-079

PILE LOAD TEST PROGRAM
YWCA DAY CARE, EDUCATION & COUNSELING BUILDING
NEW ORLEANS, LOUISIANA

EXHIBIT D



Pile Number: TP-2
Pile Type: Large Timber Pile
Tip Diameter: 7 ½ inches
Butt Diameter: 14 ½ inches
Length: 60 feet
Penetration Depth: 55 feet
Date Installed: December 9, 2019
Date Tested: December 23, 2019

STRATUM ENGINEERING, LLC

LOAD vs. SETTLEMENT CURVE

SE PROJECT NO: C19-079

PILE LOAD TEST PROGRAM
YWCA DAY CARE, EDUCATION & COUNSELING BUILDING
NEW ORLEANS, LOUISIANA

EXHIBIT D

STRATUM ENGINEERING, LLC

585 JOHNNY F. SMITH AVENUE SLIDELL, LOUISIANA 70460

VIBRATION MONITORING REPORT

TESTED FOR: YWCA Greater New Orleans	**PROJECT: YWCA Day Care, Education, and Counseling Building**	SCALE: 0 TO 2.5 IPS
DATE: December 9, 2019	PROJECT NO. C19-079	
TECHNICIAN: Cole Craddock	MONITOR NUMBER: 5605	WORK ORDER NO. 38,427

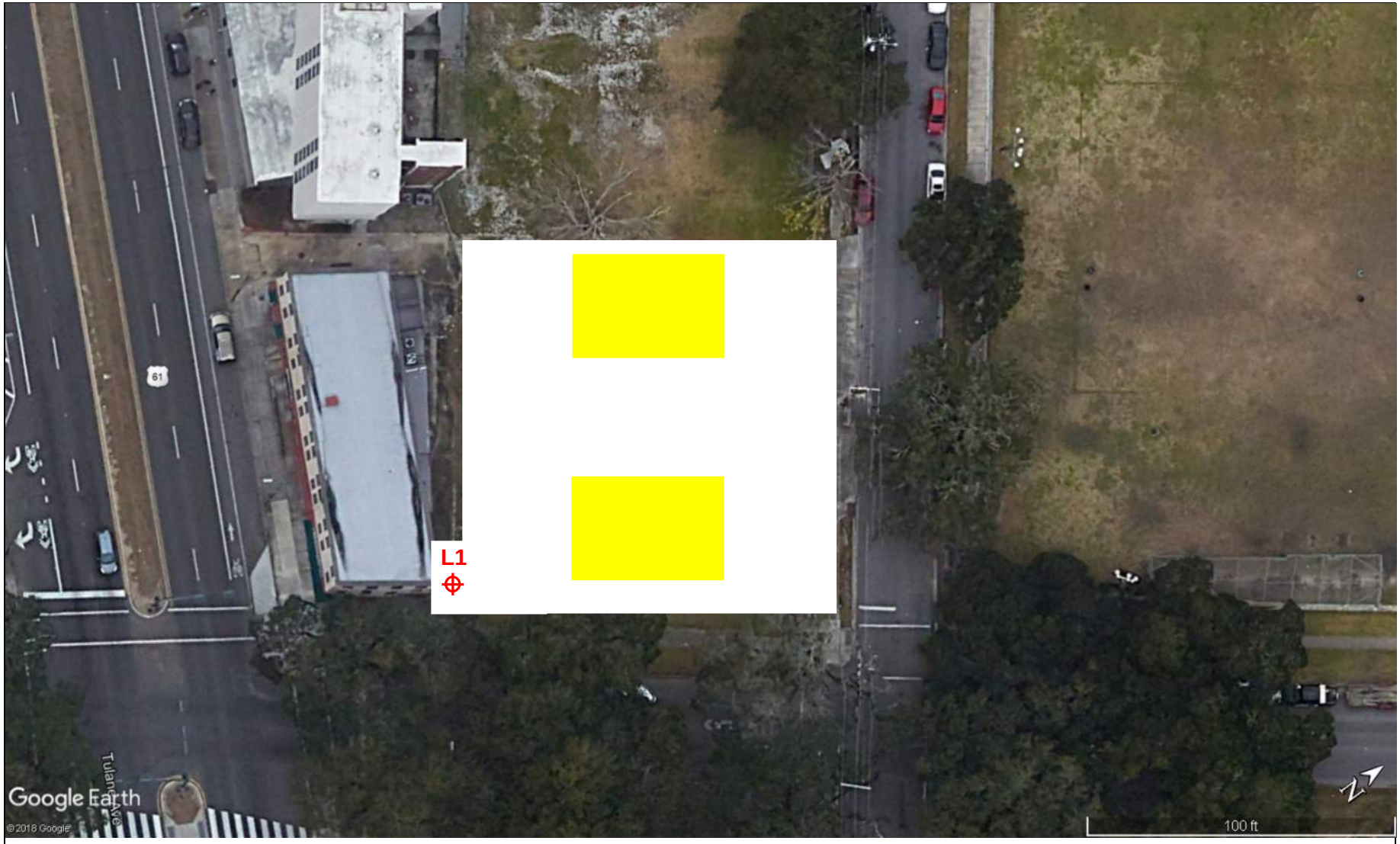
TIME		LOCATION NO.	DISTANCE FROM SOURCE	MAXIMUM PPV (IN/SEC)	DESCRIPTION OF WORK
8:00 AM	10:00 AM	L1	From 60' to 100'	0.065	Driving 60' timber piles
10:00 AM	12:00 PM	L1	From 60' to 100'	0.100	Driving 60' timber piles
12:00 PM	12:10 PM	L1	From 60' to 100'	0.055	Driving 60' timber piles

VIBRATION SOURCE: Vulcan 01 air activated hammer delivering 15,000 ft.-lbs. of energy per blow.

NOTIFICATION: No readings in excess of 0.25 IPS recorded on this date.

MONITOR LOCATION: E corner of Russel's Cleaning Services Building.

EXHIBIT D



- Vibration Monitor Location

- Vibration Source/Work Area

STRATUM ENGINEERING, LLC

VIBRATION MONITOR LOCATION PLAN

SE PROJECT NO: C19-079

PILE LOAD TEST PROGRAM
YWCA DAY CARE, EDUCATION & COUNSELING BUILDING
NEW ORLEANS, LOUISIANA

EXHIBIT D

Beerman Precision, Inc.
4206 Howard Avenue, New Orleans, LA 70125
504-207-6023 Fax: 504-207-6070

JACK CALIBRATION REPORT

CUSTOMER: STRATUM ENGINEERING
PROJECT: 75 TON RAM
ORDER NO: 1575175
DATE: December 13, 2019

CYLINDER: RC756, 75 TON 6in STROKE
SERIAL NO: A4212K
GAUGE: WIKA 10,000 PSI, 6in FACE
SERIAL NO: 1104HOMR

This report covers the results of Calibration for the above Hydraulic Cylinder. Calibration was performed utilizing our 500-Ton Master Load Cell, S/N 9403, with a RL-480 digital readout indicator, S/N 000010989. The Master Load Cell was recently calibrated on January 23, 2019 in accordance with ASTM E4 and is within a 1% tolerance. Results of current calibration are shown on the following pages:

Temperature during test 62 Degrees Fahrenheit

By:

Date: December 13, 2019

BEERMAN PRECISION, INC.

EXHIBIT D

Beerman Precision, Inc.

4206 Howard Avenue, New Orleans, LA 70125
504-207-6023 Fax: 504-207-6070

PRESSURE GAUGE CERTIFICATION

CUSTOMER: STRATUM ENGINEERING

PROJECT: 75 TON RAM

ORDER NO: 1575175

DATE: December 13, 2019

GAUGE: WIKA 10,000 PSI, 6in FACE

SERIAL NO: 1104HOMR

We certify the above hydraulic pressure gauge has been tested against our primary standard, an Amthor Dead Weight Tester and found to be within an accuracy of +/- 1/2% of full scale. The Amthor Tester was last certified on June 17, 2019 to 0.1% accuracy and traceable to the National Institute of Standards and Technology (NIST).

Standard Pressure (PSI)	Your Pressure Gauge (PSI)
0	0
1000	950
2000	1950
3000	2950
4000	3975
5000	5000
6000	6000
7000	7000
8000	7975
9000	8975
10,000	9,950

By:

Date: December 13, 2019

BEERMAN PRECISION, INC.

EXHIBIT D

Beerman Precision, Inc.
4206 Howard Avenue New Orleans, LA 70125
504-207-6023 Fax: 504-207-6070

JACK CALIBRATION REPORT

CUSTOMER: STRATUM ENGINEERING

PROJECT: 75 TON RAM

ORDER NO: 1575175

DATE: December 13, 2019

CYLINDER: RC756, 75 TON 6in STROKE

SERIAL NO: A4212K

GAUGE: WIKA 10,000 PSI, 6in FACE

SERIAL NO: 1104HOMR

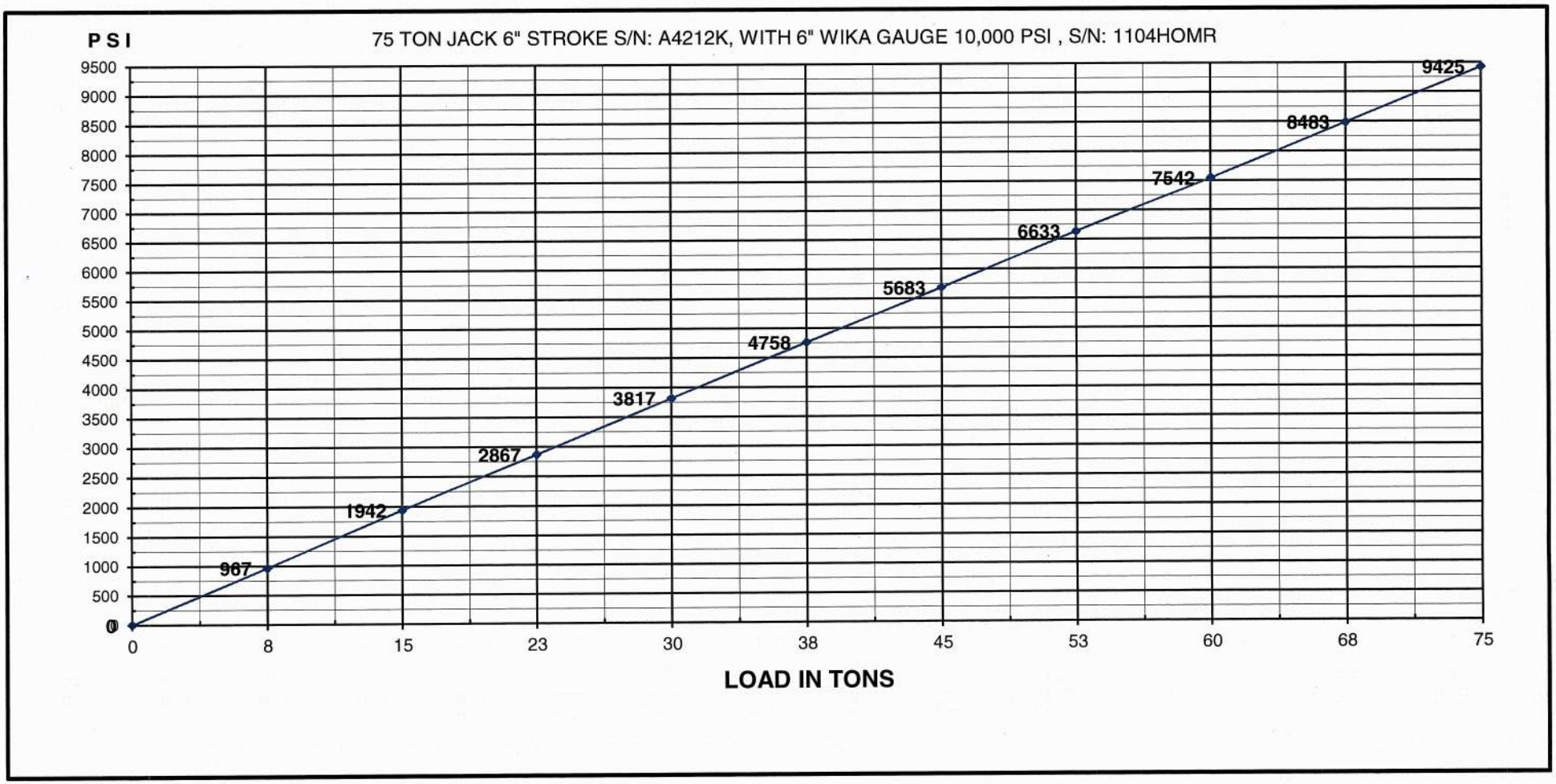
STANDARD LOAD (TONS)	GAUGE READINGS IN PSI AT PISTON EXTENSION OF						AVE GAUGE PRESSURE
	1.0	INCHES	**3.0**	INCHES	**5.0**	INCHES	
7.5	950		975		975		967
15.0	1925		1950		1950		1942
22.5	2900		2850		2850		2867
30.0	3800		3850		3800		3817
37.5	4800		4725		4750		4758
45.0	5700		5700		5650		5683
52.5	6650		6650		6600		6633
60.0	7575		7550		7500		7542
67.5	8500		8500		8450		8483
75.0	9500		9425		9350		9425

BY: _____

DATE: December 13, 2019

EXHIBIT D

Beerman Precision, Inc.
4206 Howard Ave. New Orleans, LA 70125
504-207-6023



Calibrated on 12/13/19

REPORT# 1575175

Date of Printing: 12/16/2019

EXHIBIT E

HOOD INFORMATION – Job#1687156

HOOD NO.	MODEL	LENGTH	MAX. COOKING TEMP.	EXHAUST PLENUM					TOTAL SUPPLY CFM	HOOD CONSTRUCTION	HOOD CONFIG.	
				TOTAL EXH. CFM	RISER(S)						END TO END	ROW
					WIDTH	LENG.	DIA.	CFM	S.P.			
1	4824 ND-2-PSP-F	8' 0.00"	600 Deg.	1600	10"	15"		1600	-0.566"	1280	430 SS Where Exposed	ALONE	ALONE

HOOD INFORMATION

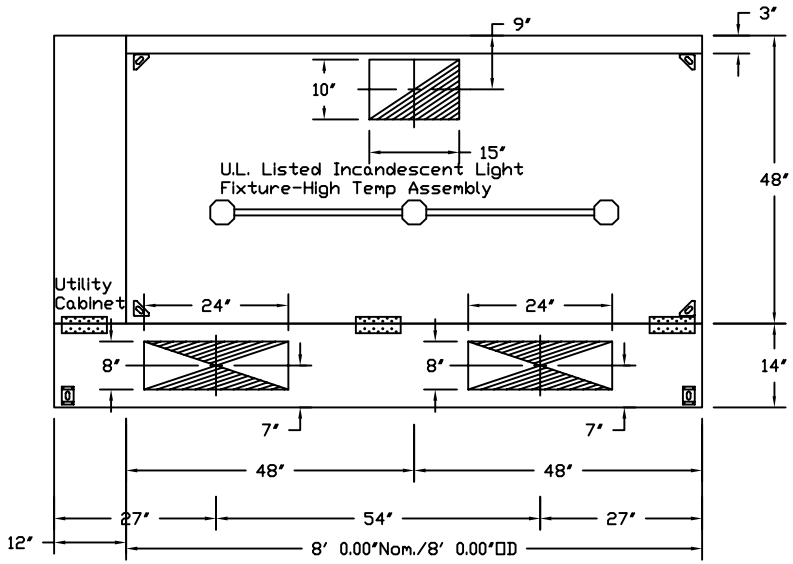
HOOD NO.	FILTER(S)				LIGHT(S)			UTILITY CABINET(S)					FIRE SYSTEM PIPING	HOOD HANGING WGHT
	TYPE	QTY.	HEIGHT	LENGTH	QTY.	TYPE	WIRE GUARD	LOCATION	FIRE SYSTEM TYPE	FIRE SYSTEM SIZE	ELECTRICAL MODEL #	SWITCHES QUANTITY		
1	Captrate Solo Filter w/	1	20"	16"	3	Incandescent Light Fixt	NO	Left	Ansul R102	3.0	EMS11102	1 Light 1 Fan 1 Other	YES	592 LBS
		4	20"	20"										

HOOD OPTIONS

HOOD NO.	OPTION
1	FIELD WRAPPER 18.00" High Front, Left, Right
	BACKSPLASH 80.00" High X 108.00" Long 430 SS

PERFORATED SUPPLY PLENUM(S)

HOOD NO.	POS.	LENGTH	WIDTH	HEIGHT	TYPE	RISER(S)				
						WIDTH	LENG.	DIA.	CFM	S.P.
1	Front	108"	14"	6"	MUA	8"	24"		640	0.274"
					MUA	8"	24"		640	0.274"



PLAN VIEW – Hood #1
8' 0.00" LONG 4824ND-2-PSP-F

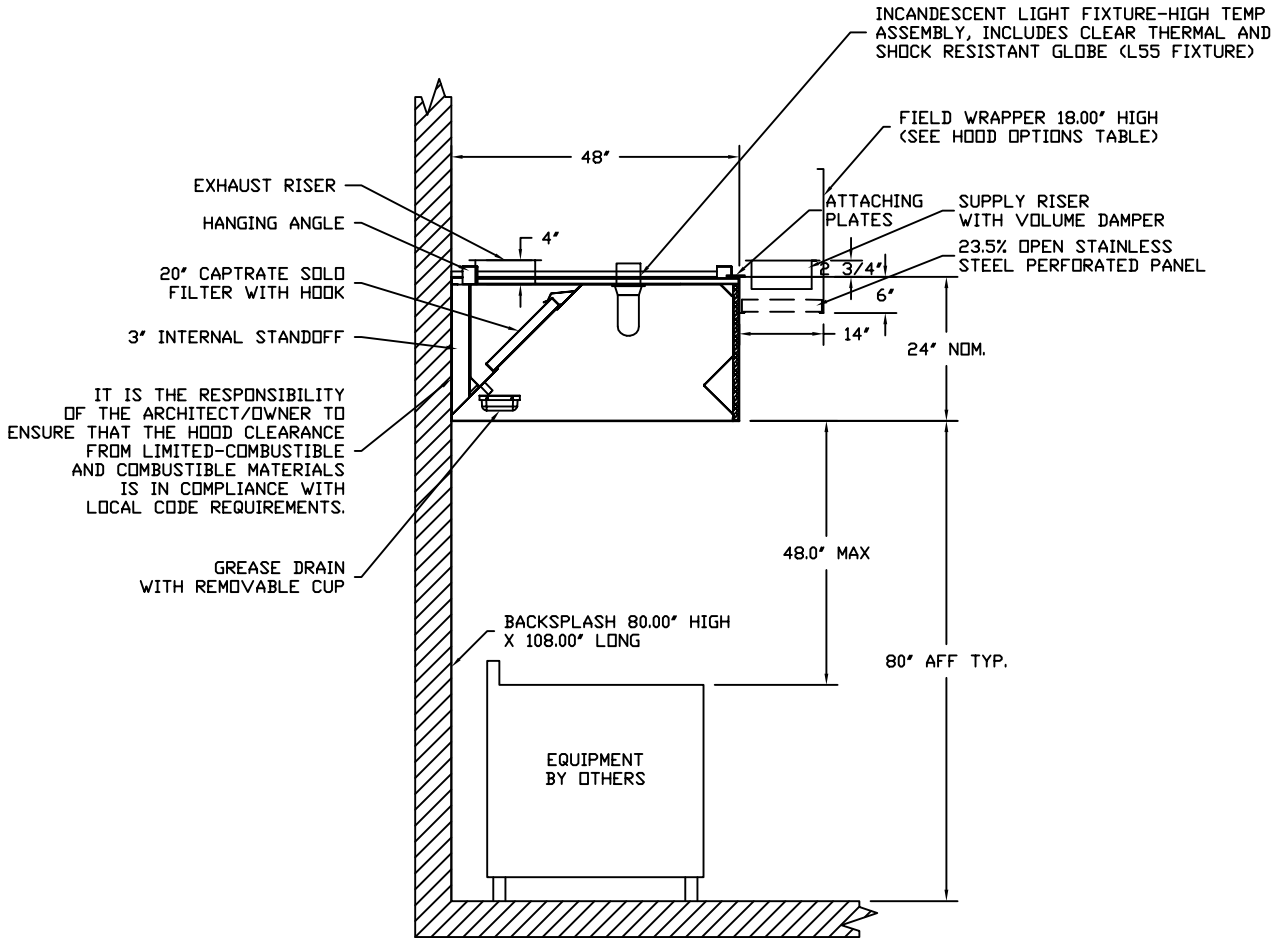
CUSTOMER APPROVAL TO MANUFACTURE:

Approved as Noted ☐
Approved with NO Exception Taken ☐
Revise and Resubmit ☐
SIGNATURE _____
Your Title _____ Date _____

CAPTIVE-AIRE

JOB	
LOCATION	MERIDIAN, MS
DATE 12/21/2012	JOB # 1687156
DWG # 1	DRAWN BY ASE
REV.	SCALE 3/8" = 1'-0"

EXHIBIT E



SECTION VIEW – MODEL 4824ND-2-PSP-F

CUSTOMER APPROVAL TO MANUFACTURE:

Approved as Noted	☐
Approved with NO Exception Taken	☐
Revise and Resubmit	☐

SIGNATURE _____

Your Title _____ Date _____

CAPTIVE-AIRE

JOB		
LOCATION	MERIDIAN, MS	
DATE	12/21/2012	JOB # 1687156
DWG #	2	DRAWN BY ASE
REV.		SCALE 3/8" = 1'-0"

EXHIBIT E

EXHAUST FAN INFORMATION – Job#1687156

FAN UNIT NO.	FAN UNIT MODEL #	MODEL	TAG	CFM	ESP.	RPM	H.P.	ø	VOLT	FLA	WEIGHT (LBS.)	SONES
1	NCA14FA	NCA14FA		1600	1.000	1157	0.500	3	208	1.8	114.14	12.6

MUA FAN INFORMATION – Job#1687156

FAN UNIT NO.	FAN UNIT MODEL #	BLOWER	HOUSING	TAG	CFM	ESP.	RPM	H.P.	ø	VOLT	FLA	WEIGHT (LBS.)	SONES
2	A1-G10	G10	A1		1280	0.500	702	0.500	3	208	1.8	225.99	11.8

FAN OPTIONS

FAN UNIT NO.	OPTION (Qty. - Descr.)
1	1 - Grease Box

FAN ACCESSORIES

FAN UNIT NO.	FAN UNIT TAG	EXHAUST			SUPPLY			
		GREASE CUP	GRAVITY DAMPER	WALL MOUNT	SIDE DISCHARGE	GRAVITY DAMPER	MOTORIZED DAMPER	WALL MOUNT
1		YES						

CURB ASSEMBLIES

NO.	ON FAN	WEIGHT	ITEM	SIZE
1	# 1	36 LBS	Curb	23.000"W x 23.000"L x 20.000"H 3.000:12.000 Pitch Vented Hinged
2	# 2	29 LBS	Curb	21.000"W x 21.000"L x 12.000"H 3.000:12.000 Pitch

CUSTOMER APPROVAL TO MANUFACTURE:

Approved as Noted ☐

Approved with NO Exception Taken ☐

Revise and Resubmit ☐

SIGNATURE _____

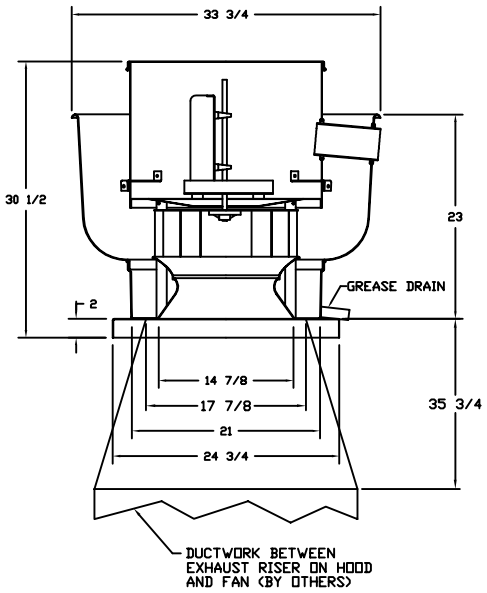
Your Title _____ Date _____

CAPTIVE-AIRE

JOB	
LOCATION MERIDIAN, MS	
DATE 12/21/2012	JOB # 1687156
DWG # 3	DRAWN BY ASE
REV.	SCALE 3/8" = 1'-0"

EXHIBIT E

FAN #1 NCA14FA - EXHAUST FAN



FEATURES:

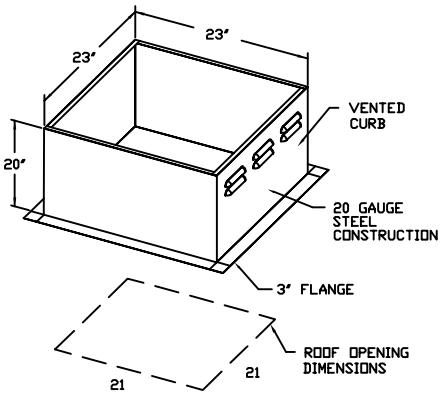
- ROOF MOUNTED FANS
- RESTAURANT MODEL
- UL705 AND UL762
- AMCA SOUND AND AIR CERTIFIED
- WIRING FROM MOTOR TO DISCONNECT SWITCH
- WEATHERPROOF DISCONNECT
- HIGH HEAT OPERATION 300°F (149°C)
- GREASE CLASSIFICATION TESTING

NORMAL TEMPERATURE TEST
EXHAUST FAN MUST OPERATE CONTINUOUSLY WHILE EXHAUSTING AIR AT 300°F (149°C) UNTIL ALL FAN PARTS HAVE REACHED THERMAL EQUILIBRIUM, AND WITHOUT ANY DETERIORATING EFFECTS TO THE FAN WHICH WOULD CAUSE UNSAFE OPERATION.

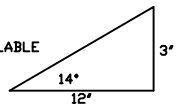
ABNORMAL FLARE-UP TEST
EXHAUST FAN MUST OPERATE CONTINUOUSLY WHILE EXHAUSTING BURNING GREASE VAPORS AT 600°F (316°C) FOR A PERIOD OF 15 MINUTES WITHOUT THE FAN BECOMING DAMAGED TO ANY EXTENT THAT COULD CAUSE AN UNSAFE CONDITION.

OPTIONS

GREASE BOX



PITCHED CURBS ARE AVAILABLE FOR PITCHED ROOFS.



SPECIFY PITCH:
EXAMPLE: 7/12 PITCH = 30° SLOPE

CUSTOMER APPROVAL TO MANUFACTURE:

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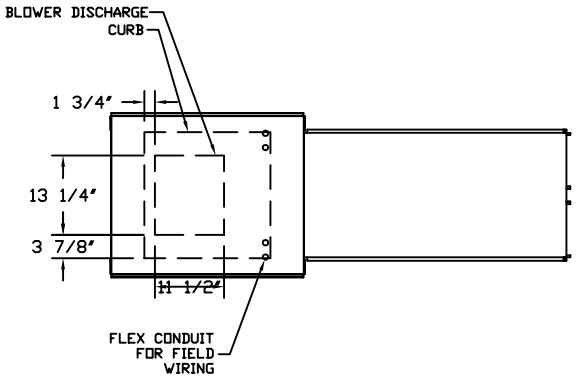
Approved with NO Exception Taken ☐
Revise and Resubmit ☐
SIGNATURE _____
Your Title _____ Date _____

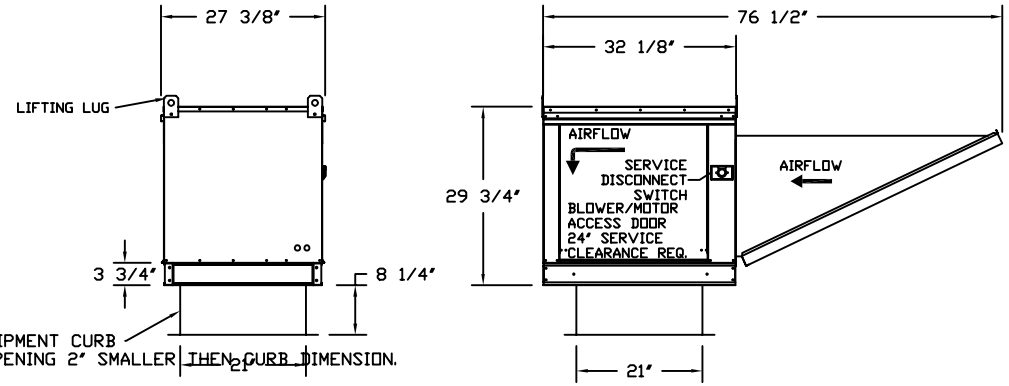
CAPTIVE-AIRE

JOB	
LOCATION MERIDIAN, MS	
DATE 12/21/2012	JOB # 1687156
DWG # 4	DRAWN BY ASE
REV.	SCALE 3/8" = 1'-0"

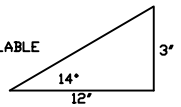
EXHIBIT E

FAN #2 A1-G10 - SUPPLY FAN
1. UNTEMPERED SUPPLY UNIT WITH 10" BLOWER IN SIZE #1 HOUSING
2. INTAKE HOOD WITH EZ FILTERS
3. DOWN DISCHARGE - AIR FLOW RIGHT -> LEFT





PITCHED CURBS ARE AVAILABLE FOR PITCHED ROOFS.



SPECIFY PITCH:
EXAMPLE: 7/12 PITCH = 30° SLOPE

CUSTOMER APPROVAL TO MANUFACTURE:

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Approved with NO Exception Taken ☐
Revise and Resubmit ☐
SIGNATURE _____
Your Title _____ Date _____

CAPTIVE-AIRE

JOB	
LOCATION MERIDIAN, MS	
DATE 12/21/2012	JOB # 1687156
DWG # 5	DRAWN BY ASE
REV.	SCALE 3/8" = 1'-0"

EXHIBIT E

ELECTRICAL PACKAGES – Job#1687156

NO.	TAG	PACKAGE #	LOCATION	SWITCHES		OPTION	FANS CONTROLLED				
				LOCATION	QUANTITY		TYPE	ø	H.P.	VOLT	FLA
1		EMS11102	Utility Cabinet Left	Utility Cabinet Left	1 Light	EMS 02: Exhaust in Fire, Lights out in Fire	Exhaust	3	0.500	208	1.8
				Hood # 1	1 Fan 1 Other						
							Supply	3	0.500	208	1.8

CUSTOMER APPROVAL TO MANUFACTURE:

Approved as Noted ☐

Approved with NO Exception Taken ☐

Revise and Resubmit ☐

SIGNATURE _____

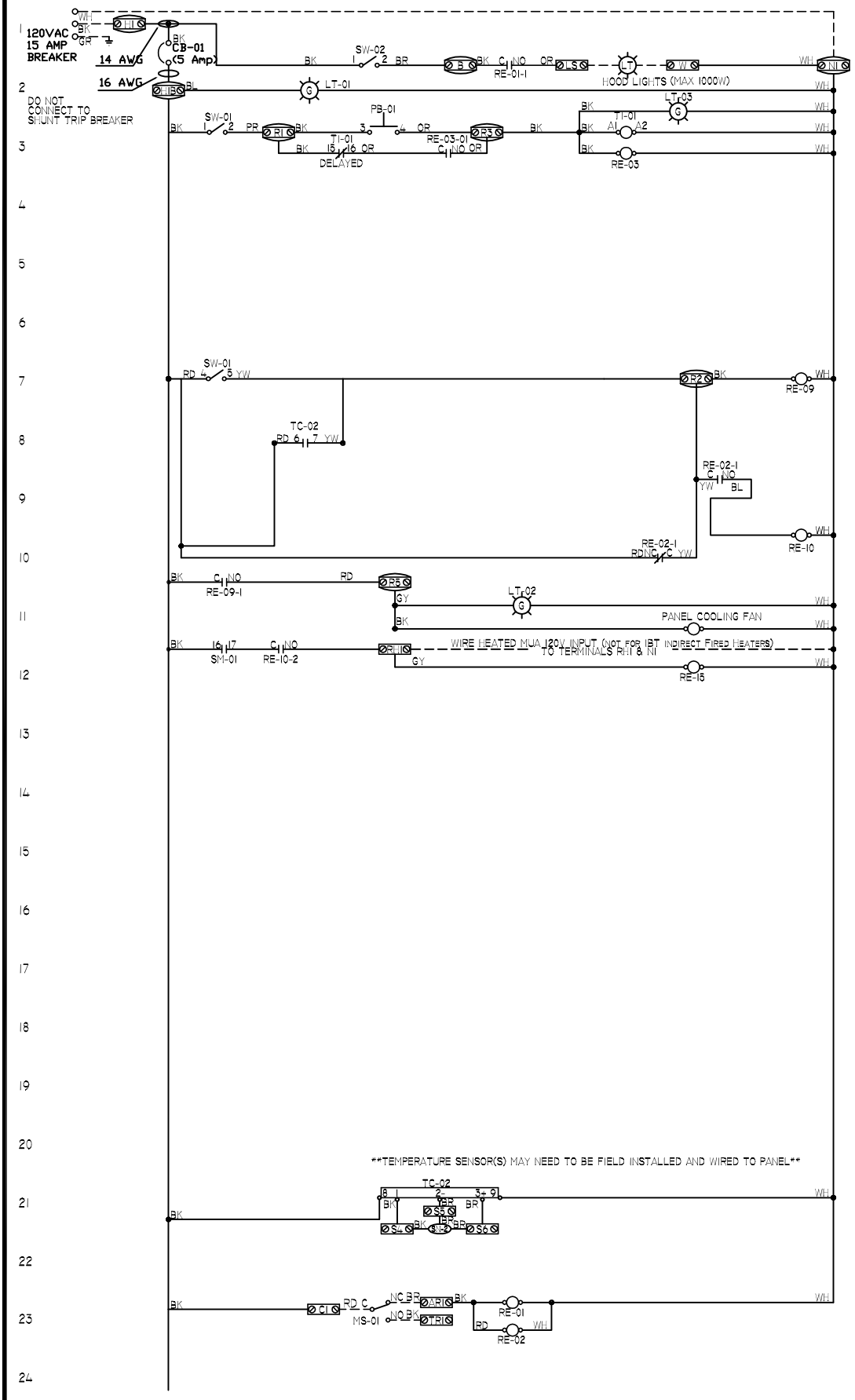
Your Title _____ Date _____

CAPTIVE-AIRE

JOB	
LOCATION MERIDIAN, MS	
DATE 12/21/2012	*JOB #* 1687156
DWG # 6	*DRAWN BY* ASE
REV.	*SCALE* 3/8" = 1'-0"

EXHIBIT E

ENERGY MANAGEMENT SYSTEM	JOB NAME *YWCA*	DATE *12/21/2012*
DRAWING NUMBER *EMS11102-1687156-#1-1*	JOB NUMBER *1687156*	MODEL **EMS11102**



PG. 1

20IN. X 18IN. X 8.6IN. BOX

INSTALLED OPTIONS

HOOD LIGHT SWITCH (MAX 1000 W)

EXHAUST ON IN FIRE

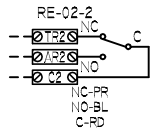
LIGHTS OUT IN FIRE

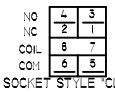
COMPONENT IDENTIFICATION

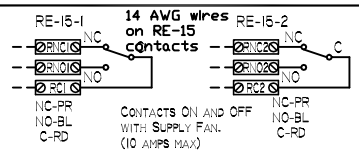
LABEL	DESCRIPTION	LOCATION
CB-01	CIRCUIT BREAKER UL489 (5 AMP)	[1]
LT-01	"POWER ON" LIGHT-PF50CG5-120VAC-W6	[2]
LT-02	"FANS ON" LIGHT-PF50CG5-120VAC-W6	[10]
LT-03	"100% OVERRIDE" LIGHT-PF50CG5-120VAC-W6	[2]
MS-XX	FIRE SYSTEM MICRO-SWITCH	[23]
PB-01	PUSH BUTTON OVERRIDE-D7-F2X11	[2]
RE-01	FIRE DPDT RELAY-34.110.0184.0	[26][27]
RE-02	FIRE DPDT RELAY-34.110.0184.0	[6][14]
RE-03	TIMER/PUSH BUTTON RELAY-34.110.0184.0	[2]
RE-09	FAN ON RELAY-34.110.0184.0	[5][28]
RE-10	SUPPLY FAN ON RELAY-34.110.0184.0	[5][28]
RE-15	RUN RELAY DPDT RELAY-34.110.0184.0	[9][18]
SM-01	SUP SPEED CONTROL-SMV SERIES	[27-31]
SM-02	EXH SPEED CONTROL-SMV SERIES	[32-35]
SN-XX	TEMPERATURE SENSOR - A/100-3W-P0-4"-EXPL	[21-22]
SW-01	FAN ON/AUTO SWITCH-RB24-2D1100	[2][29]
SW-02	HOOD LIGHT SWITCH-RB24-2D1100	[1]
TC-XX	TEMPERATURE CONTROLLER-PXR3 W/DIN RAIL MOUNT	[6-42]
TI-01	100% OVERRIDE TIMER (30 MINUTES)-RZ7-FSA4U023	[2][29]

SPARE RELAY CONTACTS

SPARE RELAY CONTACTS CAN BE USED TO CONTROL ITEMS REQUIRING SHUT DOWN WHEN THE FIRE SYSTEM DISCHARGES, SUCH AS SHUNT TRIPS, SIGNALS, ETC.







NOTES

- FIELD WIRING
- INTERNAL WIRING
- TERMINAL IN PANEL
- TERMINAL IN PANEL AND REMOTE

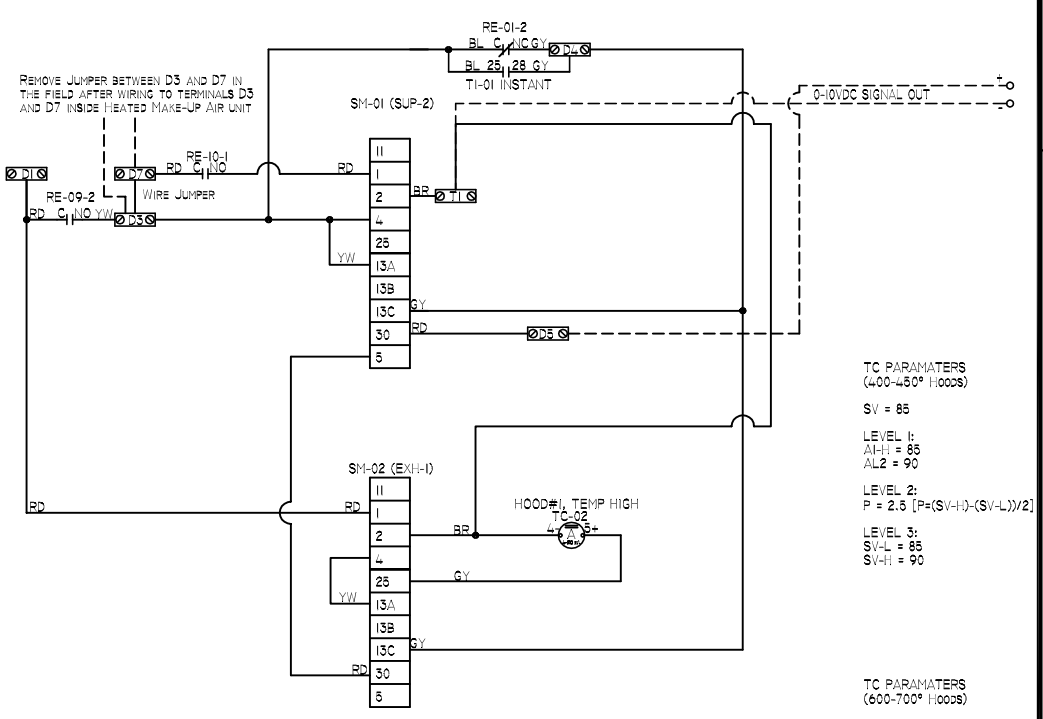
DRAWING SHOWN DE-ENERGIZED.

WIRE COLOR

BK - BLACK	YW - YELLOW
BL - BLUE	GR - GREEN
BR - BROWN	GY - GRAY
OR - ORANGE	OR/BL - ORANGE/BLUE (STRIPE)
RD - RED	BL/RD - BLUE/RED (STRIPE)
WH - WHITE	RD/GN - RED/GREEN (STRIPE)
PR - PURPLE	
PK - PINK	

EXHIBIT E

ENERGY MANAGEMENT SYSTEM	JOB NAME *YWCA*	DATE *12/21/2012*
DRAWING NUMBER *EMS11102-1687156-#1-2*	JOB NUMBER *1687156*	MODEL **EMS11102**



TC PARAMATERS
(400-450° Hoods)

SV = 85

LEVEL 1:
AI-H = 85
AL2 = 90

LEVEL 2:
P = 2.5 [P=(SV-H)-(SV-L))/2]

LEVEL 3:
SV-L = 85
SV-H = 90

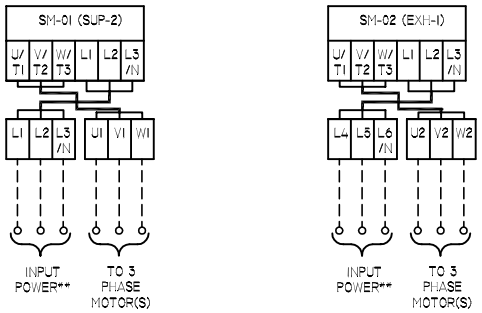
TC PARAMATERS
(600-700° Hoods)

SV = 85

LEVEL 1:
AI-H = 85
AL2 = 130

LEVEL 2:
P = 22.5 [P=(SV-H)-(SV-L))/2

LEVEL 3:
SV-L = 85
SV-H = 130



ALL EXTERNAL CONTROL WIRES TO MOTOR SPEED CONTROL SHOULD BE 16-20 AWG SHIELDED MULTICONDUCTOR CABLES AND MUST NOT BE RUN IN THE SAME CONDUIT OR RACEWAY WITH ANY HIGH POWER WIRING. GROUND SHIELDED CABLE AT THE DRIVE CHASIS ONLY.

PG. 14 OF THE AC TECH SMV DRIVE MANUAL DESCRIBES THE ELECTRICAL INSTALLATION.

PG. 23 OF THE AC TECH SMV DRIVE MANUAL DESCRIBES THE PARAMETER SETTINGS OF THE DRIVE.

**3 PHASE INPUT,
USE L1, L2, L3.
1 PHASE 240 VAC INPUT,
USE L1 & L2 ONLY.
1 PHASE 120 VAC INPUT,
USE L1 & N ONLY.

INSTALLED OPTIONS

HOOD LIGHT SWITCH (MAX 1000 W)
EXHAUST ON IN FIRE

LIGHTS OUT IN FIRE

COMPONENT IDENTIFICATION

LABEL	DESCRIPTION	LOCATION
RE-01	DPDT RELAY-34.110.0184.0	[23][29]
RE-09	FAN ON RELAY-34.110.0184.0	[5][28]
RE-10	SUPPLY FAN ON RELAY-34.110.0184.0	[5][28]
SM-01	SUP SPEED CONTROL-SMV SERIES	[27-31]
SM-02	EXH SPEED CONTROL-SMV SERIES	[32-35]
TC-XX	TEMPERATURE CONTROLLER-PXR3 W\DIN RAIL MOUNT	

GENERAL DRIVE PARAMETER SETTINGS (PW = 225)

SUPPLY FAN DRIVE
EPM PROGRAM #11

P100 - 01 (TERM STRIP)
P101 - 03 (PRESET #1)
P102 - 0 HZ (MIN FREQ)
P103 - 60 HZ (MAX FREQ)
P104 - 30 SEC. (ACCEL TIME)
P105 - 30 SEC. (DECEL TIME)
P110 - 03 (AUTO RESTART)
P121 - 01 (0 - 10 VDC)
P122 - 03 (PRESET SPEED #2)
P123 - 03 (PRESET SPEED #3)
P132 - 0 HZ (WASH CYCLE FREQ)
P133 - 60 HZ (MUST MATCH P103)
P136 - 60 HZ (MUST MATCH P103)
P140 - 03 (FAULT)
P142 - 10 (LOSS OF LOAD)
P144 - 00 (NO INVERSE P140)
P145 - 01% (ADJUST @ STARTUP)
P146 - 60 SEC (LOSS LOAD DELAY)
P150 - 01 (0-10 VDC OUTPUT)
P151 - 00 (NO OUTPUT ADDITION)
P152 - 60 HZ (FREQ SCALING)
P160 - 0 HZ (MIN SIGNAL SPEED)
P161 - 60 HZ (MAX SIGNAL SPEED)
(MUST MATCH P103)
P166 - 0 (CARRIER FREQ = 4 KHZ)
P171 - 150 (CURRENT LIMIT = 150 %)

EXHAUST FAN DRIVE(S)
EPM PROGRAM #04

P100 - 01 (TERM STRIP)
P101 - 03 (PRESET #1)
P102 - 0 HZ (MIN FREQ)
P103 - 60 HZ (MAX FREQ)
P104 - 30 SEC. (ACCEL TIME)
P105 - 30 SEC. (DECEL TIME)
P110 - 03 (AUTO RESTART)
P121 - 02 (4-20 MA)
P122 - 03 (PRESET SPEED #2)
P123 - 03 (PRESET SPEED #3)
P132 - 15 HZ (WASH CYCLE FREQ)
P133 - 60 HZ (MUST MATCH P103)
P136 - 60 HZ (MUST MATCH P103)
P140 - 01 (RUN)
P144 - 00 (NO INVERSE P140)

P150 - 01 (0-10 VDC OUTPUT)
P151 - 01 (ADD TB-5 TO TB-30)
P152 - 60 HZ (=P161*#EXH FANS)
P160 - 48 HZ (MIN SIGNAL SPEED)
P161 - 60 HZ (MAX SIGNAL SPEED)
(MUST MATCH P103)
P166 - 0 (CARRIER FREQ = 4 KHZ)
P171 - 150 (CURRENT LIMIT = 150 %)

ADJUST MANUALLY ON ALL DRIVES
P107 - 00 (IF 120 OR 208 VAC) OR 01 (IF 230, 480 OR 575 VAC)
P108 - MOTOR FLA X 100 / DRIVE OUTPUT RATING

SPEED #	TB-13A	TB-13B	TB-13C
2 (P132)	OPEN	CLOSED	OPEN
3 (P133)	OPEN	OPEN	CLOSED
6 (P136)	OPEN	CLOSED	CLOSED

MOTOR INFORMATION

MOTOR	TAG	PH	VOLT	HP	FLA	BRK
SUP-2		3	208	0.5	1.8	15A
EXH-1		3	208	0.5	1.8	15A

NOTES

FIELD WIRING
INTERNAL WIRING
TERMINAL IN PANEL
TERMINAL IN PANEL AND REMOTE
DRAWING SHOWN DE-ENERGIZED.

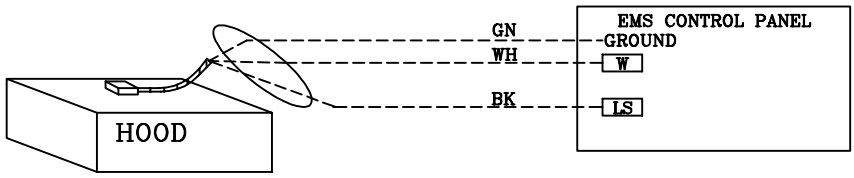
WIRE COLOR

BK - BLACK
BL - BLUE
BR - BROWN
OR - ORANGE
RD - RED
WH - WHITE
PR - PURPLE
PK - PINK
YW - YELLOW
GR - GREEN
GY - GRAY
OR/BL - ORANGE/BLUE (STRIPE)
BL/RD - BLUE/RED (STRIPE)
RD/GN - RED/GREEN (STRIPE)

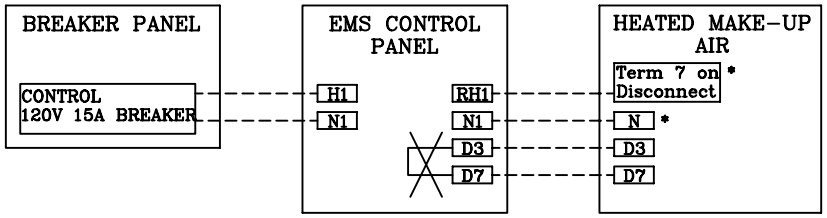
EXHIBIT E

MODULATING EMS INSTALLATION	JOB NAME *YWCA*	DATE *12/21/2012*
DRAWING NUMBER *EMS11102-1687156-#1-3*	JOB NUMBER *1687156*	MODEL **EMS11102**

HOOD LIGHTS TO CONTROL PANEL



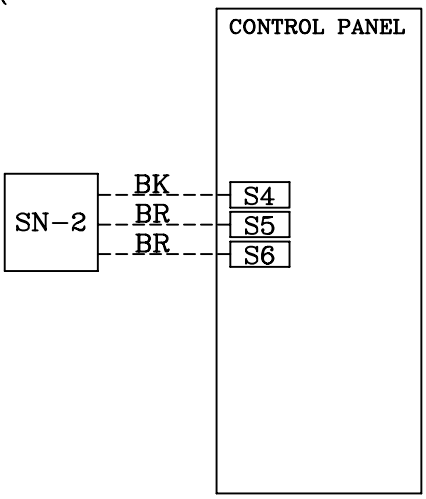
POWER FEED FOR CONTROLS AND LIGHTING



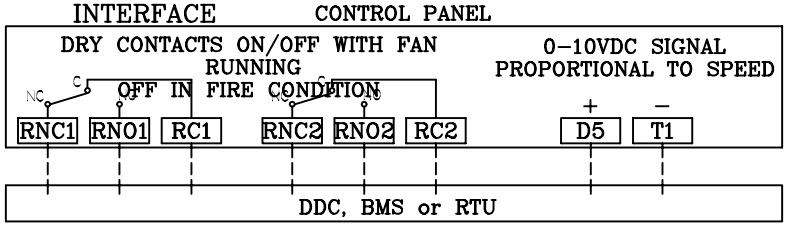
REMOVE JUMPER BETWEEN D3 AND D7 IN EMS IN THE FIELD AFTER WIRING TO TERMINALS D3 AND D7 INSIDE HEATED MAKE-UP AIR UNIT

* DO NOT WIRE WHEN IBT HEATER

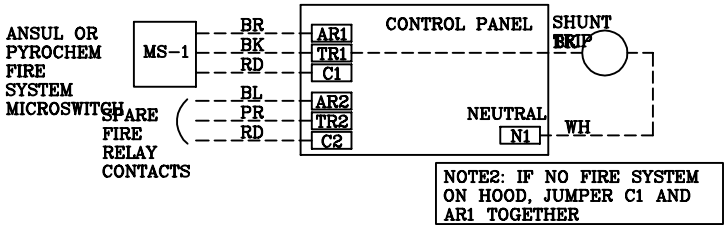
TEMPERATURE SENSOR WIRING (IF FIELD INSTALLED BY ELECTRICIAN)



DDC, BUILDING MANAGEMENT OR RTU INTERFACE



FIRE SYSTEM MICROSWITCH WIRING TO CONTROL PANEL

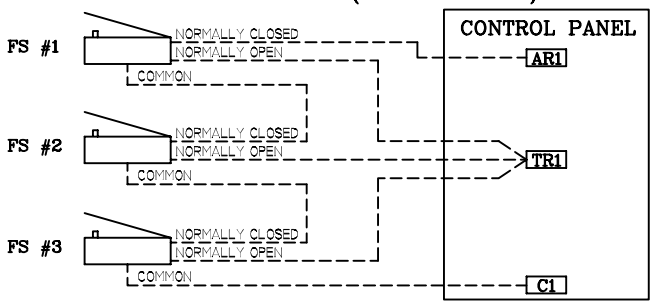


NOTE2: IF NO FIRE SYSTEM ON HOOD, JUMPER C1 AND AR1 TOGETHER

NOTE1: BUILDING FIRE ALARM IS TO BE WIRED TO THE "ALARM INITIATING SWITCH" INSIDE THE FIRE SYSTEM AUTOMAN

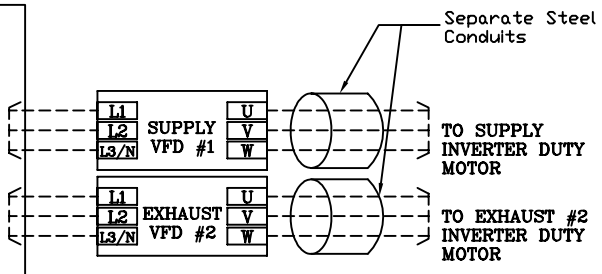
120VAC SHUNT TRIP BREAKER WIRING

MICRO-SWITCHES WIRING WHEN MULTIPLE FIRE SYSTEMS CONNECTED TO ONE EMS PANEL (3 SHOWN HERE)

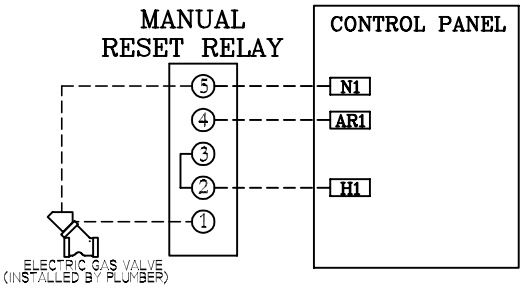


FAN WIRING TO CONTROL PANEL

FAN BREAKER PANEL, SEE DRAWING MOTOR TABLE FOR BREAKER SIZING



ELECTRIC GAS VALVE WITH RESET RELAY



NOTE:
3 PHASE INPUT, USE L1, L2, L3.
1 PHASE 240 VAC INPUT, USE L1 & L2 ONLY.
1 PHASE 120 VAC INPUT, USE L1 & N ONLY.

NOTES

----- DENOTES FIELD WIRING
——— DENOTES INTERNAL WIRING

WIRE COLOR

BK - BLACK	YW - YELLOW
BL - BLUE	GY - GRAY
BR - BROWN	PR - PURPLE
OR - ORANGE	OR/BL - ORANGE/BLUE (STRIPE)
RD - RED	BL/RD - BLUE/RED (STRIPE)
WH - WHITE	RD/GN - RED/GREEN (STRIPE)
GN - GREEN	