



Project Manual for Hurricane Laura Repairs , President's Residence Improvements

Lake Charles, Louisiana

Bidding Documents

April 14, 2025

State Project No. 19-627-21-01

WBS No. F.19002606 &

01-107-05B-13 F.01004560 (Supplement)

Site Code : 5-10-004 | State ID : S05519

Architect's Project No. 1427.00-22

State of Louisiana

Jeff Landry, Governor

Taylor Barras, Commissioner of Administration

Roger E. Husser, Jr., Director of Facility Planning & Control

McNeese State University

Dr. Wade Rousse, President

Kevin Martin, Director, Facilities and Plant Operations

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Design Team:

Architect

Tipton Associates
449 Westmoreland Drive
Baton Rouge, LA 70806
Contact: Daniel Zito, AIA
POR: Kenneth W. Tipton, AIA, Lic. 3201
(225) 387-0101

LFB | Lionel Bailey, AIA Architect
8017 Jefferson Hwy. Ste. B2
Baton Rouge, LA 70809
Contact: Lionel Bailey, AIA
(225) 924-6899

Landscape Architect

CARBO
6633 Government St.
Baton Rouge, LA 70806
Contact: Robie Lasseigne
225.709.6167

Structural Engineer

Stein Lasseigne, Inc.
4021 WE Heck Court, STE H1
Baton Rouge, LA 70816
Contact: Keith Maung-Douglass
225.302.7452

Mechanical and Plumbing Engineer

Eyre Engineering
7423 Picardy Ave, Ste E
Baton Rouge, LA 70808
Contact: Henry Eyre
225.767.7070

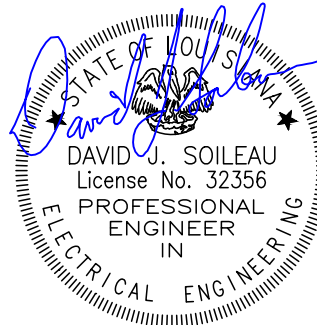
Electrical Engineer

Merge Engineering
7423 Picardy Ave, Ste E1
Baton Rouge, LA 70808
Contact: David Soileau
225.478.2990

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**EXHIBIT 1 : SPECIFICATIONS FOR ASBESTOS ABATEMENT AND
REMEDICATION PROTOCOL**

ADVERTISEMENT FOR BIDS

Sealed bids will be received for the State of Louisiana by the Division of Administration and shall be directed to the Office of Facility Planning and Control, 1201 North Third Street, Claiborne Office Building, Suite 7-160, Baton Rouge, Louisiana, 70802 or P.O. Box 94095, Baton Rouge, Louisiana, 70804-9095. The deadline for receipt of bids is 2:00 PM on **Tuesday, July 08, 2025**, at which time bids will be opened and read aloud in a public meeting in the Claiborne Office Building, Conference Room 1-145.

FOR: **Hurricane Laura Repairs
President's Residence Improvements
McNeese State University
Lake Charles, Louisiana**
PROJECT NUMBER: **19-627-21-01, F.19002606 &
01-107-05B-13, F.01004560 (Supplement)**

Complete Bidding Documents for this project are available in electronic form. They may be obtained without charge and without deposit from **www.centerlinebidconnect.com**. Printed copies are not available from the Designer but arrangements can be made to obtain them through most reprographic firms. Plan holders are responsible for their own reproduction costs.

Questions about this procedure shall be directed to the Designer at:

**Tipton Associates, APAC
449 Westmoreland Drive
Baton Rouge, LA 70806
Telephone: 225-387-0101
E-mail: dzito@tipton-associates.com**

All bids shall be accompanied by bid security in an amount of five percent (5.0%) of the sum of the base bid and all alternates. The form of this security shall be as stated in the Instructions to Bidders included in the Bid Documents for this project.

The successful Bidder shall be required to furnish a Performance and Payment Bond written as described in the Instructions to Bidders included in the Bid Documents for this project.

**A PRE-BID CONFERENCE WILL BE HELD
at 9:00 AM on Friday, June 20, 2025 at McNeese State University,
Facilities Conference Room #103, 4406 Common Street, Lake Charles, LA 70605.**

Bids shall be accepted from Contractors who are licensed under LA. R.S. 37:2150-2192 for the classification of **Building Construction**. Bidder is required to comply with provisions and requirements of LA R.S. 38:2212(B)(5). No bid may be withdrawn for a period of forty-five (45) days after receipt of bids, except under the provisions of LA. R.S. 38:2214.

The Owner reserves the right to reject any and all bids for just cause. In accordance with La. R.S. 38:2212(B)(1), the provisions and requirements of this Section and those stated in the bidding documents shall not be waived by any entity.

When this project is financed either partially or entirely with State Bonds or financed in whole or in part by federal or other funds which are not readily available at the time bids are received, the award of this Contract is contingent upon the granting of lines of credit, or the sale of bonds by the Bond Commission or the availability of federal or other funds. The State shall incur no obligation to the Contractor until the Contract Between Owner and Contractor is fully executed.

Facility Planning and Control is a participant in the Small Entrepreneurship (SE) Program (the Hudson Initiative) and the Veteran-Owned and Service-Connected Disabled Veteran-Owned (LaVet) Small Entrepreneurships Program. Bidders are encouraged to consider participation. Information is available from the Office of Facility Planning and Control or on its website at <https://www.doa.la.gov/doa/fpc/>.

If you have a disability and would like to request an accommodation in order to participate in this meeting, please contact Christina Cardona at Christina.Cardona@la.gov or (225) 342-6060 as soon as possible but no later than 48 hours before the scheduled meeting.

STATE OF LOUISIANA
DIVISION OF ADMINISTRATION
FACILITY PLANNING AND CONTROL
ROGER E. HUSSER, JR., DIRECTOR

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INSTRUCTIONS TO BIDDERS

COMPLETION TIME:

The Bidder shall agree to fully complete the contract within (365) consecutive calendar days, subject to such extensions as may be granted under Paragraph 8.3, in the General Conditions and the Supplementary Conditions, and acknowledges that this construction time will start on or before the date specified in the written "Notice to Proceed" from the Owner.

LIQUIDATED DAMAGES:

The Bidder shall agree to pay as Liquidated Damages the amount of (One Thousand) Dollars (\$ 1,000.00) for each consecutive calendar day for which the work is not complete, beginning with the first day beyond the contract completion date stated on the "Notice to Proceed" or as amended by change order.

ARTICLE 1

DEFINITIONS

1.1 The Bid Documents include the following:

Advertisement for Bids
Instructions to Bidders
Bid Form
Bid Bond
General Conditions of the Contract for Construction,
AIA Document A201, 2017 Edition
Supplementary Conditions
Contract Between Owner and Contractor and Performance and Payment Bond
Affidavit
User Agency Documents (if applicable)
Change Order Form
Partial Occupancy Form
Recommendation of Acceptance
Asbestos Abatement (if applicable)
Other Documents (if applicable)
Specifications & Drawings
Addenda issued during the bid period and acknowledged in the Bid Form

1.2 All definitions set forth in the General Conditions of the Contract for Construction, AIA Document A201 and the Supplementary Conditions are applicable to the Bid Documents.

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

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

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

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

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

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

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

ARTICLE 2

PRE-BID CONFERENCE

2.1 A Pre-Bid Conference shall be held at least 10 days before the date for receipt for bids. The Architect shall coordinate the setting of the date, time and place for the Pre-Bid Conference with the User Agency and shall notify in writing the Owner and all who have received sets of the Bid Documents to

attend. The purpose of the Pre-Bid Conference is to familiarize Bidders with the requirements of the Project and the intent of the Bid Documents, and to receive comments and information from interested Bidders. If the Pre-Bid Conference is stated in the Advertisement for Bids to be a Mandatory Pre-Bid Conference, bids shall be accepted only from those bidders who attend the Pre-Bid Conference. Contractors who are not in attendance for the **entire** Pre-Bid Conference will be considered to have not attended.

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

ARTICLE 3

BIDDER'S REPRESENTATION

3.1 Each Bidder by making his bid represents that:

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

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

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

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

3.1.5 He is familiar with Code of Governmental Ethics requirement that prohibits public servants and/or their immediate family members from bidding on or entering into contracts; he is aware that the Designer and its principal owners are considered Public Servants under the Code of Governmental Ethics for the limited purposes and scope of the Design Contract with the State on this Project (see Ethics Board Advisory Opinion, No. 2009-378 and 2010-128); and neither he nor any principal of the Bidder with a controlling interest therein has an immediate family relationship with the Designer or any principal within the Designer's firm (see La. R.S.

42:1113). Any Bidder submitting a bid in violation of this clause shall be disqualified and any contract entered into in violation of this clause shall be null and void.

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

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

ARTICLE 4

BID DOCUMENTS

4.1 Copies

4.1.1 Bid Documents may be obtained from the Architect for a deposit as stated in the Advertisement for Bids. The deposit will be refunded as stated in the Advertisement for Bids. No deposits will be refunded on Bid Documents returned later than ten days after receipt of bids.

4.1.1.2 As an alternative method of distribution, the Designer may provide the Bid Documents in electronic format. They may be obtained without charge and without deposit as stated in the Advertisement for Bids.

4.1.1.2.1 If electronic distribution is available, printed copies will not be available from the Designer, but arrangements can be made to obtain them through most reprographic firms and/or plan rooms.

4.1.1.2.2 If electronic distribution is available, the reproduction cost on the first paper plan set acquired by bona fide prime bidders will be fully refunded by the Designer upon delivery of the documents to the Designer in good condition no later than ten days after receipt of bids.

4.1.1.2.3 If electronic distribution is available, all other plan holders are responsible for their own reproduction costs.

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

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

4.2 Interpretation or Correction of Bid Documents

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

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

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

4.3 Substitutions

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

4.3.2 No substitution will be considered unless written request for approval has been submitted by the Proposer and has been received by the Architect at least fourteen (14) working days prior to the opening of bids. (La. R.S. 38:2295(C)) Each such request shall include the name of the material or equipment for which it is to be substituted and a complete description of the proposed substitute including model numbers, drawings, cuts, performance and test data and any other information necessary for an evaluation. A statement setting forth any changes in other materials, equipment or work that incorporation of the substitute would require

shall be included. It shall be the responsibility of the proposer to include in his proposal all changes required of the Bid Documents if the proposed product is used. Prior approval, if given, is contingent upon supplier being responsible for any costs which may be necessary to modify the space or facilities needed to accommodate the materials and equipment approved.

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

4.4 Addenda

4.4.1 Addenda will be transmitted to all who are known by the Architect to have received a complete set of Bid Documents.

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

4.4.3 Except as described herein, addenda shall not be issued within a period of seventy-two (72) hours prior to the advertised time for the opening of bids, excluding Saturdays, Sundays, and any other legal holidays. If the necessity arises of issuing an addendum modifying plans and specifications within the seventy-two (72) hour period prior to the advertised time for the opening of bids, then the opening of bids shall be extended at least seven but no more than twenty-one (21) working days, without the requirement of re-advertising. Facility Planning shall be consulted prior to issuance of such an addendum and shall approve such issuance. The revised time and date for the opening of bids shall be stated in the addendum.

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

4.4.5 The Owner shall have the right to extend the bid date by up to (30) thirty days without the requirement of re-advertising. Any such extension shall be made by addendum issued by the Architect.

ARTICLE 5

BID PROCEDURE

5.1 Form and Style of Bids

5.1.1 Bids shall be submitted on the Louisiana Uniform Public Work Bid Form provided by the Architect for this project.

5.1.2 The Bidder shall ensure that all applicable blanks on the bid form are completely and accurately filled in.

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

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

5.1.5 Bidders are cautioned to complete all alternates should such be required in the Bid Form. Failure to submit alternate prices will render the bid non responsive and shall cause its rejection.

5.1.6 Bidders are cautioned to complete all unit prices should such be required in the Bid Form. Unit prices represent a price proposal to do a specified quantity and quality of work. Unit prices are incorporated into the base bid or alternates, as indicated on the Unit Price Form, but are not the sole components thereof.

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

5.1.8 Written evidence of the authority of the person signing the bid for the public work shall be submitted in accordance with La. R.S. 38:2212 (B)(5).

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

5.2 Bid Security

5.2.1 No bid shall be considered or accepted unless the bid is accompanied by bid security in an

amount of five percent (5.0%) of the base bid and all alternates.

The bid security shall be in the form of a certified check or cashier's check drawn on a bank insured by the Federal Deposit Insurance Corporation, or a Bid Bond written by a surety company licensed to do business in Louisiana and signed by the surety's agent or attorney-in-fact. The Bid Bond shall be written on the Facility Planning and Control Bid Bond Form, and the surety for the bond must meet the qualifications stated thereon. The Bid Bond shall include the legal name of the bidder be in favor of the State of Louisiana, Division of Administration, Office of Facility Planning and Control, and shall be accompanied by appropriate power of attorney. The Bid Bond must be signed by both the bidder/principal and the surety in the space provided on the Facility Planning and Control Bid Bond Form. Failure by the bidder/principal or the surety to sign the bid bond shall result in the rejection of the bid.

Bid security furnished by the Contractor shall guarantee that the Contractor will, if awarded the work according to the terms of his proposal, enter into the Contract and furnish Performance and Payment Bonds as required by these Bid Documents, within fifteen (15) days after written notice that the instrument is ready for his signature.

Should the Bidder refuse to enter into such Contract or fail to furnish such bonds, the amount of the bid security shall be forfeited to the Owner as liquidated damages, not as penalty.

5.2.2 The Owner will have the right to retain the bid security of Bidders until either (a) the Contract has been executed and bonds have been furnished, or (b) the specified time has elapsed so that bids may be withdrawn, or (c) all bids have been rejected.

5.3 Submission of Bids

5.3.1 The Bid shall be sealed in an opaque envelope. The bid envelope shall be identified on the outside with the name of the project, and the name, address, and license number of the Bidder.

The envelope shall not contain multiple bid forms, and will be received until the time specified and at the place specified in the Advertisement for Bids. It shall be the specific responsibility of the Bidder to deliver his sealed bid to Facility Planning and Control Department at the appointed place and prior to the announced time for the opening of bids. Late delivery of a bid for any reason, including late

delivery by United States Mail, or express delivery, shall disqualify the bid.

If the bid is sent by mail, the sealed envelope shall be enclosed in a separate mailing envelope with the notation "Bid Enclosed" on the face thereof. Such bids shall be sent by Registered or Certified Mail, Return Receipt Requested, addressed to:

Facility Planning and Control,
P. O. Box 94095

Baton Rouge, Louisiana, 70804-9095.

Bids sent by express delivery shall be delivered to:

Facility Planning and Control
Suite 7-160

Claiborne Office Building
1201 North Third Street

Baton Rouge, Louisiana 70802

5.3.2 Bids shall be deposited at the designated location prior to the time on the date for receipt of bids indicated in the Advertisement for Bids, or any extension thereof made by addendum. Bids received after the time and date for receipt of bids will be returned unopened.

5.3.3 Bidder shall assume full responsibility for timely delivery at location designated for receipt of bids.

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

5.4 Modification or Withdrawal of Bid

5.4.1 A bid may not be modified, withdrawn or canceled by the Bidder during the time stipulated in the Advertisement for Bids, for the period following the time and bid date designated for the receipt of bids, and Bidder so agrees in submitting his bid, except in accordance with R.S. 38:2214 which states, in part, "Bids containing patently obvious, unintentional, and substantial mechanical, clerical, or mathematical errors, or errors of unintentional omission of a substantial quantity of work, labor, material, or services made directly in the compilation of the bid, may be withdrawn by the contractor if clear and convincing sworn, written evidence of such

errors is furnished to the public entity within forty-eight hours of the bid opening excluding Saturdays, Sundays, and legal holidays".

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

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

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

5.5 Prohibition of Discriminatory Boycotts of Israel

By submitting a bid, the bidder certifies and agrees that the following information is correct:

In preparing its bid, the bidder has considered all proposals submitted from qualified, potential subcontractors and suppliers, and has not, in the solicitation, selection, or commercial treatment of any subcontractor or supplier, refused to transact or terminated business activities, or taken other actions intended to limit commercial relations, with a person or entity that is engaging in commercial transactions in Israel or Israel-controlled territories, with the specific intent to accomplish a boycott or divestment of Israel. The bidder has also not retaliated against any person or other entity for reporting such refusal, termination, or commercially limiting actions. The state reserves the right to reject any bid if this certification is subsequently determined to be false and to terminate any contract awarded based on such a false response.

ARTICLE 6

CONSIDERATION OF BIDS

6.1 Opening of Bids

6.1.1 The properly identified Bids received on time will be opened publicly and will be read aloud, and a tabulation abstract of the amounts of the base bids and alternates, if any, will be made available to Bidders.

6.2 Rejection of Bids

6.2.1 The Owner shall have the right to reject any or all bids and in particular to reject a bid not accompanied by any required bid security or data required by the Bid Documents or a bid in any way incomplete or irregular.

6.3 Acceptance of Bid

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

ARTICLE 7

POST-BID INFORMATION

7.1 Submissions

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

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

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

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

7.1.1.4 A list of names and business domiciles of all Subcontractors, manufacturers, suppliers or other persons or organizations (including those who are to furnish materials or equipment fabricated to a special design) proposed for the principal portions of the work. It is the preference of the Owner that, to the greatest extent possible or practical, the Contractor utilize Louisiana Subcontractors, manufacturers, suppliers and labor.

7.1.2 The General Contractor shall be responsible for actions or inactions of Subcontractors and/or material suppliers.

The General Contractor is totally responsible for any lost time or extra expense incurred due to a Subcontractor's or Material Supplier's failure to perform. Failure to perform includes, but is not limited to, a Subcontractor's financial failure, abandonment of the project, failure to make prompt delivery, or failure to do work up to standard. Under no circumstances shall the Owner mitigate the General Contractor's losses or reimburse the General Contractor for losses caused by these events.

7.1.3 The lowest responsive and responsible bidder shall submit to the Architect and the Owner within ten days after the bid opening a letter/letters from the manufacturer stating that the manufacturer will issue the roof system guarantee complying with the requirements of Facility Planning and Control based on the specified roof system and include the name of the applicator acceptable to the manufacturer at the highest level of certification for installing the specified roof system. This manufacturer shall be one that has received prior approval or is named in the specifications.

In accordance with La. R.S. 38:2227 [references La R.S. 38:2212(A)(3)(c)(ii), which has since been renumbered as La R.S. 38:2212(B)(3)], La. R.S. 38:2212.10 and La. R.S. 23:1726(B) the apparent low bidder on this project shall submit the completed Attestations Affidavit (Past Criminal Convictions of Bidders, Verification of Employees and Certification Regarding Unpaid Workers Compensation Insurance) form found within this bid package to Facility Planning and Control within 10 days after the opening of bids.

ARTICLE 8

PERFORMANCE AND PAYMENT BOND

8.1 Bond Required

8.1.1 The Contractor shall furnish and pay for a Performance and Payment Bond written by a company licensed to do business in Louisiana, which shall be signed by the surety's agent or attorney-in-fact, in an amount equal to 100% of the Contract amount. Surety must be listed currently on

the U. S. Department of Treasury Financial Management Service List (Treasury List) as approved for an amount equal to or greater than the contract amount, or must be an insurance company domiciled in Louisiana or owned by Louisiana residents. If surety is qualified other than by listing on the Treasury list, the contract amount may not exceed fifteen percent of policyholders' surplus as shown by surety's most recent financial statements filed with the Louisiana Department of Insurance and may not exceed the amount of \$500,000. However, a Louisiana domiciled insurance company with at least an A- rating in the latest printing of the A. M. Best's Key Rating Guide shall not be subject to the \$500,000 limitation, provided that the contract amount does not exceed ten percent of policyholders' surplus as shown in the latest A. M. Best's Key Rating Guide nor fifteen percent of policyholders' surplus as shown by surety's most recent financial statements filed with the Louisiana Department of Insurance. The Bond shall be signed by the surety's agent or attorney-in-fact. The Bond shall be in favor of the State of Louisiana, Office of Facility Planning and Control.

8.2 Time of Delivery and Form of Bond

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

8.2.2 Bond shall be in the form furnished by Facility Planning and Control, entitled CONTRACT BETWEEN OWNER AND CONTRACTOR AND PERFORMANCE AND PAYMENT BOND, a copy of which is included in the Bid Documents.

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

ARTICLE 9

FORM OF AGREEMENT BETWEEN OWNER AND CONTRACTOR

9.1 Form to be Used

9.1.1 Form of the Contract to be used shall be furnished by Facility Planning and Control, an example of which is bound in the Bid Documents.

9.2 Award

9.2.1 After award of the Contract, the successful Bidder, if a corporation, shall furnish to the Owner the most current copy of a Disclosure of Ownership Affidavit on file with the Secretary of State.

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

9.2.3 When this project is financed either partially or entirely with State Bonds, the award of this Contract is contingent upon the sale of bonds by the State Bond Commission. The State shall incur no obligation to the Contractor until the Contract Between Owner and Contractor is duly executed.

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LOUISIANA UNIFORM PUBLIC WORK BID FORM

TO: Louisiana Division of Administration
Facility Planning and Control
1201 N. Third Street
Baton Rouge, LA 70802

Hurricane Laura Repairs, President Residence
Improvements, McNeese State University
19-627-21-01, F.19002606 &
01-107-05B-13, F.01004560 (Supplement)

BID FOR: Hurricane Laura Repairs, President's Residence Improvements

The undersigned bidder hereby declares and represents that she/he: a) has carefully examined and understands the Bidding Documents, b) has not received, relied on, or based his bid on any verbal instructions contrary to the Bidding Documents or any addenda, c) has personally inspected and is familiar with the project site, and hereby proposes to provide all labor, materials, tools, appliances and facilities as required to perform, in a workmanlike manner, all work and services for the construction and completion of the referenced project, all in strict accordance with the Bidding Documents prepared by: **Tipton Associates in association with LFB Lionel F Bailey Architect** and dated: April 14, 2025

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

TOTAL BASE BID: For all work required by the Bidding Documents (including any and all unit prices designated "Base Bid" * but not alternates) for the sum of:

_____ Dollars (\$ _____)

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

Alternate No. 1 (Add -Construction of Additions and Alterations in addition to Base Bid scope, including Landscape, Architectural, Structural, Mechanical, Plumbing, and Electrical work documented in Construction Document L, A, S, M, P, E Drawings) for the lump sum of:

_____ Dollars (\$ _____)

Alternate No. 2 (Owner to provide description of alternate and state whether add or deduct) for the lump sum of:

Not Applicable _____ Dollars (\$ Not Applicable)

Alternate No. 3 (Owner to provide description of alternate and state whether add or deduct) for the lump sum of:

Not Applicable _____ Dollars (\$ Not Applicable)

NAME OF BIDDER: _____

ADDRESS OF BIDDER: _____

LOUISIANA CONTRACTOR'S LICENSE NUMBER: _____

NAME OF AUTHORIZED SIGNATORY OF BIDDER: _____

TITLE OF AUTHORIZED SIGNATORY OF BIDDER: _____

SIGNATURE OF AUTHORIZED SIGNATORY OF BIDDER **: _____

DATE: _____

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

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

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

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

BID BOND
FOR
FACILITY PLANNING AND CONTROL PROJECTS

Date: _____

KNOW ALL MEN BY THESE PRESENTS:

That _____ of _____, as Principal, and _____, as Surety, are held and firmly bound unto the State of Louisiana, Division of Administration, Office of Facility Planning and Control (Obligee), in the full and just sum of five (5%) percent of the total amount of this proposal, including all alternates, lawful money of the United States, for payment of which sum, well and truly be made, we bind ourselves, our heirs, executors, administrators, successors and assigns, jointly and severally firmly by these presents.

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

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

THE CONDITION OF THIS OBLIGATION IS SUCH that, whereas said Principal is herewith submitting its proposal to the Obligee on a Contract for:

NOW, THEREFORE, if the said Contract be awarded to the Principal and the Principal shall, within such time as may be specified, enter into the Contract in writing and give a good and sufficient bond to secure the performance of the terms and conditions of the Contract with surety acceptable to the Obligee, then this obligation shall be void; otherwise this obligation shall become due and payable.

PRINCIPAL (BIDDER)

SURETY

BY: _____
AUTHORIZED OFFICER-OWNER-PARTNER

BY: _____
AGENT OR ATTORNEY-IN-FACT(SEAL)

July 2021

AIA® Document A201® – 2017

General Conditions of the Contract for Construction

for the following PROJECT:

(Name and location or address)

McNeese President' Residence Improvements
Lake Charles, Louisiana
State Project No.: 19-627-21-01 ; F.19002606
01-107-05B-13 (Supplement) F.01004560 (Supplement)

THE OWNER:

(Name, legal status and address)

State of Louisiana
Facility Planning and Control
1201 N. Third St, Ste. 7-210
Baton Rouge, LA 70802

THE ARCHITECT:

(Name, legal status and address)

Tipton Associates
449 Westmoreland Dr
Baton Rouge, LA 70806

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10	PROTECTION OF PERSONS AND PROPERTY
11	INSURANCE AND BONDS
12	UNCOVERING AND CORRECTION OF WORK

ADDITIONS AND DELETIONS:

The author of this document has added information needed for its completion. The author may also have revised the text of the original AIA standard form. An *Additions and Deletions Report* that notes added information as well as revisions to the standard form text is available from the author and should be reviewed. A vertical line in the left margin of this document indicates where the author has added necessary information and where the author has added to or deleted from the original AIA text.

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

For guidance in modifying this document to include supplementary conditions, see AIA Document A503™, Guide for Supplementary Conditions.

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Work, Definition of

1.1.3

Written Consent

1.5.2, 3.4.2, 3.7.4, 3.12.8, 3.14.2, 4.1.2, 9.3.2, 9.10.3, 13.2, 13.3.2, 15.4.4.2

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ARTICLE 1 GENERAL PROVISIONS

§ 1.1 Basic Definitions

§ 1.1.1 The Contract Documents

The Contract Documents are enumerated in the Agreement between the Owner and Contractor (hereinafter the Agreement) and consist of the Agreement, Conditions of the Contract (General, Supplementary and other Conditions), Drawings, Specifications, Addenda issued prior to execution of the Contract, other documents listed in the Agreement, and Modifications issued after execution of the Contract. A Modification is (1) a written amendment to the Contract signed by both parties, (2) a Change Order, (3) a Construction Change Directive, or (4) a written order for a minor change in the Work issued by the Architect. Unless specifically enumerated in the Agreement, the Contract Documents do not include the advertisement or invitation to bid, Instructions to Bidders, sample forms, other information furnished by the Owner in anticipation of receiving bids or proposals, the Contractor's bid or proposal, or portions of Addenda relating to bidding or proposal requirements.

§ 1.1.2 The Contract

The Contract Documents form the Contract for Construction. The Contract represents the entire and integrated agreement between the parties hereto and supersedes prior negotiations, representations, or agreements, either written or oral. The Contract may be amended or modified only by a Modification. The Contract Documents shall not be construed to create a contractual relationship of any kind (1) between the Contractor and the Architect or the Architect's consultants, (2) between the Owner and a Subcontractor or a Sub-subcontractor, (3) between the Owner and the Architect or the Architect's consultants, or (4) between any persons or entities other than the Owner and the Contractor. The Architect shall, however, be entitled to performance and enforcement of obligations under the Contract intended to facilitate performance of the Architect's duties.

§ 1.1.3 The Work

The term "Work" means the construction and services required by the Contract Documents, whether completed or partially completed, and includes all other labor, materials, equipment, and services provided or to be provided by the Contractor to fulfill the Contractor's obligations. The Work may constitute the whole or a part of the Project.

§ 1.1.4 The Project

The Project is the total construction of which the Work performed under the Contract Documents may be the whole or a part and which may include construction by the Owner and by Separate Contractors.

§ 1.1.5 The Drawings

The Drawings are the graphic and pictorial portions of the Contract Documents showing the design, location and dimensions of the Work, generally including plans, elevations, sections, details, schedules, and diagrams.

§ 1.1.6 The Specifications

The Specifications are that portion of the Contract Documents consisting of the written requirements for materials, equipment, systems, standards and workmanship for the Work, and performance of related services.

§ 1.1.7 Instruments of Service

Instruments of Service are representations, in any medium of expression now known or later developed, of the tangible and intangible creative work performed by the Architect and the Architect's consultants under their respective professional services agreements. Instruments of Service may include, without limitation, studies, surveys, models, sketches, drawings, specifications, and other similar materials.

§ 1.1.8 Initial Decision Maker

The Initial Decision Maker is the person identified in the Agreement to render initial decisions on Claims in accordance with Section 15.2. The Initial Decision Maker shall not show partiality to the Owner or Contractor and shall not be liable for results of interpretations or decisions rendered in good faith.

§ 1.2 Correlation and Intent of the Contract Documents

§ 1.2.1 The intent of the Contract Documents is to include all items necessary for the proper execution and completion of the Work by the Contractor. The Contract Documents are complementary, and what is required by one shall be as binding as if required by all; performance by the Contractor shall be required only to the extent consistent with the Contract Documents and reasonably inferable from them as being necessary to produce the indicated results.

§ 1.2.1.1 The invalidity of any provision of the Contract Documents shall not invalidate the Contract or its remaining provisions. If it is determined that any provision of the Contract Documents violates any law, or is otherwise invalid or unenforceable, then that provision shall be revised to the extent necessary to make that provision legal and enforceable. In such case the Contract Documents shall be construed, to the fullest extent permitted by law, to give effect to the parties' intentions and purposes in executing the Contract.

§ 1.2.2 Organization of the Specifications into divisions, sections and articles, and arrangement of Drawings shall not control the Contractor in dividing the Work among Subcontractors or in establishing the extent of Work to be performed by any trade.

§ 1.2.3 Unless otherwise stated in the Contract Documents, words that have well-known technical or construction industry meanings are used in the Contract Documents in accordance with such recognized meanings.

§ 1.3 Capitalization

Terms capitalized in these General Conditions include those that are (1) specifically defined, (2) the titles of numbered articles, or (3) the titles of other documents published by the American Institute of Architects.

§ 1.4 Interpretation

In the interest of brevity the Contract Documents frequently omit modifying words such as "all" and "any" and articles such as "the" and "an," but the fact that a modifier or an article is absent from one statement and appears in another is not intended to affect the interpretation of either statement.

§ 1.5 Ownership and Use of Drawings, Specifications, and Other Instruments of Service

§ 1.5.1 The Architect and the Architect's consultants shall be deemed the authors and owners of their respective Instruments of Service, including the Drawings and Specifications, and retain all common law, statutory, and other reserved rights in their Instruments of Service, including copyrights. The Contractor, Subcontractors, Sub-subcontractors, and suppliers shall not own or claim a copyright in the Instruments of Service. Submittal or distribution to meet official regulatory requirements or for other purposes in connection with the Project is not to be construed as publication in derogation of the Architect's or Architect's consultants' reserved rights.

§ 1.5.2 The Contractor, Subcontractors, Sub-subcontractors, and suppliers are authorized to use and reproduce the Instruments of Service provided to them, subject to any protocols established pursuant to Sections 1.7 and 1.8, solely and exclusively for execution of the Work. All copies made under this authorization shall bear the copyright notice, if any, shown on the Instruments of Service. The Contractor, Subcontractors, Sub-subcontractors, and suppliers may not use the Instruments of Service on other projects or for additions to the Project outside the scope of the Work without the specific written consent of the Owner, Architect, and the Architect's consultants.

§ 1.6 Notice

§ 1.6.1 Except as otherwise provided in Section 1.6.2, where the Contract Documents require one party to notify or give notice to the other party, such notice shall be provided in writing to the designated representative of the party to whom the notice is addressed and shall be deemed to have been duly served if delivered in person, by mail, by courier, or by electronic transmission if a method for electronic transmission is set forth in the Agreement.

§ 1.6.2 Notice of Claims as provided in Section 15.1.3 shall be provided in writing and shall be deemed to have been duly served only if delivered to the designated representative of the party to whom the notice is addressed by certified or registered mail, or by courier providing proof of delivery.

§ 1.7 Digital Data Use and Transmission

The parties shall agree upon written protocols governing the transmission and use of, and reliance on, Instruments of Service or any other information or documentation in digital form.

§ 1.8 Building Information Models Use and Reliance

Any use of, or reliance on, all or a portion of a building information model without agreement to written protocols governing the use of, and reliance on, the information contained in the model shall be at the using or relying party's sole risk and without liability to the other party and its contractors or consultants, the authors of, or contributors to, the building information model, and each of their agents and employees.

ARTICLE 2 OWNER

§ 2.1 General

§ 2.1.1 The Owner is the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The Owner shall designate in writing a representative who shall have express authority to bind the Owner with respect to all matters requiring the Owner's approval or authorization. Except as otherwise provided in Section 4.2.1, the Architect does not have such authority. The term "Owner" means the Owner or the Owner's authorized representative.

§ 2.1.2 The Owner shall furnish to the Contractor, within fifteen days after receipt of a written request, information necessary and relevant for the Contractor to evaluate, give notice of, or enforce mechanic's lien rights. Such information shall include a correct statement of the record legal title to the property on which the Project is located, usually referred to as the site, and the Owner's interest therein.

§ 2.2 Evidence of the Owner's Financial Arrangements

§ 2.2.1 Prior to commencement of the Work and upon written request by the Contractor, the Owner shall furnish to the Contractor reasonable evidence that the Owner has made financial arrangements to fulfill the Owner's obligations under the Contract. The Contractor shall have no obligation to commence the Work until the Owner provides such evidence. If commencement of the Work is delayed under this Section 2.2.1, the Contract Time shall be extended appropriately.

§ 2.2.2 Following commencement of the Work and upon written request by the Contractor, the Owner shall furnish to the Contractor reasonable evidence that the Owner has made financial arrangements to fulfill the Owner's obligations under the Contract only if (1) the Owner fails to make payments to the Contractor as the Contract Documents require; (2) the Contractor identifies in writing a reasonable concern regarding the Owner's ability to make payment when due; or (3) a change in the Work materially changes the Contract Sum. If the Owner fails to provide such evidence, as required, within fourteen days of the Contractor's request, the Contractor may immediately stop the Work and, in that event, shall notify the Owner that the Work has stopped. However, if the request is made because a change in the Work materially changes the Contract Sum under (3) above, the Contractor may immediately stop only that portion of the Work affected by the change until reasonable evidence is provided. If the Work is stopped under this Section 2.2.2, the Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable costs of shutdown, delay and start-up, plus interest as provided in the Contract Documents.

§ 2.2.3 After the Owner furnishes evidence of financial arrangements under this Section 2.2, the Owner shall not materially vary such financial arrangements without prior notice to the Contractor.

§ 2.2.4 Where the Owner has designated information furnished under this Section 2.2 as "confidential," the Contractor shall keep the information confidential and shall not disclose it to any other person. However, the Contractor may disclose "confidential" information, after seven (7) days' notice to the Owner, where disclosure is required by law, including a subpoena or other form of compulsory legal process issued by a court or governmental entity, or by court or arbitrator(s) order. The Contractor may also disclose "confidential" information to its employees, consultants, sureties, Subcontractors and their employees, Sub-subcontractors, and others who need to know the content of such information solely and exclusively for the Project and who agree to maintain the confidentiality of such information.

§ 2.3 Information and Services Required of the Owner

§ 2.3.1 Except for permits and fees that are the responsibility of the Contractor under the Contract Documents, including those required under Section 3.7.1, the Owner shall secure and pay for necessary approvals, easements, assessments and charges required for construction, use or occupancy of permanent structures or for permanent changes in existing facilities.

§ 2.3.2 The Owner shall retain an architect lawfully licensed to practice architecture, or an entity lawfully practicing architecture, in the jurisdiction where the Project is located. That person or entity is identified as the Architect in the Agreement and is referred to throughout the Contract Documents as if singular in number.

§ 2.3.3 If the employment of the Architect terminates, the Owner shall employ a successor to whom the Contractor has no reasonable objection and whose status under the Contract Documents shall be that of the Architect.

§ 2.3.4 The Owner shall furnish surveys describing physical characteristics, legal limitations and utility locations for the site of the Project, and a legal description of the site. The Contractor shall be entitled to rely on the accuracy of information furnished by the Owner but shall exercise proper precautions relating to the safe performance of the Work.

§ 2.3.5 The Owner shall furnish information or services required of the Owner by the Contract Documents with reasonable promptness. The Owner shall also furnish any other information or services under the Owner's control and relevant to the Contractor's performance of the Work with reasonable promptness after receiving the Contractor's written request for such information or services.

§ 2.3.6 Unless otherwise provided in the Contract Documents, the Owner shall furnish to the Contractor one copy of the Contract Documents for purposes of making reproductions pursuant to Section 1.5.2.

§ 2.4 Owner's Right to Stop the Work

If the Contractor fails to correct Work that is not in accordance with the requirements of the Contract Documents as required by Section 12.2 or repeatedly fails to carry out Work in accordance with the Contract Documents, the Owner may issue a written order to the Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, the right of the Owner to stop the Work shall not give rise to a duty on the part of the Owner to exercise this right for the benefit of the Contractor or any other person or entity, except to the extent required by Section 6.1.3.

§ 2.5 Owner's Right to Carry Out the Work

If the Contractor defaults or neglects to carry out the Work in accordance with the Contract Documents and fails within a ten-day period after receipt of notice from the Owner to commence and continue correction of such default or neglect with diligence and promptness, the Owner may, without prejudice to other remedies the Owner may have, correct such default or neglect. Such action by the Owner and amounts charged to the Contractor are both subject to prior approval of the Architect and the Architect may, pursuant to Section 9.5.1, withhold or nullify a Certificate for Payment in whole or in part, to the extent reasonably necessary to reimburse the Owner for the reasonable cost of correcting such deficiencies, including Owner's expenses and compensation for the Architect's additional services made necessary by such default, neglect, or failure. If current and future payments are not sufficient to cover such amounts, the Contractor shall pay the difference to the Owner. If the Contractor disagrees with the actions of the Owner or the Architect, or the amounts claimed as costs to the Owner, the Contractor may file a Claim pursuant to Article 15.

ARTICLE 3 CONTRACTOR

§ 3.1 General

§ 3.1.1 The Contractor is the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The Contractor shall be lawfully licensed, if required in the jurisdiction where the Project is located. The Contractor shall designate in writing a representative who shall have express authority to bind the Contractor with respect to all matters under this Contract. The term "Contractor" means the Contractor or the Contractor's authorized representative.

§ 3.1.2 The Contractor shall perform the Work in accordance with the Contract Documents.

§ 3.1.3 The Contractor shall not be relieved of its obligations to perform the Work in accordance with the Contract Documents either by activities or duties of the Architect in the Architect's administration of the Contract, or by tests, inspections or approvals required or performed by persons or entities other than the Contractor.

§ 3.2 Review of Contract Documents and Field Conditions by Contractor

§ 3.2.1 Execution of the Contract by the Contractor is a representation that the Contractor has visited the site, become generally familiar with local conditions under which the Work is to be performed, and correlated personal observations with requirements of the Contract Documents.

§ 3.2.2 Because the Contract Documents are complementary, the Contractor shall, before starting each portion of the Work, carefully study and compare the various Contract Documents relative to that portion of the Work, as well as the information furnished by the Owner pursuant to Section 2.3.4, shall take field measurements of any existing conditions related to that portion of the Work, and shall observe any conditions at the site affecting it. These

obligations are for the purpose of facilitating coordination and construction by the Contractor and are not for the purpose of discovering errors, omissions, or inconsistencies in the Contract Documents; however, the Contractor shall promptly report to the Architect any errors, inconsistencies or omissions discovered by or made known to the Contractor as a request for information in such form as the Architect may require. It is recognized that the Contractor's review is made in the Contractor's capacity as a contractor and not as a licensed design professional, unless otherwise specifically provided in the Contract Documents.

§ 3.2.3 The Contractor is not required to ascertain that the Contract Documents are in accordance with applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of public authorities, but the Contractor shall promptly report to the Architect any nonconformity discovered by or made known to the Contractor as a request for information in such form as the Architect may require.

§ 3.2.4 If the Contractor believes that additional cost or time is involved because of clarifications or instructions the Architect issues in response to the Contractor's notices or requests for information pursuant to Sections 3.2.2 or 3.2.3, the Contractor shall submit Claims as provided in Article 15. If the Contractor fails to perform the obligations of Sections 3.2.2 or 3.2.3, the Contractor shall pay such costs and damages to the Owner, subject to Section 15.1.7, as would have been avoided if the Contractor had performed such obligations. If the Contractor performs those obligations, the Contractor shall not be liable to the Owner or Architect for damages resulting from errors, inconsistencies or omissions in the Contract Documents, for differences between field measurements or conditions and the Contract Documents, or for nonconformities of the Contract Documents to applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities.

§ 3.3 Supervision and Construction Procedures

§ 3.3.1 The Contractor shall supervise and direct the Work, using the Contractor's best skill and attention. The Contractor shall be solely responsible for, and have control over, construction means, methods, techniques, sequences, and procedures, and for coordinating all portions of the Work under the Contract. If the Contract Documents give specific instructions concerning construction means, methods, techniques, sequences, or procedures, the Contractor shall evaluate the jobsite safety thereof and shall be solely responsible for the jobsite safety of such means, methods, techniques, sequences, or procedures. If the Contractor determines that such means, methods, techniques, sequences or procedures may not be safe, the Contractor shall give timely notice to the Owner and Architect, and shall propose alternative means, methods, techniques, sequences, or procedures. The Architect shall evaluate the proposed alternative solely for conformance with the design intent for the completed construction. Unless the Architect objects to the Contractor's proposed alternative, the Contractor shall perform the Work using its alternative means, methods, techniques, sequences, or procedures.

§ 3.3.2 The Contractor shall be responsible to the Owner for acts and omissions of the Contractor's employees, Subcontractors and their agents and employees, and other persons or entities performing portions of the Work for, or on behalf of, the Contractor or any of its Subcontractors.

§ 3.3.3 The Contractor shall be responsible for inspection of portions of Work already performed to determine that such portions are in proper condition to receive subsequent Work.

§ 3.4 Labor and Materials

§ 3.4.1 Unless otherwise provided in the Contract Documents, the Contractor shall provide and pay for labor, materials, equipment, tools, construction equipment and machinery, water, heat, utilities, transportation, and other facilities and services necessary for proper execution and completion of the Work, whether temporary or permanent and whether or not incorporated or to be incorporated in the Work.

§ 3.4.2 Except in the case of minor changes in the Work approved by the Architect in accordance with Section 3.12.8 or ordered by the Architect in accordance with Section 7.4, the Contractor may make substitutions only with the consent of the Owner, after evaluation by the Architect and in accordance with a Change Order or Construction Change Directive.

§ 3.4.3 The Contractor shall enforce strict discipline and good order among the Contractor's employees and other persons carrying out the Work. The Contractor shall not permit employment of unfit persons or persons not properly skilled in tasks assigned to them.

§ 3.5 Warranty

§ 3.5.1 The Contractor warrants to the Owner and Architect that materials and equipment furnished under the Contract will be of good quality and new unless the Contract Documents require or permit otherwise. The Contractor further warrants that the Work will conform to the requirements of the Contract Documents and will be free from defects, except for those inherent in the quality of the Work the Contract Documents require or permit. Work, materials, or equipment not conforming to these requirements may be considered defective. The Contractor's warranty excludes remedy for damage or defect caused by abuse, alterations to the Work not executed by the Contractor, improper or insufficient maintenance, improper operation, or normal wear and tear and normal usage. If required by the Architect, the Contractor shall furnish satisfactory evidence as to the kind and quality of materials and equipment.

§ 3.5.2 All material, equipment, or other special warranties required by the Contract Documents shall be issued in the name of the Owner, or shall be transferable to the Owner, and shall commence in accordance with Section 9.8.4.

§ 3.6 Taxes

The Contractor shall pay sales, consumer, use and similar taxes for the Work provided by the Contractor that are legally enacted when bids are received or negotiations concluded, whether or not yet effective or merely scheduled to go into effect.

§ 3.7 Permits, Fees, Notices and Compliance with Laws

§ 3.7.1 Unless otherwise provided in the Contract Documents, the Contractor shall secure and pay for the building permit as well as for other permits, fees, licenses, and inspections by government agencies necessary for proper execution and completion of the Work that are customarily secured after execution of the Contract and legally required at the time bids are received or negotiations concluded.

§ 3.7.2 The Contractor shall comply with and give notices required by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities applicable to performance of the Work.

§ 3.7.3 If the Contractor performs Work knowing it to be contrary to applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of public authorities, the Contractor shall assume appropriate responsibility for such Work and shall bear the costs attributable to correction.

§ 3.7.4 Concealed or Unknown Conditions

If the Contractor encounters conditions at the site that are (1) subsurface or otherwise concealed physical conditions that differ materially from those indicated in the Contract Documents or (2) unknown physical conditions of an unusual nature that differ materially from those ordinarily found to exist and generally recognized as inherent in construction activities of the character provided for in the Contract Documents, the Contractor shall promptly provide notice to the Owner and the Architect before conditions are disturbed and in no event later than 14 days after first observance of the conditions. The Architect will promptly investigate such conditions and, if the Architect determines that they differ materially and cause an increase or decrease in the Contractor's cost of, or time required for, performance of any part of the Work, will recommend that an equitable adjustment be made in the Contract Sum or Contract Time, or both. If the Architect determines that the conditions at the site are not materially different from those indicated in the Contract Documents and that no change in the terms of the Contract is justified, the Architect shall promptly notify the Owner and Contractor, stating the reasons. If either party disputes the Architect's determination or recommendation, that party may submit a Claim as provided in Article 15.

§ 3.7.5 If, in the course of the Work, the Contractor encounters human remains or recognizes the existence of burial markers, archaeological sites or wetlands not indicated in the Contract Documents, the Contractor shall immediately suspend any operations that would affect them and shall notify the Owner and Architect. Upon receipt of such notice, the Owner shall promptly take any action necessary to obtain governmental authorization required to resume the operations. The Contractor shall continue to suspend such operations until otherwise instructed by the Owner but shall continue with all other operations that do not affect those remains or features. Requests for adjustments in the Contract Sum and Contract Time arising from the existence of such remains or features may be made as provided in Article 15.

§ 3.8 Allowances

§ 3.8.1 The Contractor shall include in the Contract Sum all allowances stated in the Contract Documents. Items covered by allowances shall be supplied for such amounts and by such persons or entities as the Owner may direct, but the Contractor shall not be required to employ persons or entities to whom the Contractor has reasonable objection.

§ 3.8.2 Unless otherwise provided in the Contract Documents,

- .1 allowances shall cover the cost to the Contractor of materials and equipment delivered at the site and all required taxes, less applicable trade discounts;
- .2 Contractor's costs for unloading and handling at the site, labor, installation costs, overhead, profit, and other expenses contemplated for stated allowance amounts shall be included in the Contract Sum but not in the allowances; and
- .3 whenever costs are more than or less than allowances, the Contract Sum shall be adjusted accordingly by Change Order. The amount of the Change Order shall reflect (1) the difference between actual costs and the allowances under Section 3.8.2.1 and (2) changes in Contractor's costs under Section 3.8.2.2.

§ 3.8.3 Materials and equipment under an allowance shall be selected by the Owner with reasonable promptness.

§ 3.9 Superintendent

§ 3.9.1 The Contractor shall employ a competent superintendent and necessary assistants who shall be in attendance at the Project site during performance of the Work. The superintendent shall represent the Contractor, and communications given to the superintendent shall be as binding as if given to the Contractor.

§ 3.9.2 The Contractor, as soon as practicable after award of the Contract, shall notify the Owner and Architect of the name and qualifications of a proposed superintendent. Within 14 days of receipt of the information, the Architect may notify the Contractor, stating whether the Owner or the Architect (1) has reasonable objection to the proposed superintendent or (2) requires additional time for review. Failure of the Architect to provide notice within the 14-day period shall constitute notice of no reasonable objection.

§ 3.9.3 The Contractor shall not employ a proposed superintendent to whom the Owner or Architect has made reasonable and timely objection. The Contractor shall not change the superintendent without the Owner's consent, which shall not unreasonably be withheld or delayed.

§ 3.10 Contractor's Construction and Submittal Schedules

§ 3.10.1 The Contractor, promptly after being awarded the Contract, shall submit for the Owner's and Architect's information a Contractor's construction schedule for the Work. The schedule shall contain detail appropriate for the Project, including (1) the date of commencement of the Work, interim schedule milestone dates, and the date of Substantial Completion; (2) an apportionment of the Work by construction activity; and (3) the time required for completion of each portion of the Work. The schedule shall provide for the orderly progression of the Work to completion and shall not exceed time limits current under the Contract Documents. The schedule shall be revised at appropriate intervals as required by the conditions of the Work and Project.

§ 3.10.2 The Contractor, promptly after being awarded the Contract and thereafter as necessary to maintain a current submittal schedule, shall submit a submittal schedule for the Architect's approval. The Architect's approval shall not be unreasonably delayed or withheld. The submittal schedule shall (1) be coordinated with the Contractor's construction schedule, and (2) allow the Architect reasonable time to review submittals. If the Contractor fails to submit a submittal schedule, or fails to provide submittals in accordance with the approved submittal schedule, the Contractor shall not be entitled to any increase in Contract Sum or extension of Contract Time based on the time required for review of submittals.

§ 3.10.3 The Contractor shall perform the Work in general accordance with the most recent schedules submitted to the Owner and Architect.

§ 3.11 Documents and Samples at the Site

The Contractor shall make available, at the Project site, the Contract Documents, including Change Orders, Construction Change Directives, and other Modifications, in good order and marked currently to indicate field changes and selections made during construction, and the approved Shop Drawings, Product Data, Samples, and similar required submittals. These shall be in electronic form or paper copy, available to the Architect and Owner, and delivered to the Architect for submittal to the Owner upon completion of the Work as a record of the Work as constructed.

§ 3.12 Shop Drawings, Product Data and Samples

§ 3.12.1 Shop Drawings are drawings, diagrams, schedules, and other data specially prepared for the Work by the Contractor or a Subcontractor, Sub-subcontractor, manufacturer, supplier, or distributor to illustrate some portion of the Work.

§ 3.12.2 Product Data are illustrations, standard schedules, performance charts, instructions, brochures, diagrams, and other information furnished by the Contractor to illustrate materials or equipment for some portion of the Work.

§ 3.12.3 Samples are physical examples that illustrate materials, equipment, or workmanship, and establish standards by which the Work will be judged.

§ 3.12.4 Shop Drawings, Product Data, Samples, and similar submittals are not Contract Documents. Their purpose is to demonstrate how the Contractor proposes to conform to the information given and the design concept expressed in the Contract Documents for those portions of the Work for which the Contract Documents require submittals. Review by the Architect is subject to the limitations of Section 4.2.7. Informational submittals upon which the Architect is not expected to take responsive action may be so identified in the Contract Documents. Submittals that are not required by the Contract Documents may be returned by the Architect without action.

§ 3.12.5 The Contractor shall review for compliance with the Contract Documents, approve, and submit to the Architect, Shop Drawings, Product Data, Samples, and similar submittals required by the Contract Documents, in accordance with the submittal schedule approved by the Architect or, in the absence of an approved submittal schedule, with reasonable promptness and in such sequence as to cause no delay in the Work or in the activities of the Owner or of Separate Contractors.

§ 3.12.6 By submitting Shop Drawings, Product Data, Samples, and similar submittals, the Contractor represents to the Owner and Architect that the Contractor has (1) reviewed and approved them, (2) determined and verified materials, field measurements and field construction criteria related thereto, or will do so, and (3) checked and coordinated the information contained within such submittals with the requirements of the Work and of the Contract Documents.

§ 3.12.7 The Contractor shall perform no portion of the Work for which the Contract Documents require submittal and review of Shop Drawings, Product Data, Samples, or similar submittals, until the respective submittal has been approved by the Architect.

§ 3.12.8 The Work shall be in accordance with approved submittals except that the Contractor shall not be relieved of responsibility for deviations from the requirements of the Contract Documents by the Architect's approval of Shop Drawings, Product Data, Samples, or similar submittals, unless the Contractor has specifically notified the Architect of such deviation at the time of submittal and (1) the Architect has given written approval to the specific deviation as a minor change in the Work, or (2) a Change Order or Construction Change Directive has been issued authorizing the deviation. The Contractor shall not be relieved of responsibility for errors or omissions in Shop Drawings, Product Data, Samples, or similar submittals, by the Architect's approval thereof.

§ 3.12.9 The Contractor shall direct specific attention, in writing or on resubmitted Shop Drawings, Product Data, Samples, or similar submittals, to revisions other than those requested by the Architect on previous submittals. In the absence of such notice, the Architect's approval of a resubmission shall not apply to such revisions.

§ 3.12.10 The Contractor shall not be required to provide professional services that constitute the practice of architecture or engineering unless such services are specifically required by the Contract Documents for a portion of the Work or unless the Contractor needs to provide such services in order to carry out the Contractor's responsibilities for construction means, methods, techniques, sequences, and procedures. The Contractor shall not be required to provide professional services in violation of applicable law.

§ 3.12.10.1 If professional design services or certifications by a design professional related to systems, materials, or equipment are specifically required of the Contractor by the Contract Documents, the Owner and the Architect will specify all performance and design criteria that such services must satisfy. The Contractor shall be entitled to rely upon the adequacy and accuracy of the performance and design criteria provided in the Contract Documents. The Contractor shall cause such services or certifications to be provided by an appropriately licensed design professional,

whose signature and seal shall appear on all drawings, calculations, specifications, certifications, Shop Drawings, and other submittals prepared by such professional. Shop Drawings, and other submittals related to the Work, designed or certified by such professional, if prepared by others, shall bear such professional's written approval when submitted to the Architect. The Owner and the Architect shall be entitled to rely upon the adequacy and accuracy of the services, certifications, and approvals performed or provided by such design professionals, provided the Owner and Architect have specified to the Contractor the performance and design criteria that such services must satisfy. Pursuant to this Section 3.12.10, the Architect will review and approve or take other appropriate action on submittals only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents.

§ 3.12.10.2 If the Contract Documents require the Contractor's design professional to certify that the Work has been performed in accordance with the design criteria, the Contractor shall furnish such certifications to the Architect at the time and in the form specified by the Architect.

§ 3.13 Use of Site

The Contractor shall confine operations at the site to areas permitted by applicable laws, statutes, ordinances, codes, rules and regulations, lawful orders of public authorities, and the Contract Documents and shall not unreasonably encumber the site with materials or equipment.

§ 3.14 Cutting and Patching

§ 3.14.1 The Contractor shall be responsible for cutting, fitting, or patching required to complete the Work or to make its parts fit together properly. All areas requiring cutting, fitting, or patching shall be restored to the condition existing prior to the cutting, fitting, or patching, unless otherwise required by the Contract Documents.

§ 3.14.2 The Contractor shall not damage or endanger a portion of the Work or fully or partially completed construction of the Owner or Separate Contractors by cutting, patching, or otherwise altering such construction, or by excavation. The Contractor shall not cut or otherwise alter construction by the Owner or a Separate Contractor except with written consent of the Owner and of the Separate Contractor. Consent shall not be unreasonably withheld. The Contractor shall not unreasonably withhold, from the Owner or a Separate Contractor, its consent to cutting or otherwise altering the Work.

§ 3.15 Cleaning Up

§ 3.15.1 The Contractor shall keep the premises and surrounding area free from accumulation of waste materials and rubbish caused by operations under the Contract. At completion of the Work, the Contractor shall remove waste materials, rubbish, the Contractor's tools, construction equipment, machinery, and surplus materials from and about the Project.

§ 3.15.2 If the Contractor fails to clean up as provided in the Contract Documents, the Owner may do so and the Owner shall be entitled to reimbursement from the Contractor.

§ 3.16 Access to Work

The Contractor shall provide the Owner and Architect with access to the Work in preparation and progress wherever located.

§ 3.17 Royalties, Patents and Copyrights

The Contractor shall pay all royalties and license fees. The Contractor shall defend suits or claims for infringement of copyrights and patent rights and shall hold the Owner and Architect harmless from loss on account thereof, but shall not be responsible for defense or loss when a particular design, process, or product of a particular manufacturer or manufacturers is required by the Contract Documents, or where the copyright violations are contained in Drawings, Specifications, or other documents prepared by the Owner or Architect. However, if an infringement of a copyright or patent is discovered by, or made known to, the Contractor, the Contractor shall be responsible for the loss unless the information is promptly furnished to the Architect.

§ 3.18 Indemnification

§ 3.18.1 To the fullest extent permitted by law, the Contractor shall indemnify and hold harmless the Owner, Architect, Architect's consultants, and agents and employees of any of them from and against claims, damages, losses, and expenses, including but not limited to attorneys' fees, arising out of or resulting from performance of the Work,

provided that such claim, damage, loss, or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself), but only to the extent caused by the negligent acts or omissions of the Contractor, a Subcontractor, anyone directly or indirectly employed by them, or anyone for whose acts they may be liable, regardless of whether or not such claim, damage, loss, or expense is caused in part by a party indemnified hereunder. Such obligation shall not be construed to negate, abridge, or reduce other rights or obligations of indemnity that would otherwise exist as to a party or person described in this Section 3.18.

§ 3.18.2 In claims against any person or entity indemnified under this Section 3.18 by an employee of the Contractor, a Subcontractor, anyone directly or indirectly employed by them, or anyone for whose acts they may be liable, the indemnification obligation under Section 3.18.1 shall not be limited by a limitation on amount or type of damages, compensation, or benefits payable by or for the Contractor or a Subcontractor under workers' compensation acts, disability benefit acts, or other employee benefit acts.

ARTICLE 4 ARCHITECT

§ 4.1 General

§ 4.1.1 The Architect is the person or entity retained by the Owner pursuant to Section 2.3.2 and identified as such in the Agreement.

§ 4.1.2 Duties, responsibilities, and limitations of authority of the Architect as set forth in the Contract Documents shall not be restricted, modified, or extended without written consent of the Owner, Contractor, and Architect. Consent shall not be unreasonably withheld.

§ 4.2 Administration of the Contract

§ 4.2.1 The Architect will provide administration of the Contract as described in the Contract Documents and will be an Owner's representative during construction until the date the Architect issues the final Certificate for Payment. The Architect will have authority to act on behalf of the Owner only to the extent provided in the Contract Documents.

§ 4.2.2 The Architect will visit the site at intervals appropriate to the stage of construction, or as otherwise agreed with the Owner, to become generally familiar with the progress and quality of the portion of the Work completed, and to determine in general if the Work observed is being performed in a manner indicating that the Work, when fully completed, will be in accordance with the Contract Documents. However, the Architect will not be required to make exhaustive or continuous on-site inspections to check the quality or quantity of the Work. The Architect will not have control over, charge of, or responsibility for the construction means, methods, techniques, sequences or procedures, or for the safety precautions and programs in connection with the Work, since these are solely the Contractor's rights and responsibilities under the Contract Documents.

§ 4.2.3 On the basis of the site visits, the Architect will keep the Owner reasonably informed about the progress and quality of the portion of the Work completed, and promptly report to the Owner (1) known deviations from the Contract Documents, (2) known deviations from the most recent construction schedule submitted by the Contractor, and (3) defects and deficiencies observed in the Work. The Architect will not be responsible for the Contractor's failure to perform the Work in accordance with the requirements of the Contract Documents. The Architect will not have control over or charge of, and will not be responsible for acts or omissions of, the Contractor, Subcontractors, or their agents or employees, or any other persons or entities performing portions of the Work.

§ 4.2.4 Communications

The Owner and Contractor shall include the Architect in all communications that relate to or affect the Architect's services or professional responsibilities. The Owner shall promptly notify the Architect of the substance of any direct communications between the Owner and the Contractor otherwise relating to the Project. Communications by and with the Architect's consultants shall be through the Architect. Communications by and with Subcontractors and suppliers shall be through the Contractor. Communications by and with Separate Contractors shall be through the Owner. The Contract Documents may specify other communication protocols.

§ 4.2.5 Based on the Architect's evaluations of the Contractor's Applications for Payment, the Architect will review and certify the amounts due the Contractor and will issue Certificates for Payment in such amounts.

§ 4.2.6 The Architect has authority to reject Work that does not conform to the Contract Documents. Whenever the Architect considers it necessary or advisable, the Architect will have authority to require inspection or testing of the

Work in accordance with Sections 13.4.2 and 13.4.3, whether or not the Work is fabricated, installed or completed. However, neither this authority of the Architect nor a decision made in good faith either to exercise or not to exercise such authority shall give rise to a duty or responsibility of the Architect to the Contractor, Subcontractors, suppliers, their agents or employees, or other persons or entities performing portions of the Work.

§ 4.2.7 The Architect will review and approve, or take other appropriate action upon, the Contractor's submittals such as Shop Drawings, Product Data, and Samples, but only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents. The Architect's action will be taken in accordance with the submittal schedule approved by the Architect or, in the absence of an approved submittal schedule, with reasonable promptness while allowing sufficient time in the Architect's professional judgment to permit adequate review. Review of such submittals is not conducted for the purpose of determining the accuracy and completeness of other details such as dimensions and quantities, or for substantiating instructions for installation or performance of equipment or systems, all of which remain the responsibility of the Contractor as required by the Contract Documents. The Architect's review of the Contractor's submittals shall not relieve the Contractor of the obligations under Sections 3.3, 3.5, and 3.12. The Architect's review shall not constitute approval of safety precautions or of any construction means, methods, techniques, sequences, or procedures. The Architect's approval of a specific item shall not indicate approval of an assembly of which the item is a component.

§ 4.2.8 The Architect will prepare Change Orders and Construction Change Directives, and may order minor changes in the Work as provided in Section 7.4. The Architect will investigate and make determinations and recommendations regarding concealed and unknown conditions as provided in Section 3.7.4.

§ 4.2.9 The Architect will conduct inspections to determine the date or dates of Substantial Completion and the date of final completion; issue Certificates of Substantial Completion pursuant to Section 9.8; receive and forward to the Owner, for the Owner's review and records, written warranties and related documents required by the Contract and assembled by the Contractor pursuant to Section 9.10; and issue a final Certificate for Payment pursuant to Section 9.10.

§ 4.2.10 If the Owner and Architect agree, the Architect will provide one or more Project representatives to assist in carrying out the Architect's responsibilities at the site. The Owner shall notify the Contractor of any change in the duties, responsibilities and limitations of authority of the Project representatives.

§ 4.2.11 The Architect will interpret and decide matters concerning performance under, and requirements of, the Contract Documents on written request of either the Owner or Contractor. The Architect's response to such requests will be made in writing within any time limits agreed upon or otherwise with reasonable promptness.

§ 4.2.12 Interpretations and decisions of the Architect will be consistent with the intent of, and reasonably inferable from, the Contract Documents and will be in writing or in the form of drawings. When making such interpretations and decisions, the Architect will endeavor to secure faithful performance by both Owner and Contractor, will not show partiality to either, and will not be liable for results of interpretations or decisions rendered in good faith.

§ 4.2.13 The Architect's decisions on matters relating to aesthetic effect will be final if consistent with the intent expressed in the Contract Documents.

§ 4.2.14 The Architect will review and respond to requests for information about the Contract Documents. The Architect's response to such requests will be made in writing within any time limits agreed upon or otherwise with reasonable promptness. If appropriate, the Architect will prepare and issue supplemental Drawings and Specifications in response to the requests for information.

ARTICLE 5 SUBCONTRACTORS

§ 5.1 Definitions

§ 5.1.1 A Subcontractor is a person or entity who has a direct contract with the Contractor to perform a portion of the Work at the site. The term "Subcontractor" is referred to throughout the Contract Documents as if singular in number and means a Subcontractor or an authorized representative of the Subcontractor. The term "Subcontractor" does not include a Separate Contractor or the subcontractors of a Separate Contractor.

§ 5.1.2 A Sub-subcontractor is a person or entity who has a direct or indirect contract with a Subcontractor to perform a portion of the Work at the site. The term "Sub-subcontractor" is referred to throughout the Contract Documents as if singular in number and means a Sub-subcontractor or an authorized representative of the Sub-subcontractor.

§ 5.2 Award of Subcontracts and Other Contracts for Portions of the Work

§ 5.2.1 Unless otherwise stated in the Contract Documents, the Contractor, as soon as practicable after award of the Contract, shall notify the Owner and Architect of the persons or entities proposed for each principal portion of the Work, including those who are to furnish materials or equipment fabricated to a special design. Within 14 days of receipt of the information, the Architect may notify the Contractor whether the Owner or the Architect (1) has reasonable objection to any such proposed person or entity or (2) requires additional time for review. Failure of the Architect to provide notice within the 14-day period shall constitute notice of no reasonable objection.

§ 5.2.2 The Contractor shall not contract with a proposed person or entity to whom the Owner or Architect has made reasonable and timely objection. The Contractor shall not be required to contract with anyone to whom the Contractor has made reasonable objection.

§ 5.2.3 If the Owner or Architect has reasonable objection to a person or entity proposed by the Contractor, the Contractor shall propose another to whom the Owner or Architect has no reasonable objection. If the proposed but rejected Subcontractor was reasonably capable of performing the Work, the Contract Sum and Contract Time shall be increased or decreased by the difference, if any, occasioned by such change, and an appropriate Change Order shall be issued before commencement of the substitute Subcontractor's Work. However, no increase in the Contract Sum or Contract Time shall be allowed for such change unless the Contractor has acted promptly and responsively in submitting names as required.

§ 5.2.4 The Contractor shall not substitute a Subcontractor, person, or entity for one previously selected if the Owner or Architect makes reasonable objection to such substitution.

§ 5.3 Subcontractual Relations

By appropriate written agreement, the Contractor shall require each Subcontractor, to the extent of the Work to be performed by the Subcontractor, to be bound to the Contractor by terms of the Contract Documents, and to assume toward the Contractor all the obligations and responsibilities, including the responsibility for safety of the Subcontractor's Work that the Contractor, by these Contract Documents, assumes toward the Owner and Architect. Each subcontract agreement shall preserve and protect the rights of the Owner and Architect under the Contract Documents with respect to the Work to be performed by the Subcontractor so that subcontracting thereof will not prejudice such rights, and shall allow to the Subcontractor, unless specifically provided otherwise in the subcontract agreement, the benefit of all rights, remedies, and redress against the Contractor that the Contractor, by the Contract Documents, has against the Owner. Where appropriate, the Contractor shall require each Subcontractor to enter into similar agreements with Sub-subcontractors. The Contractor shall make available to each proposed Subcontractor, prior to the execution of the subcontract agreement, copies of the Contract Documents to which the Subcontractor will be bound, and, upon written request of the Subcontractor, identify to the Subcontractor terms and conditions of the proposed subcontract agreement that may be at variance with the Contract Documents. Subcontractors will similarly make copies of applicable portions of such documents available to their respective proposed Sub-subcontractors.

§ 5.4 Contingent Assignment of Subcontracts

§ 5.4.1 Each subcontract agreement for a portion of the Work is assigned by the Contractor to the Owner, provided that

- .1 assignment is effective only after termination of the Contract by the Owner for cause pursuant to Section 14.2 and only for those subcontract agreements that the Owner accepts by notifying the Subcontractor and Contractor; and
- .2 assignment is subject to the prior rights of the surety, if any, obligated under bond relating to the Contract.

When the Owner accepts the assignment of a subcontract agreement, the Owner assumes the Contractor's rights and obligations under the subcontract.

§ 5.4.2 Upon such assignment, if the Work has been suspended for more than 30 days, the Subcontractor's compensation shall be equitably adjusted for increases in cost resulting from the suspension.

§ 5.4.3 Upon assignment to the Owner under this Section 5.4, the Owner may further assign the subcontract to a successor contractor or other entity. If the Owner assigns the subcontract to a successor contractor or other entity, the Owner shall nevertheless remain legally responsible for all of the successor contractor's obligations under the subcontract.

ARTICLE 6 CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS

§ 6.1 Owner's Right to Perform Construction and to Award Separate Contracts

§ 6.1.1 The term "Separate Contractor(s)" shall mean other contractors retained by the Owner under separate agreements. The Owner reserves the right to perform construction or operations related to the Project with the Owner's own forces, and with Separate Contractors retained under Conditions of the Contract substantially similar to those of this Contract, including those provisions of the Conditions of the Contract related to insurance and waiver of subrogation.

§ 6.1.2 When separate contracts are awarded for different portions of the Project or other construction or operations on the site, the term "Contractor" in the Contract Documents in each case shall mean the Contractor who executes each separate Owner-Contractor Agreement.

§ 6.1.3 The Owner shall provide for coordination of the activities of the Owner's own forces and of each Separate Contractor with the Work of the Contractor, who shall cooperate with them. The Contractor shall participate with any Separate Contractors and the Owner in reviewing their construction schedules. The Contractor shall make any revisions to its construction schedule deemed necessary after a joint review and mutual agreement. The construction schedules shall then constitute the schedules to be used by the Contractor, Separate Contractors, and the Owner until subsequently revised.

§ 6.1.4 Unless otherwise provided in the Contract Documents, when the Owner performs construction or operations related to the Project with the Owner's own forces or with Separate Contractors, the Owner or its Separate Contractors shall have the same obligations and rights that the Contractor has under the Conditions of the Contract, including, without excluding others, those stated in Article 3, this Article 6, and Articles 10, 11, and 12.

§ 6.2 Mutual Responsibility

§ 6.2.1 The Contractor shall afford the Owner and Separate Contractors reasonable opportunity for introduction and storage of their materials and equipment and performance of their activities, and shall connect and coordinate the Contractor's construction and operations with theirs as required by the Contract Documents.

§ 6.2.2 If part of the Contractor's Work depends for proper execution or results upon construction or operations by the Owner or a Separate Contractor, the Contractor shall, prior to proceeding with that portion of the Work, promptly notify the Architect of apparent discrepancies or defects in the construction or operations by the Owner or Separate Contractor that would render it unsuitable for proper execution and results of the Contractor's Work. Failure of the Contractor to notify the Architect of apparent discrepancies or defects prior to proceeding with the Work shall constitute an acknowledgment that the Owner's or Separate Contractor's completed or partially completed construction is fit and proper to receive the Contractor's Work. The Contractor shall not be responsible for discrepancies or defects in the construction or operations by the Owner or Separate Contractor that are not apparent.

§ 6.2.3 The Contractor shall reimburse the Owner for costs the Owner incurs that are payable to a Separate Contractor because of the Contractor's delays, improperly timed activities or defective construction. The Owner shall be responsible to the Contractor for costs the Contractor incurs because of a Separate Contractor's delays, improperly timed activities, damage to the Work or defective construction.

§ 6.2.4 The Contractor shall promptly remedy damage that the Contractor wrongfully causes to completed or partially completed construction or to property of the Owner or Separate Contractor as provided in Section 10.2.5.

§ 6.2.5 The Owner and each Separate Contractor shall have the same responsibilities for cutting and patching as are described for the Contractor in Section 3.14.

§ 6.3 Owner's Right to Clean Up

If a dispute arises among the Contractor, Separate Contractors, and the Owner as to the responsibility under their respective contracts for maintaining the premises and surrounding area free from waste materials and rubbish, the Owner may clean up and the Architect will allocate the cost among those responsible.

ARTICLE 7 CHANGES IN THE WORK

§ 7.1 General

§ 7.1.1 Changes in the Work may be accomplished after execution of the Contract, and without invalidating the Contract, by Change Order, Construction Change Directive or order for a minor change in the Work, subject to the limitations stated in this Article 7 and elsewhere in the Contract Documents.

§ 7.1.2 A Change Order shall be based upon agreement among the Owner, Contractor, and Architect. A Construction Change Directive requires agreement by the Owner and Architect and may or may not be agreed to by the Contractor. An order for a minor change in the Work may be issued by the Architect alone.

§ 7.1.3 Changes in the Work shall be performed under applicable provisions of the Contract Documents. The Contractor shall proceed promptly with changes in the Work, unless otherwise provided in the Change Order, Construction Change Directive, or order for a minor change in the Work.

§ 7.2 Change Orders

§ 7.2.1 A Change Order is a written instrument prepared by the Architect and signed by the Owner, Contractor, and Architect stating their agreement upon all of the following:

- .1 The change in the Work;
- .2 The amount of the adjustment, if any, in the Contract Sum; and
- .3 The extent of the adjustment, if any, in the Contract Time.

§ 7.3 Construction Change Directives

§ 7.3.1 A Construction Change Directive is a written order prepared by the Architect and signed by the Owner and Architect, directing a change in the Work prior to agreement on adjustment, if any, in the Contract Sum or Contract Time, or both. The Owner may by Construction Change Directive, without invalidating the Contract, order changes in the Work within the general scope of the Contract consisting of additions, deletions, or other revisions, the Contract Sum and Contract Time being adjusted accordingly.

§ 7.3.2 A Construction Change Directive shall be used in the absence of total agreement on the terms of a Change Order.

§ 7.3.3 If the Construction Change Directive provides for an adjustment to the Contract Sum, the adjustment shall be based on one of the following methods:

- .1 Mutual acceptance of a lump sum properly itemized and supported by sufficient substantiating data to permit evaluation;
- .2 Unit prices stated in the Contract Documents or subsequently agreed upon;
- .3 Cost to be determined in a manner agreed upon by the parties and a mutually acceptable fixed or percentage fee; or
- .4 As provided in Section 7.3.4.

§ 7.3.4 If the Contractor does not respond promptly or disagrees with the method for adjustment in the Contract Sum, the Architect shall determine the adjustment on the basis of reasonable expenditures and savings of those performing the Work attributable to the change, including, in case of an increase in the Contract Sum, an amount for overhead and profit as set forth in the Agreement, or if no such amount is set forth in the Agreement, a reasonable amount. In such case, and also under Section 7.3.3, the Contractor shall keep and present, in such form as the Architect may prescribe, an itemized accounting together with appropriate supporting data. Unless otherwise provided in the Contract Documents, costs for the purposes of this Section 7.3.4 shall be limited to the following:

- .1 Costs of labor, including applicable payroll taxes, fringe benefits required by agreement or custom, workers' compensation insurance, and other employee costs approved by the Architect;
- .2 Costs of materials, supplies, and equipment, including cost of transportation, whether incorporated or consumed;

- .3 Rental costs of machinery and equipment, exclusive of hand tools, whether rented from the Contractor or others;
- .4 Costs of premiums for all bonds and insurance, permit fees, and sales, use, or similar taxes, directly related to the change; and
- .5 Costs of supervision and field office personnel directly attributable to the change.

§ 7.3.5 If the Contractor disagrees with the adjustment in the Contract Time, the Contractor may make a Claim in accordance with applicable provisions of Article 15.

§ 7.3.6 Upon receipt of a Construction Change Directive, the Contractor shall promptly proceed with the change in the Work involved and advise the Architect of the Contractor's agreement or disagreement with the method, if any, provided in the Construction Change Directive for determining the proposed adjustment in the Contract Sum or Contract Time.

§ 7.3.7 A Construction Change Directive signed by the Contractor indicates the Contractor's agreement therewith, including adjustment in Contract Sum and Contract Time or the method for determining them. Such agreement shall be effective immediately and shall be recorded as a Change Order.

§ 7.3.8 The amount of credit to be allowed by the Contractor to the Owner for a deletion or change that results in a net decrease in the Contract Sum shall be actual net cost as confirmed by the Architect. When both additions and credits covering related Work or substitutions are involved in a change, the allowance for overhead and profit shall be figured on the basis of net increase, if any, with respect to that change.

§ 7.3.9 Pending final determination of the total cost of a Construction Change Directive to the Owner, the Contractor may request payment for Work completed under the Construction Change Directive in Applications for Payment. The Architect will make an interim determination for purposes of monthly certification for payment for those costs and certify for payment the amount that the Architect determines, in the Architect's professional judgment, to be reasonably justified. The Architect's interim determination of cost shall adjust the Contract Sum on the same basis as a Change Order, subject to the right of either party to disagree and assert a Claim in accordance with Article 15.

§ 7.3.10 When the Owner and Contractor agree with a determination made by the Architect concerning the adjustments in the Contract Sum and Contract Time, or otherwise reach agreement upon the adjustments, such agreement shall be effective immediately and the Architect will prepare a Change Order. Change Orders may be issued for all or any part of a Construction Change Directive.

§ 7.4 Minor Changes in the Work

The Architect may order minor changes in the Work that are consistent with the intent of the Contract Documents and do not involve an adjustment in the Contract Sum or an extension of the Contract Time. The Architect's order for minor changes shall be in writing. If the Contractor believes that the proposed minor change in the Work will affect the Contract Sum or Contract Time, the Contractor shall notify the Architect and shall not proceed to implement the change in the Work. If the Contractor performs the Work set forth in the Architect's order for a minor change without prior notice to the Architect that such change will affect the Contract Sum or Contract Time, the Contractor waives any adjustment to the Contract Sum or extension of the Contract Time.

ARTICLE 8 TIME

§ 8.1 Definitions

§ 8.1.1 Unless otherwise provided, Contract Time is the period of time, including authorized adjustments, allotted in the Contract Documents for Substantial Completion of the Work.

§ 8.1.2 The date of commencement of the Work is the date established in the Agreement.

§ 8.1.3 The date of Substantial Completion is the date certified by the Architect in accordance with Section 9.8.

§ 8.1.4 The term "day" as used in the Contract Documents shall mean calendar day unless otherwise specifically defined.

§ 8.2 Progress and Completion

§ 8.2.1 Time limits stated in the Contract Documents are of the essence of the Contract. By executing the Agreement, the Contractor confirms that the Contract Time is a reasonable period for performing the Work.

§ 8.2.2 The Contractor shall not knowingly, except by agreement or instruction of the Owner in writing, commence the Work prior to the effective date of insurance required to be furnished by the Contractor and Owner.

§ 8.2.3 The Contractor shall proceed expeditiously with adequate forces and shall achieve Substantial Completion within the Contract Time.

§ 8.3 Delays and Extensions of Time

§ 8.3.1 If the Contractor is delayed at any time in the commencement or progress of the Work by (1) an act or neglect of the Owner or Architect, of an employee of either, or of a Separate Contractor; (2) by changes ordered in the Work; (3) by labor disputes, fire, unusual delay in deliveries, unavoidable casualties, adverse weather conditions documented in accordance with Section 15.1.6.2, or other causes beyond the Contractor's control; (4) by delay authorized by the Owner pending mediation and binding dispute resolution; or (5) by other causes that the Contractor asserts, and the Architect determines, justify delay, then the Contract Time shall be extended for such reasonable time as the Architect may determine.

§ 8.3.2 Claims relating to time shall be made in accordance with applicable provisions of Article 15.

§ 8.3.3 This Section 8.3 does not preclude recovery of damages for delay by either party under other provisions of the Contract Documents.

ARTICLE 9 PAYMENTS AND COMPLETION

§ 9.1 Contract Sum

§ 9.1.1 The Contract Sum is stated in the Agreement and, including authorized adjustments, is the total amount payable by the Owner to the Contractor for performance of the Work under the Contract Documents.

§ 9.1.2 If unit prices are stated in the Contract Documents or subsequently agreed upon, and if quantities originally contemplated are materially changed so that application of such unit prices to the actual quantities causes substantial inequity to the Owner or Contractor, the applicable unit prices shall be equitably adjusted.

§ 9.2 Schedule of Values

Where the Contract is based on a stipulated sum or Guaranteed Maximum Price, the Contractor shall submit a schedule of values to the Architect before the first Application for Payment, allocating the entire Contract Sum to the various portions of the Work. The schedule of values shall be prepared in the form, and supported by the data to substantiate its accuracy, required by the Architect. This schedule, unless objected to by the Architect, shall be used as a basis for reviewing the Contractor's Applications for Payment. Any changes to the schedule of values shall be submitted to the Architect and supported by such data to substantiate its accuracy as the Architect may require, and unless objected to by the Architect, shall be used as a basis for reviewing the Contractor's subsequent Applications for Payment.

§ 9.3 Applications for Payment

§ 9.3.1 At least ten days before the date established for each progress payment, the Contractor shall submit to the Architect an itemized Application for Payment prepared in accordance with the schedule of values, if required under Section 9.2, for completed portions of the Work. The application shall be notarized, if required, and supported by all data substantiating the Contractor's right to payment that the Owner or Architect require, such as copies of requisitions, and releases and waivers of liens from Subcontractors and suppliers, and shall reflect retainage if provided for in the Contract Documents.

§ 9.3.1.1 As provided in Section 7.3.9, such applications may include requests for payment on account of changes in the Work that have been properly authorized by Construction Change Directives, or by interim determinations of the Architect, but not yet included in Change Orders.

§ 9.3.1.2 Applications for Payment shall not include requests for payment for portions of the Work for which the Contractor does not intend to pay a Subcontractor or supplier, unless such Work has been performed by others whom the Contractor intends to pay.

§ 9.3.2 Unless otherwise provided in the Contract Documents, payments shall be made on account of materials and equipment delivered and suitably stored at the site for subsequent incorporation in the Work. If approved in advance by the Owner, payment may similarly be made for materials and equipment suitably stored off the site at a location agreed upon in writing. Payment for materials and equipment stored on or off the site shall be conditioned upon compliance by the Contractor with procedures satisfactory to the Owner to establish the Owner's title to such materials and equipment or otherwise protect the Owner's interest, and shall include the costs of applicable insurance, storage, and transportation to the site, for such materials and equipment stored off the site.

§ 9.3.3 The Contractor warrants that title to all Work covered by an Application for Payment will pass to the Owner no later than the time of payment. The Contractor further warrants that upon submittal of an Application for Payment all Work for which Certificates for Payment have been previously issued and payments received from the Owner shall, to the best of the Contractor's knowledge, information, and belief, be free and clear of liens, claims, security interests, or encumbrances, in favor of the Contractor, Subcontractors, suppliers, or other persons or entities that provided labor, materials, and equipment relating to the Work.

§ 9.4 Certificates for Payment

§ 9.4.1 The Architect will, within seven days after receipt of the Contractor's Application for Payment, either (1) issue to the Owner a Certificate for Payment in the full amount of the Application for Payment, with a copy to the Contractor; or (2) issue to the Owner a Certificate for Payment for such amount as the Architect determines is properly due, and notify the Contractor and Owner of the Architect's reasons for withholding certification in part as provided in Section 9.5.1; or (3) withhold certification of the entire Application for Payment, and notify the Contractor and Owner of the Architect's reason for withholding certification in whole as provided in Section 9.5.1.

§ 9.4.2 The issuance of a Certificate for Payment will constitute a representation by the Architect to the Owner, based on the Architect's evaluation of the Work and the data in the Application for Payment, that, to the best of the Architect's knowledge, information, and belief, the Work has progressed to the point indicated, the quality of the Work is in accordance with the Contract Documents, and that the Contractor is entitled to payment in the amount certified. The foregoing representations are subject to an evaluation of the Work for conformance with the Contract Documents upon Substantial Completion, to results of subsequent tests and inspections, to correction of minor deviations from the Contract Documents prior to completion, and to specific qualifications expressed by the Architect. However, the issuance of a Certificate for Payment will not be a representation that the Architect has (1) made exhaustive or continuous on-site inspections to check the quality or quantity of the Work; (2) reviewed construction means, methods, techniques, sequences, or procedures; (3) reviewed copies of requisitions received from Subcontractors and suppliers and other data requested by the Owner to substantiate the Contractor's right to payment; or (4) made examination to ascertain how or for what purpose the Contractor has used money previously paid on account of the Contract Sum.

§ 9.5 Decisions to Withhold Certification

§ 9.5.1 The Architect may withhold a Certificate for Payment in whole or in part, to the extent reasonably necessary to protect the Owner, if in the Architect's opinion the representations to the Owner required by Section 9.4.2 cannot be made. If the Architect is unable to certify payment in the amount of the Application, the Architect will notify the Contractor and Owner as provided in Section 9.4.1. If the Contractor and Architect cannot agree on a revised amount, the Architect will promptly issue a Certificate for Payment for the amount for which the Architect is able to make such representations to the Owner. The Architect may also withhold a Certificate for Payment or, because of subsequently discovered evidence, may nullify the whole or a part of a Certificate for Payment previously issued, to such extent as may be necessary in the Architect's opinion to protect the Owner from loss for which the Contractor is responsible, including loss resulting from acts and omissions described in Section 3.3.2, because of

- .1 defective Work not remedied;
- .2 third party claims filed or reasonable evidence indicating probable filing of such claims, unless security acceptable to the Owner is provided by the Contractor;
- .3 failure of the Contractor to make payments properly to Subcontractors or suppliers for labor, materials or equipment;
- .4 reasonable evidence that the Work cannot be completed for the unpaid balance of the Contract Sum;

- .5 damage to the Owner or a Separate Contractor;
- .6 reasonable evidence that the Work will not be completed within the Contract Time, and that the unpaid balance would not be adequate to cover actual or liquidated damages for the anticipated delay; or
- .7 repeated failure to carry out the Work in accordance with the Contract Documents.

§ 9.5.2 When either party disputes the Architect's decision regarding a Certificate for Payment under Section 9.5.1, in whole or in part, that party may submit a Claim in accordance with Article 15.

§ 9.5.3 When the reasons for withholding certification are removed, certification will be made for amounts previously withheld.

§ 9.5.4 If the Architect withholds certification for payment under Section 9.5.1.3, the Owner may, at its sole option, issue joint checks to the Contractor and to any Subcontractor or supplier to whom the Contractor failed to make payment for Work properly performed or material or equipment suitably delivered. If the Owner makes payments by joint check, the Owner shall notify the Architect and the Contractor shall reflect such payment on its next Application for Payment.

§ 9.6 Progress Payments

§ 9.6.1 After the Architect has issued a Certificate for Payment, the Owner shall make payment in the manner and within the time provided in the Contract Documents, and shall so notify the Architect.

§ 9.6.2 The Contractor shall pay each Subcontractor, no later than seven days after receipt of payment from the Owner, the amount to which the Subcontractor is entitled, reflecting percentages actually retained from payments to the Contractor on account of the Subcontractor's portion of the Work. The Contractor shall, by appropriate agreement with each Subcontractor, require each Subcontractor to make payments to Sub-subcontractors in a similar manner.

§ 9.6.3 The Architect will, on request, furnish to a Subcontractor, if practicable, information regarding percentages of completion or amounts applied for by the Contractor and action taken thereon by the Architect and Owner on account of portions of the Work done by such Subcontractor.

§ 9.6.4 The Owner has the right to request written evidence from the Contractor that the Contractor has properly paid Subcontractors and suppliers amounts paid by the Owner to the Contractor for subcontracted Work. If the Contractor fails to furnish such evidence within seven days, the Owner shall have the right to contact Subcontractors and suppliers to ascertain whether they have been properly paid. Neither the Owner nor Architect shall have an obligation to pay, or to see to the payment of money to, a Subcontractor or supplier, except as may otherwise be required by law.

§ 9.6.5 The Contractor's payments to suppliers shall be treated in a manner similar to that provided in Sections 9.6.2, 9.6.3 and 9.6.4.

§ 9.6.6 A Certificate for Payment, a progress payment, or partial or entire use or occupancy of the Project by the Owner shall not constitute acceptance of Work not in accordance with the Contract Documents.

§ 9.6.7 Unless the Contractor provides the Owner with a payment bond in the full penal sum of the Contract Sum, payments received by the Contractor for Work properly performed by Subcontractors or provided by suppliers shall be held by the Contractor for those Subcontractors or suppliers who performed Work or furnished materials, or both, under contract with the Contractor for which payment was made by the Owner. Nothing contained herein shall require money to be placed in a separate account and not commingled with money of the Contractor, create any fiduciary liability or tort liability on the part of the Contractor for breach of trust, or entitle any person or entity to an award of punitive damages against the Contractor for breach of the requirements of this provision.

§ 9.6.8 Provided the Owner has fulfilled its payment obligations under the Contract Documents, the Contractor shall defend and indemnify the Owner from all loss, liability, damage or expense, including reasonable attorney's fees and litigation expenses, arising out of any lien claim or other claim for payment by any Subcontractor or supplier of any tier. Upon receipt of notice of a lien claim or other claim for payment, the Owner shall notify the Contractor. If approved by the applicable court, when required, the Contractor may substitute a surety bond for the property against which the lien or other claim for payment has been asserted.

§ 9.7 Failure of Payment

If the Architect does not issue a Certificate for Payment, through no fault of the Contractor, within seven days after receipt of the Contractor's Application for Payment, or if the Owner does not pay the Contractor within seven days after the date established in the Contract Documents, the amount certified by the Architect or awarded by binding dispute resolution, then the Contractor may, upon seven additional days' notice to the Owner and Architect, stop the Work until payment of the amount owing has been received. The Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable costs of shutdown, delay and start-up, plus interest as provided for in the Contract Documents.

§ 9.8 Substantial Completion

§ 9.8.1 Substantial Completion is the stage in the progress of the Work when the Work or designated portion thereof is sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work for its intended use.

§ 9.8.2 When the Contractor considers that the Work, or a portion thereof which the Owner agrees to accept separately, is substantially complete, the Contractor shall prepare and submit to the Architect a comprehensive list of items to be completed or corrected prior to final payment. Failure to include an item on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents.

§ 9.8.3 Upon receipt of the Contractor's list, the Architect will make an inspection to determine whether the Work or designated portion thereof is substantially complete. If the Architect's inspection discloses any item, whether or not included on the Contractor's list, which is not sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work or designated portion thereof for its intended use, the Contractor shall, before issuance of the Certificate of Substantial Completion, complete or correct such item upon notification by the Architect. In such case, the Contractor shall then submit a request for another inspection by the Architect to determine Substantial Completion.

§ 9.8.4 When the Work or designated portion thereof is substantially complete, the Architect will prepare a Certificate of Substantial Completion that shall establish the date of Substantial Completion; establish responsibilities of the Owner and Contractor for security, maintenance, heat, utilities, damage to the Work and insurance; and fix the time within which the Contractor shall finish all items on the list accompanying the Certificate. Warranties required by the Contract Documents shall commence on the date of Substantial Completion of the Work or designated portion thereof unless otherwise provided in the Certificate of Substantial Completion.

§ 9.8.5 The Certificate of Substantial Completion shall be submitted to the Owner and Contractor for their written acceptance of responsibilities assigned to them in the Certificate. Upon such acceptance, and consent of surety if any, the Owner shall make payment of retainage applying to the Work or designated portion thereof. Such payment shall be adjusted for Work that is incomplete or not in accordance with the requirements of the Contract Documents.

§ 9.9 Partial Occupancy or Use

§ 9.9.1 The Owner may occupy or use any completed or partially completed portion of the Work at any stage when such portion is designated by separate agreement with the Contractor, provided such occupancy or use is consented to by the insurer and authorized by public authorities having jurisdiction over the Project. Such partial occupancy or use may commence whether or not the portion is substantially complete, provided the Owner and Contractor have accepted in writing the responsibilities assigned to each of them for payments, retainage, if any, security, maintenance, heat, utilities, damage to the Work and insurance, and have agreed in writing concerning the period for correction of the Work and commencement of warranties required by the Contract Documents. When the Contractor considers a portion substantially complete, the Contractor shall prepare and submit a list to the Architect as provided under Section 9.8.2. Consent of the Contractor to partial occupancy or use shall not be unreasonably withheld. The stage of the progress of the Work shall be determined by written agreement between the Owner and Contractor or, if no agreement is reached, by decision of the Architect.

§ 9.9.2 Immediately prior to such partial occupancy or use, the Owner, Contractor, and Architect shall jointly inspect the area to be occupied or portion of the Work to be used in order to determine and record the condition of the Work.

§ 9.9.3 Unless otherwise agreed upon, partial occupancy or use of a portion or portions of the Work shall not constitute acceptance of Work not complying with the requirements of the Contract Documents.

§ 9.10 Final Completion and Final Payment

§ 9.10.1 Upon receipt of the Contractor's notice that the Work is ready for final inspection and acceptance and upon receipt of a final Application for Payment, the Architect will promptly make such inspection. When the Architect finds the Work acceptable under the Contract Documents and the Contract fully performed, the Architect will promptly issue a final Certificate for Payment stating that to the best of the Architect's knowledge, information and belief, and on the basis of the Architect's on-site visits and inspections, the Work has been completed in accordance with the Contract Documents and that the entire balance found to be due the Contractor and noted in the final Certificate is due and payable. The Architect's final Certificate for Payment will constitute a further representation that conditions listed in Section 9.10.2 as precedent to the Contractor's being entitled to final payment have been fulfilled.

§ 9.10.2 Neither final payment nor any remaining retained percentage shall become due until the Contractor submits to the Architect (1) an affidavit that payrolls, bills for materials and equipment, and other indebtedness connected with the Work for which the Owner or the Owner's property might be responsible or encumbered (less amounts withheld by Owner) have been paid or otherwise satisfied, (2) a certificate evidencing that insurance required by the Contract Documents to remain in force after final payment is currently in effect, (3) a written statement that the Contractor knows of no reason that the insurance will not be renewable to cover the period required by the Contract Documents, (4) consent of surety, if any, to final payment, (5) documentation of any special warranties, such as manufacturers' warranties or specific Subcontractor warranties, and (6) if required by the Owner, other data establishing payment or satisfaction of obligations, such as receipts and releases and waivers of liens, claims, security interests, or encumbrances arising out of the Contract, to the extent and in such form as may be designated by the Owner. If a Subcontractor refuses to furnish a release or waiver required by the Owner, the Contractor may furnish a bond satisfactory to the Owner to indemnify the Owner against such lien, claim, security interest, or encumbrance. If a lien, claim, security interest, or encumbrance remains unsatisfied after payments are made, the Contractor shall refund to the Owner all money that the Owner may be compelled to pay in discharging the lien, claim, security interest, or encumbrance, including all costs and reasonable attorneys' fees.

§ 9.10.3 If, after Substantial Completion of the Work, final completion thereof is materially delayed through no fault of the Contractor or by issuance of Change Orders affecting final completion, and the Architect so confirms, the Owner shall, upon application by the Contractor and certification by the Architect, and without terminating the Contract, make payment of the balance due for that portion of the Work fully completed, corrected, and accepted. If the remaining balance for Work not fully completed or corrected is less than retainage stipulated in the Contract Documents, and if bonds have been furnished, the written consent of the surety to payment of the balance due for that portion of the Work fully completed and accepted shall be submitted by the Contractor to the Architect prior to certification of such payment. Such payment shall be made under terms and conditions governing final payment, except that it shall not constitute a waiver of Claims.

§ 9.10.4 The making of final payment shall constitute a waiver of Claims by the Owner except those arising from

- .1 liens, Claims, security interests, or encumbrances arising out of the Contract and unsettled;
- .2 failure of the Work to comply with the requirements of the Contract Documents;
- .3 terms of special warranties required by the Contract Documents; or
- .4 audits performed by the Owner, if permitted by the Contract Documents, after final payment.

§ 9.10.5 Acceptance of final payment by the Contractor, a Subcontractor, or a supplier, shall constitute a waiver of claims by that payee except those previously made in writing and identified by that payee as unsettled at the time of final Application for Payment.

ARTICLE 10 PROTECTION OF PERSONS AND PROPERTY

§ 10.1 Safety Precautions and Programs

The Contractor shall be responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with the performance of the Contract.

§ 10.2 Safety of Persons and Property

§ 10.2.1 The Contractor shall take reasonable precautions for safety of, and shall provide reasonable protection to prevent damage, injury, or loss to

- .1 employees on the Work and other persons who may be affected thereby;

- .2 the Work and materials and equipment to be incorporated therein, whether in storage on or off the site, under care, custody, or control of the Contractor, a Subcontractor, or a Sub-subcontractor; and
- .3 other property at the site or adjacent thereto, such as trees, shrubs, lawns, walks, pavements, roadways, structures, and utilities not designated for removal, relocation, or replacement in the course of construction.

§ 10.2.2 The Contractor shall comply with, and give notices required by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities, bearing on safety of persons or property or their protection from damage, injury, or loss.

§ 10.2.3 The Contractor shall implement, erect, and maintain, as required by existing conditions and performance of the Contract, reasonable safeguards for safety and protection, including posting danger signs and other warnings against hazards; promulgating safety regulations; and notifying the owners and users of adjacent sites and utilities of the safeguards.

§ 10.2.4 When use or storage of explosives or other hazardous materials or equipment, or unusual methods are necessary for execution of the Work, the Contractor shall exercise utmost care and carry on such activities under supervision of properly qualified personnel.

§ 10.2.5 The Contractor shall promptly remedy damage and loss (other than damage or loss insured under property insurance required by the Contract Documents) to property referred to in Sections 10.2.1.2 and 10.2.1.3 caused in whole or in part by the Contractor, a Subcontractor, a Sub-subcontractor, or anyone directly or indirectly employed by any of them, or by anyone for whose acts they may be liable and for which the Contractor is responsible under Sections 10.2.1.2 and 10.2.1.3. The Contractor may make a Claim for the cost to remedy the damage or loss to the extent such damage or loss is attributable to acts or omissions of the Owner or Architect or anyone directly or indirectly employed by either of them, or by anyone for whose acts either of them may be liable, and not attributable to the fault or negligence of the Contractor. The foregoing obligations of the Contractor are in addition to the Contractor's obligations under Section 3.18.

§ 10.2.6 The Contractor shall designate a responsible member of the Contractor's organization at the site whose duty shall be the prevention of accidents. This person shall be the Contractor's superintendent unless otherwise designated by the Contractor in writing to the Owner and Architect.

§ 10.2.7 The Contractor shall not permit any part of the construction or site to be loaded so as to cause damage or create an unsafe condition.

§ 10.2.8 Injury or Damage to Person or Property

If either party suffers injury or damage to person or property because of an act or omission of the other party, or of others for whose acts such party is legally responsible, notice of the injury or damage, whether or not insured, shall be given to the other party within a reasonable time not exceeding 21 days after discovery. The notice shall provide sufficient detail to enable the other party to investigate the matter.

§ 10.3 Hazardous Materials and Substances

§ 10.3.1 The Contractor is responsible for compliance with any requirements included in the Contract Documents regarding hazardous materials or substances. If the Contractor encounters a hazardous material or substance not addressed in the Contract Documents and if reasonable precautions will be inadequate to prevent foreseeable bodily injury or death to persons resulting from a material or substance, including but not limited to asbestos or polychlorinated biphenyl (PCB), encountered on the site by the Contractor, the Contractor shall, upon recognizing the condition, immediately stop Work in the affected area and notify the Owner and Architect of the condition.

§ 10.3.2 Upon receipt of the Contractor's notice, the Owner shall obtain the services of a licensed laboratory to verify the presence or absence of the material or substance reported by the Contractor and, in the event such material or substance is found to be present, to cause it to be rendered harmless. Unless otherwise required by the Contract Documents, the Owner shall furnish in writing to the Contractor and Architect the names and qualifications of persons or entities who are to perform tests verifying the presence or absence of the material or substance or who are to perform the task of removal or safe containment of the material or substance. The Contractor and the Architect will promptly reply to the Owner in writing stating whether or not either has reasonable objection to the persons or entities

proposed by the Owner. If either the Contractor or Architect has an objection to a person or entity proposed by the Owner, the Owner shall propose another to whom the Contractor and the Architect have no reasonable objection. When the material or substance has been rendered harmless, Work in the affected area shall resume upon written agreement of the Owner and Contractor. By Change Order, the Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable additional costs of shutdown, delay, and start-up.

§ 10.3.3 To the fullest extent permitted by law, the Owner shall indemnify and hold harmless the Contractor, Subcontractors, Architect, Architect's consultants, and agents and employees of any of them from and against claims, damages, losses, and expenses, including but not limited to attorneys' fees, arising out of or resulting from performance of the Work in the affected area if in fact the material or substance presents the risk of bodily injury or death as described in Section 10.3.1 and has not been rendered harmless, provided that such claim, damage, loss, or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself), except to the extent that such damage, loss, or expense is due to the fault or negligence of the party seeking indemnity.

§ 10.3.4 The Owner shall not be responsible under this Section 10.3 for hazardous materials or substances the Contractor brings to the site unless such materials or substances are required by the Contract Documents. The Owner shall be responsible for hazardous materials or substances required by the Contract Documents, except to the extent of the Contractor's fault or negligence in the use and handling of such materials or substances.

§ 10.3.5 The Contractor shall reimburse the Owner for the cost and expense the Owner incurs (1) for remediation of hazardous materials or substances the Contractor brings to the site and negligently handles, or (2) where the Contractor fails to perform its obligations under Section 10.3.1, except to the extent that the cost and expense are due to the Owner's fault or negligence.

§ 10.3.6 If, without negligence on the part of the Contractor, the Contractor is held liable by a government agency for the cost of remediation of a hazardous material or substance solely by reason of performing Work as required by the Contract Documents, the Owner shall reimburse the Contractor for all cost and expense thereby incurred.

§ 10.4 Emergencies

In an emergency affecting safety of persons or property, the Contractor shall act, at the Contractor's discretion, to prevent threatened damage, injury, or loss. Additional compensation or extension of time claimed by the Contractor on account of an emergency shall be determined as provided in Article 15 and Article 7.

ARTICLE 11 INSURANCE AND BONDS

§ 11.1 Contractor's Insurance and Bonds

§ 11.1.1 The Contractor shall purchase and maintain insurance of the types and limits of liability, containing the endorsements, and subject to the terms and conditions, as described in the Agreement or elsewhere in the Contract Documents. The Contractor shall purchase and maintain the required insurance from an insurance company or insurance companies lawfully authorized to issue insurance in the jurisdiction where the Project is located. The Owner, Architect, and Architect's consultants shall be named as additional insureds under the Contractor's commercial general liability policy or as otherwise described in the Contract Documents.

§ 11.1.2 The Contractor shall provide surety bonds of the types, for such penal sums, and subject to such terms and conditions as required by the Contract Documents. The Contractor shall purchase and maintain the required bonds from a company or companies lawfully authorized to issue surety bonds in the jurisdiction where the Project is located.

§ 11.1.3 Upon the request of any person or entity appearing to be a potential beneficiary of bonds covering payment of obligations arising under the Contract, the Contractor shall promptly furnish a copy of the bonds or shall authorize a copy to be furnished.

§ 11.1.4 **Notice of Cancellation or Expiration of Contractor's Required Insurance.** Within three (3) business days of the date the Contractor becomes aware of an impending or actual cancellation or expiration of any insurance required by the Contract Documents, the Contractor shall provide notice to the Owner of such impending or actual cancellation or expiration. Upon receipt of notice from the Contractor, the Owner shall, unless the lapse in coverage arises from an act or omission of the Owner, have the right to stop the Work until the lapse in coverage has been cured by the

procurement of replacement coverage by the Contractor. The furnishing of notice by the Contractor shall not relieve the Contractor of any contractual obligation to provide any required coverage.

§ 11.2 Owner's Insurance

§ 11.2.1 The Owner shall purchase and maintain insurance of the types and limits of liability, containing the endorsements, and subject to the terms and conditions, as described in the Agreement or elsewhere in the Contract Documents. The Owner shall purchase and maintain the required insurance from an insurance company or insurance companies lawfully authorized to issue insurance in the jurisdiction where the Project is located.

§ 11.2.2 Failure to Purchase Required Property Insurance. If the Owner fails to purchase and maintain the required property insurance, with all of the coverages and in the amounts described in the Agreement or elsewhere in the Contract Documents, the Owner shall inform the Contractor in writing prior to commencement of the Work. Upon receipt of notice from the Owner, the Contractor may delay commencement of the Work and may obtain insurance that will protect the interests of the Contractor, Subcontractors, and Sub-Subcontractors in the Work. When the failure to provide coverage has been cured or resolved, the Contract Sum and Contract Time shall be equitably adjusted. In the event the Owner fails to procure coverage, the Owner waives all rights against the Contractor, Subcontractors, and Sub-subcontractors to the extent the loss to the Owner would have been covered by the insurance to have been procured by the Owner. The cost of the insurance shall be charged to the Owner by a Change Order. If the Owner does not provide written notice, and the Contractor is damaged by the failure or neglect of the Owner to purchase or maintain the required insurance, the Owner shall reimburse the Contractor for all reasonable costs and damages attributable thereto.

§ 11.2.3 Notice of Cancellation or Expiration of Owner's Required Property Insurance. Within three (3) business days of the date the Owner becomes aware of an impending or actual cancellation or expiration of any property insurance required by the Contract Documents, the Owner shall provide notice to the Contractor of such impending or actual cancellation or expiration. Unless the lapse in coverage arises from an act or omission of the Contractor: (1) the Contractor, upon receipt of notice from the Owner, shall have the right to stop the Work until the lapse in coverage has been cured by the procurement of replacement coverage by either the Owner or the Contractor; (2) the Contract Time and Contract Sum shall be equitably adjusted; and (3) the Owner waives all rights against the Contractor, Subcontractors, and Sub-subcontractors to the extent any loss to the Owner would have been covered by the insurance had it not expired or been cancelled. If the Contractor purchases replacement coverage, the cost of the insurance shall be charged to the Owner by an appropriate Change Order. The furnishing of notice by the Owner shall not relieve the Owner of any contractual obligation to provide required insurance.

§ 11.3 Waivers of Subrogation

§ 11.3.1 The Owner and Contractor waive all rights against (1) each other and any of their subcontractors, sub-subcontractors, agents, and employees, each of the other; (2) the Architect and Architect's consultants; and (3) Separate Contractors, if any, and any of their subcontractors, sub-subcontractors, agents, and employees, for damages caused by fire, or other causes of loss, to the extent those losses are covered by property insurance required by the Agreement or other property insurance applicable to the Project, except such rights as they have to proceeds of such insurance. The Owner or Contractor, as appropriate, shall require similar written waivers in favor of the individuals and entities identified above from the Architect, Architect's consultants, Separate Contractors, subcontractors, and sub-subcontractors. The policies of insurance purchased and maintained by each person or entity agreeing to waive claims pursuant to this section 11.3.1 shall not prohibit this waiver of subrogation. This waiver of subrogation shall be effective as to a person or entity (1) even though that person or entity would otherwise have a duty of indemnification, contractual or otherwise, (2) even though that person or entity did not pay the insurance premium directly or indirectly, or (3) whether or not the person or entity had an insurable interest in the damaged property.

§ 11.3.2 If during the Project construction period the Owner insures properties, real or personal or both, at or adjacent to the site by property insurance under policies separate from those insuring the Project, or if after final payment property insurance is to be provided on the completed Project through a policy or policies other than those insuring the Project during the construction period, to the extent permissible by such policies, the Owner waives all rights in accordance with the terms of Section 11.3.1 for damages caused by fire or other causes of loss covered by this separate property insurance.

§ 11.4 Loss of Use, Business Interruption, and Delay in Completion Insurance

The Owner, at the Owner's option, may purchase and maintain insurance that will protect the Owner against loss of use of the Owner's property, or the inability to conduct normal operations, due to fire or other causes of loss. The Owner waives all rights of action against the Contractor and Architect for loss of use of the Owner's property, due to fire or other hazards however caused.

§11.5 Adjustment and Settlement of Insured Loss

§ 11.5.1 A loss insured under the property insurance required by the Agreement shall be adjusted by the Owner as fiduciary and made payable to the Owner as fiduciary for the insureds, as their interests may appear, subject to requirements of any applicable mortgagee clause and of Section 11.5.2. The Owner shall pay the Architect and Contractor their just shares of insurance proceeds received by the Owner, and by appropriate agreements the Architect and Contractor shall make payments to their consultants and Subcontractors in similar manner.

§ 11.5.2 Prior to settlement of an insured loss, the Owner shall notify the Contractor of the terms of the proposed settlement as well as the proposed allocation of the insurance proceeds. The Contractor shall have 14 days from receipt of notice to object to the proposed settlement or allocation of the proceeds. If the Contractor does not object, the Owner shall settle the loss and the Contractor shall be bound by the settlement and allocation. Upon receipt, the Owner shall deposit the insurance proceeds in a separate account and make the appropriate distributions. Thereafter, if no other agreement is made or the Owner does not terminate the Contract for convenience, the Owner and Contractor shall execute a Change Order for reconstruction of the damaged or destroyed Work in the amount allocated for that purpose. If the Contractor timely objects to either the terms of the proposed settlement or the allocation of the proceeds, the Owner may proceed to settle the insured loss, and any dispute between the Owner and Contractor arising out of the settlement or allocation of the proceeds shall be resolved pursuant to Article 15. Pending resolution of any dispute, the Owner may issue a Construction Change Directive for the reconstruction of the damaged or destroyed Work.

ARTICLE 12 UNCOVERING AND CORRECTION OF WORK

§ 12.1 Uncovering of Work

§ 12.1.1 If a portion of the Work is covered contrary to the Architect's request or to requirements specifically expressed in the Contract Documents, it must, if requested in writing by the Architect, be uncovered for the Architect's examination and be replaced at the Contractor's expense without change in the Contract Time.

§ 12.1.2 If a portion of the Work has been covered that the Architect has not specifically requested to examine prior to its being covered, the Architect may request to see such Work and it shall be uncovered by the Contractor. If such Work is in accordance with the Contract Documents, the Contractor shall be entitled to an equitable adjustment to the Contract Sum and Contract Time as may be appropriate. If such Work is not in accordance with the Contract Documents, the costs of uncovering the Work, and the cost of correction, shall be at the Contractor's expense.

§ 12.2 Correction of Work

§ 12.2.1 Before Substantial Completion

The Contractor shall promptly correct Work rejected by the Architect or failing to conform to the requirements of the Contract Documents, discovered before Substantial Completion and whether or not fabricated, installed or completed. Costs of correcting such rejected Work, including additional testing and inspections, the cost of uncovering and replacement, and compensation for the Architect's services and expenses made necessary thereby, shall be at the Contractor's expense.

§ 12.2.2 After Substantial Completion

§ 12.2.2.1 In addition to the Contractor's obligations under Section 3.5, if, within one year after the date of Substantial Completion of the Work or designated portion thereof or after the date for commencement of warranties established under Section 9.9.1, or by terms of any applicable special warranty required by the Contract Documents, any of the Work is found to be not in accordance with the requirements of the Contract Documents, the Contractor shall correct it promptly after receipt of notice from the Owner to do so, unless the Owner has previously given the Contractor a written acceptance of such condition. The Owner shall give such notice promptly after discovery of the condition. During the one-year period for correction of Work, if the Owner fails to notify the Contractor and give the Contractor an opportunity to make the correction, the Owner waives the rights to require correction by the Contractor and to make a claim for breach of warranty. If the Contractor fails to correct nonconforming Work within a reasonable time during that period after receipt of notice from the Owner or Architect, the Owner may correct it in accordance with Section 2.5.

§ 12.2.2.2 The one-year period for correction of Work shall be extended with respect to portions of Work first performed after Substantial Completion by the period of time between Substantial Completion and the actual completion of that portion of the Work.

§ 12.2.2.3 The one-year period for correction of Work shall not be extended by corrective Work performed by the Contractor pursuant to this Section 12.2.

§ 12.2.3 The Contractor shall remove from the site portions of the Work that are not in accordance with the requirements of the Contract Documents and are neither corrected by the Contractor nor accepted by the Owner.

§ 12.2.4 The Contractor shall bear the cost of correcting destroyed or damaged construction of the Owner or Separate Contractors, whether completed or partially completed, caused by the Contractor's correction or removal of Work that is not in accordance with the requirements of the Contract Documents.

§ 12.2.5 Nothing contained in this Section 12.2 shall be construed to establish a period of limitation with respect to other obligations the Contractor has under the Contract Documents. Establishment of the one-year period for correction of Work as described in Section 12.2.2 relates only to the specific obligation of the Contractor to correct the Work, and has no relationship to the time within which the obligation to comply with the Contract Documents may be sought to be enforced, nor to the time within which proceedings may be commenced to establish the Contractor's liability with respect to the Contractor's obligations other than specifically to correct the Work.

§ 12.3 Acceptance of Nonconforming Work

If the Owner prefers to accept Work that is not in accordance with the requirements of the Contract Documents, the Owner may do so instead of requiring its removal and correction, in which case the Contract Sum will be reduced as appropriate and equitable. Such adjustment shall be effected whether or not final payment has been made.

ARTICLE 13 MISCELLANEOUS PROVISIONS

§ 13.1 Governing Law

The Contract shall be governed by the law of the place where the Project is located, excluding that jurisdiction's choice of law rules. If the parties have selected arbitration as the method of binding dispute resolution, the Federal Arbitration Act shall govern Section 15.4.

§ 13.2 Successors and Assigns

§ 13.2.1 The Owner and Contractor respectively bind themselves, their partners, successors, assigns, and legal representatives to covenants, agreements, and obligations contained in the Contract Documents. Except as provided in Section 13.2.2, neither party to the Contract shall assign the Contract as a whole without written consent of the other. If either party attempts to make an assignment without such consent, that party shall nevertheless remain legally responsible for all obligations under the Contract.

§ 13.2.2 The Owner may, without consent of the Contractor, assign the Contract to a lender providing construction financing for the Project, if the lender assumes the Owner's rights and obligations under the Contract Documents. The Contractor shall execute all consents reasonably required to facilitate the assignment.

§ 13.3 Rights and Remedies

§ 13.3.1 Duties and obligations imposed by the Contract Documents and rights and remedies available thereunder shall be in addition to and not a limitation of duties, obligations, rights, and remedies otherwise imposed or available by law.

§ 13.3.2 No action or failure to act by the Owner, Architect, or Contractor shall constitute a waiver of a right or duty afforded them under the Contract, nor shall such action or failure to act constitute approval of or acquiescence in a breach thereunder, except as may be specifically agreed upon in writing.

§ 13.4 Tests and Inspections

§ 13.4.1 Tests, inspections, and approvals of portions of the Work shall be made as required by the Contract Documents and by applicable laws, statutes, ordinances, codes, rules, and regulations or lawful orders of public authorities. Unless otherwise provided, the Contractor shall make arrangements for such tests, inspections, and

approvals with an independent testing laboratory or entity acceptable to the Owner, or with the appropriate public authority, and shall bear all related costs of tests, inspections, and approvals. The Contractor shall give the Architect timely notice of when and where tests and inspections are to be made so that the Architect may be present for such procedures. The Owner shall bear costs of tests, inspections, or approvals that do not become requirements until after bids are received or negotiations concluded. The Owner shall directly arrange and pay for tests, inspections, or approvals where building codes or applicable laws or regulations so require.

§ 13.4.2 If the Architect, Owner, or public authorities having jurisdiction determine that portions of the Work require additional testing, inspection, or approval not included under Section 13.4.1, the Architect will, upon written authorization from the Owner, instruct the Contractor to make arrangements for such additional testing, inspection, or approval, by an entity acceptable to the Owner, and the Contractor shall give timely notice to the Architect of when and where tests and inspections are to be made so that the Architect may be present for such procedures. Such costs, except as provided in Section 13.4.3, shall be at the Owner's expense.

§ 13.4.3 If procedures for testing, inspection, or approval under Sections 13.4.1 and 13.4.2 reveal failure of the portions of the Work to comply with requirements established by the Contract Documents, all costs made necessary by such failure, including those of repeated procedures and compensation for the Architect's services and expenses, shall be at the Contractor's expense.

§ 13.4.4 Required certificates of testing, inspection, or approval shall, unless otherwise required by the Contract Documents, be secured by the Contractor and promptly delivered to the Architect.

§ 13.4.5 If the Architect is to observe tests, inspections, or approvals required by the Contract Documents, the Architect will do so promptly and, where practicable, at the normal place of testing.

§ 13.4.6 Tests or inspections conducted pursuant to the Contract Documents shall be made promptly to avoid unreasonable delay in the Work.

§ 13.5 Interest

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

ARTICLE 14 TERMINATION OR SUSPENSION OF THE CONTRACT

§ 14.1 Termination by the Contractor

§ 14.1.1 The Contractor may terminate the Contract if the Work is stopped for a period of 30 consecutive days through no act or fault of the Contractor, a Subcontractor, a Sub-subcontractor, their agents or employees, or any other persons or entities performing portions of the Work, for any of the following reasons:

- .1 Issuance of an order of a court or other public authority having jurisdiction that requires all Work to be stopped;
- .2 An act of government, such as a declaration of national emergency, that requires all Work to be stopped;
- .3 Because the Architect has not issued a Certificate for Payment and has not notified the Contractor of the reason for withholding certification as provided in Section 9.4.1, or because the Owner has not made payment on a Certificate for Payment within the time stated in the Contract Documents; or
- .4 The Owner has failed to furnish to the Contractor reasonable evidence as required by Section 2.2.

§ 14.1.2 The Contractor may terminate the Contract if, through no act or fault of the Contractor, a Subcontractor, a Sub-subcontractor, their agents or employees, or any other persons or entities performing portions of the Work, repeated suspensions, delays, or interruptions of the entire Work by the Owner as described in Section 14.3, constitute in the aggregate more than 100 percent of the total number of days scheduled for completion, or 120 days in any 365-day period, whichever is less.

§ 14.1.3 If one of the reasons described in Section 14.1.1 or 14.1.2 exists, the Contractor may, upon seven days' notice to the Owner and Architect, terminate the Contract and recover from the Owner payment for Work executed, as well as reasonable overhead and profit on Work not executed, and costs incurred by reason of such termination.

§ 14.1.4 If the Work is stopped for a period of 60 consecutive days through no act or fault of the Contractor, a Subcontractor, a Sub-subcontractor, or their agents or employees or any other persons or entities performing portions of the Work because the Owner has repeatedly failed to fulfill the Owner's obligations under the Contract Documents with respect to matters important to the progress of the Work, the Contractor may, upon seven additional days' notice to the Owner and the Architect, terminate the Contract and recover from the Owner as provided in Section 14.1.3.

§ 14.2 Termination by the Owner for Cause

§ 14.2.1 The Owner may terminate the Contract if the Contractor

- .1 repeatedly refuses or fails to supply enough properly skilled workers or proper materials;
- .2 fails to make payment to Subcontractors or suppliers in accordance with the respective agreements between the Contractor and the Subcontractors or suppliers;
- .3 repeatedly disregards applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of a public authority; or
- .4 otherwise is guilty of substantial breach of a provision of the Contract Documents.

§ 14.2.2 When any of the reasons described in Section 14.2.1 exist, and upon certification by the Architect that sufficient cause exists to justify such action, the Owner may, without prejudice to any other rights or remedies of the Owner and after giving the Contractor and the Contractor's surety, if any, seven days' notice, terminate employment of the Contractor and may, subject to any prior rights of the surety:

- .1 Exclude the Contractor from the site and take possession of all materials, equipment, tools, and construction equipment and machinery thereon owned by the Contractor;
- .2 Accept assignment of subcontracts pursuant to Section 5.4; and
- .3 Finish the Work by whatever reasonable method the Owner may deem expedient. Upon written request of the Contractor, the Owner shall furnish to the Contractor a detailed accounting of the costs incurred by the Owner in finishing the Work.

§ 14.2.3 When the Owner terminates the Contract for one of the reasons stated in Section 14.2.1, the Contractor shall not be entitled to receive further payment until the Work is finished.

§ 14.2.4 If the unpaid balance of the Contract Sum exceeds costs of finishing the Work, including compensation for the Architect's services and expenses made necessary thereby, and other damages incurred by the Owner and not expressly waived, such excess shall be paid to the Contractor. If such costs and damages exceed the unpaid balance, the Contractor shall pay the difference to the Owner. The amount to be paid to the Contractor or Owner, as the case may be, shall be certified by the Initial Decision Maker, upon application, and this obligation for payment shall survive termination of the Contract.

§ 14.3 Suspension by the Owner for Convenience

§ 14.3.1 The Owner may, without cause, order the Contractor in writing to suspend, delay or interrupt the Work, in whole or in part for such period of time as the Owner may determine.

§ 14.3.2 The Contract Sum and Contract Time shall be adjusted for increases in the cost and time caused by suspension, delay, or interruption under Section 14.3.1. Adjustment of the Contract Sum shall include profit. No adjustment shall be made to the extent

- .1 that performance is, was, or would have been, so suspended, delayed, or interrupted, by another cause for which the Contractor is responsible; or
- .2 that an equitable adjustment is made or denied under another provision of the Contract.

§ 14.4 Termination by the Owner for Convenience

§ 14.4.1 The Owner may, at any time, terminate the Contract for the Owner's convenience and without cause.

§ 14.4.2 Upon receipt of notice from the Owner of such termination for the Owner's convenience, the Contractor shall

- .1 cease operations as directed by the Owner in the notice;
- .2 take actions necessary, or that the Owner may direct, for the protection and preservation of the Work; and
- .3 except for Work directed to be performed prior to the effective date of termination stated in the notice, terminate all existing subcontracts and purchase orders and enter into no further subcontracts and purchase orders.

§ 14.4.3 In case of such termination for the Owner's convenience, the Owner shall pay the Contractor for Work properly executed; costs incurred by reason of the termination, including costs attributable to termination of Subcontracts; and the termination fee, if any, set forth in the Agreement.

ARTICLE 15 CLAIMS AND DISPUTES

§ 15.1 Claims

§ 15.1.1 Definition

A Claim is a demand or assertion by one of the parties seeking, as a matter of right, payment of money, a change in the Contract Time, or other relief with respect to the terms of the Contract. The term "Claim" also includes other disputes and matters in question between the Owner and Contractor arising out of or relating to the Contract. The responsibility to substantiate Claims shall rest with the party making the Claim. This Section 15.1.1 does not require the Owner to file a Claim in order to impose liquidated damages in accordance with the Contract Documents.

§ 15.1.2 Time Limits on Claims

The Owner and Contractor shall commence all Claims and causes of action against the other and arising out of or related to the Contract, whether in contract, tort, breach of warranty or otherwise, in accordance with the requirements of the binding dispute resolution method selected in the Agreement and within the period specified by applicable law, but in any case not more than 10 years after the date of Substantial Completion of the Work. The Owner and Contractor waive all Claims and causes of action not commenced in accordance with this Section 15.1.2.

§ 15.1.3 Notice of Claims

§ 15.1.3.1 Claims by either the Owner or Contractor, where the condition giving rise to the Claim is first discovered prior to expiration of the period for correction of the Work set forth in Section 12.2.2, shall be initiated by notice to the other party and to the Initial Decision Maker with a copy sent to the Architect, if the Architect is not serving as the Initial Decision Maker. Claims by either party under this Section 15.1.3.1 shall be initiated within 21 days after occurrence of the event giving rise to such Claim or within 21 days after the claimant first recognizes the condition giving rise to the Claim, whichever is later.

§ 15.1.3.2 Claims by either the Owner or Contractor, where the condition giving rise to the Claim is first discovered after expiration of the period for correction of the Work set forth in Section 12.2.2, shall be initiated by notice to the other party. In such event, no decision by the Initial Decision Maker is required.

§ 15.1.4 Continuing Contract Performance

§ 15.1.4.1 Pending final resolution of a Claim, except as otherwise agreed in writing or as provided in Section 9.7 and Article 14, the Contractor shall proceed diligently with performance of the Contract and the Owner shall continue to make payments in accordance with the Contract Documents.

§ 15.1.4.2 The Contract Sum and Contract Time shall be adjusted in accordance with the Initial Decision Maker's decision, subject to the right of either party to proceed in accordance with this Article 15. The Architect will issue Certificates for Payment in accordance with the decision of the Initial Decision Maker.

§ 15.1.5 Claims for Additional Cost

If the Contractor wishes to make a Claim for an increase in the Contract Sum, notice as provided in Section 15.1.3 shall be given before proceeding to execute the portion of the Work that is the subject of the Claim. Prior notice is not required for Claims relating to an emergency endangering life or property arising under Section 10.4.

§ 15.1.6 Claims for Additional Time

§ 15.1.6.1 If the Contractor wishes to make a Claim for an increase in the Contract Time, notice as provided in Section 15.1.3 shall be given. The Contractor's Claim shall include an estimate of cost and of probable effect of delay on progress of the Work. In the case of a continuing delay, only one Claim is necessary.

§ 15.1.6.2 If adverse weather conditions are the basis for a Claim for additional time, such Claim shall be documented by data substantiating that weather conditions were abnormal for the period of time, could not have been reasonably anticipated, and had an adverse effect on the scheduled construction.

§ 15.1.7 Waiver of Claims for Consequential Damages

The Contractor and Owner waive Claims against each other for consequential damages arising out of or relating to this Contract. This mutual waiver includes

- .1 damages incurred by the Owner for rental expenses, for losses of use, income, profit, financing, business and reputation, and for loss of management or employee productivity or of the services of such persons; and
- .2 damages incurred by the Contractor for principal office expenses including the compensation of personnel stationed there, for losses of financing, business and reputation, and for loss of profit, except anticipated profit arising directly from the Work.

This mutual waiver is applicable, without limitation, to all consequential damages due to either party's termination in accordance with Article 14. Nothing contained in this Section 15.1.7 shall be deemed to preclude assessment of liquidated damages, when applicable, in accordance with the requirements of the Contract Documents.

§ 15.2 Initial Decision

§ 15.2.1 Claims, excluding those where the condition giving rise to the Claim is first discovered after expiration of the period for correction of the Work set forth in Section 12.2.2 or arising under Sections 10.3, 10.4, and 11.5, shall be referred to the Initial Decision Maker for initial decision. The Architect will serve as the Initial Decision Maker, unless otherwise indicated in the Agreement. Except for those Claims excluded by this Section 15.2.1, an initial decision shall be required as a condition precedent to mediation of any Claim. If an initial decision has not been rendered within 30 days after the Claim has been referred to the Initial Decision Maker, the party asserting the Claim may demand mediation and binding dispute resolution without a decision having been rendered. Unless the Initial Decision Maker and all affected parties agree, the Initial Decision Maker will not decide disputes between the Contractor and persons or entities other than the Owner.

§ 15.2.2 The Initial Decision Maker will review Claims and within ten days of the receipt of a Claim take one or more of the following actions: (1) request additional supporting data from the claimant or a response with supporting data from the other party, (2) reject the Claim in whole or in part, (3) approve the Claim, (4) suggest a compromise, or (5) advise the parties that the Initial Decision Maker is unable to resolve the Claim if the Initial Decision Maker lacks sufficient information to evaluate the merits of the Claim or if the Initial Decision Maker concludes that, in the Initial Decision Maker's sole discretion, it would be inappropriate for the Initial Decision Maker to resolve the Claim.

§ 15.2.3 In evaluating Claims, the Initial Decision Maker may, but shall not be obligated to, consult with or seek information from either party or from persons with special knowledge or expertise who may assist the Initial Decision Maker in rendering a decision. The Initial Decision Maker may request the Owner to authorize retention of such persons at the Owner's expense.

§ 15.2.4 If the Initial Decision Maker requests a party to provide a response to a Claim or to furnish additional supporting data, such party shall respond, within ten days after receipt of the request, and shall either (1) provide a response on the requested supporting data, (2) advise the Initial Decision Maker when the response or supporting data will be furnished, or (3) advise the Initial Decision Maker that no supporting data will be furnished. Upon receipt of the response or supporting data, if any, the Initial Decision Maker will either reject or approve the Claim in whole or in part.

§ 15.2.5 The Initial Decision Maker will render an initial decision approving or rejecting the Claim, or indicating that the Initial Decision Maker is unable to resolve the Claim. This initial decision shall (1) be in writing; (2) state the reasons therefor; and (3) notify the parties and the Architect, if the Architect is not serving as the Initial Decision Maker, of any change in the Contract Sum or Contract Time or both. The initial decision shall be final and binding on the parties but subject to mediation and, if the parties fail to resolve their dispute through mediation, to binding dispute resolution.

§ 15.2.6 Either party may file for mediation of an initial decision at any time, subject to the terms of Section 15.2.6.1.

§ 15.2.6.1 Either party may, within 30 days from the date of receipt of an initial decision, demand in writing that the other party file for mediation. If such a demand is made and the party receiving the demand fails to file for mediation within 30 days after receipt thereof, then both parties waive their rights to mediate or pursue binding dispute resolution proceedings with respect to the initial decision.

§ 15.2.7 In the event of a Claim against the Contractor, the Owner may, but is not obligated to, notify the surety, if any, of the nature and amount of the Claim. If the Claim relates to a possibility of a Contractor's default, the Owner may, but is not obligated to, notify the surety and request the surety's assistance in resolving the controversy.

§ 15.2.8 If a Claim relates to or is the subject of a mechanic's lien, the party asserting such Claim may proceed in accordance with applicable law to comply with the lien notice or filing deadlines.

§ 15.3 Mediation

§ 15.3.1 Claims, disputes, or other matters in controversy arising out of or related to the Contract, except those waived as provided for in Sections 9.10.4, 9.10.5, and 15.1.7, shall be subject to mediation as a condition precedent to binding dispute resolution.

§ 15.3.2 The parties shall endeavor to resolve their Claims by mediation which, unless the parties mutually agree otherwise, shall be administered by the American Arbitration Association in accordance with its Construction Industry Mediation Procedures in effect on the date of the Agreement. A request for mediation shall be made in writing, delivered to the other party to the Contract, and filed with the person or entity administering the mediation. The request may be made concurrently with the filing of binding dispute resolution proceedings but, in such event, mediation shall proceed in advance of binding dispute resolution proceedings, which shall be stayed pending mediation for a period of 60 days from the date of filing, unless stayed for a longer period by agreement of the parties or court order. If an arbitration is stayed pursuant to this Section 15.3.2, the parties may nonetheless proceed to the selection of the arbitrator(s) and agree upon a schedule for later proceedings.

§ 15.3.3 Either party may, within 30 days from the date that mediation has been concluded without resolution of the dispute or 60 days after mediation has been demanded without resolution of the dispute, demand in writing that the other party file for binding dispute resolution. If such a demand is made and the party receiving the demand fails to file for binding dispute resolution within 60 days after receipt thereof, then both parties waive their rights to binding dispute resolution proceedings with respect to the initial decision.

§ 15.3.4 The parties shall share the mediator's fee and any filing fees equally. The mediation shall be held in the place where the Project is located, unless another location is mutually agreed upon. Agreements reached in mediation shall be enforceable as settlement agreements in any court having jurisdiction thereof.

§ 15.4 Arbitration

§ 15.4.1 If the parties have selected arbitration as the method for binding dispute resolution in the Agreement, any Claim subject to, but not resolved by, mediation shall be subject to arbitration which, unless the parties mutually agree otherwise, shall be administered by the American Arbitration Association in accordance with its Construction Industry Arbitration Rules in effect on the date of the Agreement. The Arbitration shall be conducted in the place where the Project is located, unless another location is mutually agreed upon. A demand for arbitration shall be made in writing, delivered to the other party to the Contract, and filed with the person or entity administering the arbitration. The party filing a notice of demand for arbitration must assert in the demand all Claims then known to that party on which arbitration is permitted to be demanded.

§ 15.4.1.1 A demand for arbitration shall be made no earlier than concurrently with the filing of a request for mediation, but in no event shall it be made after the date when the institution of legal or equitable proceedings based on the Claim would be barred by the applicable statute of limitations. For statute of limitations purposes, receipt of a written demand for arbitration by the person or entity administering the arbitration shall constitute the institution of legal or equitable proceedings based on the Claim.

§ 15.4.2 The award rendered by the arbitrator or arbitrators shall be final, and judgment may be entered upon it in accordance with applicable law in any court having jurisdiction thereof.

§ 15.4.3 The foregoing agreement to arbitrate and other agreements to arbitrate with an additional person or entity duly consented to by parties to the Agreement, shall be specifically enforceable under applicable law in any court having jurisdiction thereof.

§ 15.4.4 Consolidation or Joinder

§ 15.4.4.1 Subject to the rules of the American Arbitration Association or other applicable arbitration rules, either party may consolidate an arbitration conducted under this Agreement with any other arbitration to which it is a party provided that (1) the arbitration agreement governing the other arbitration permits consolidation, (2) the arbitrations to be consolidated substantially involve common questions of law or fact, and (3) the arbitrations employ materially similar procedural rules and methods for selecting arbitrator(s).

§ 15.4.4.2 Subject to the rules of the American Arbitration Association or other applicable arbitration rules, either party may include by joinder persons or entities substantially involved in a common question of law or fact whose presence is required if complete relief is to be accorded in arbitration, provided that the party sought to be joined consents in writing to such joinder. Consent to arbitration involving an additional person or entity shall not constitute consent to arbitration of any claim, dispute or other matter in question not described in the written consent.

§ 15.4.4.3 The Owner and Contractor grant to any person or entity made a party to an arbitration conducted under this Section 15.4, whether by joinder or consolidation, the same rights of joinder and consolidation as those of the Owner and Contractor under this Agreement.

Additions and Deletions Report for

AIA® Document A201® – 2017

This Additions and Deletions Report, as defined on page 1 of the associated document, reproduces below all text the author has added to the standard form AIA document in order to complete it, as well as any text the author may have added to or deleted from the original AIA text. Added text is shown underlined. Deleted text is indicated with a horizontal line through the original AIA text.

Note: This Additions and Deletions Report is provided for information purposes only and is not incorporated into or constitute any part of the associated AIA document. This Additions and Deletions Report and its associated document were generated simultaneously by AIA software at 14:57:11 CT on 02/03/2025.

PAGE 1

McNeese President' Residence Improvements

Lake Charles, Louisiana

State Project No.: 19-627-21-01 ; F.19002606

01-107-05B-13 (Supplement) F.01004560 (Supplement)

(Name, legal status and address)

State of Louisiana

Facility Planning and Control

1201 N. Third St, Ste. 7-210

Baton Rouge, LA 70802

...

(Name, legal status and address)

Tipton Associates

449 Westmoreland Dr

Baton Rouge, LA 70806

Certification of Document's Authenticity

AIA® Document D401™ – 2003

I, Kenneth W. Tipton, hereby certify, to the best of my knowledge, information and belief, that I created the attached final document simultaneously with its associated Additions and Deletions Report and this certification at 14:57:11 CT on 02/03/2025 under Order No. 2114516006 from AIA Contract Documents software and that in preparing the attached final document I made no changes to the original text of AIA® Document A201™ – 2017, General Conditions of the Contract for Construction, other than those additions and deletions shown in the associated Additions and Deletions Report.

(Signed)

(Title)

(Dated)

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SUPPLEMENTARY CONDITIONS

These Supplementary Conditions modify, change, delete from or add to the General Conditions of the Contract for Construction, AIA Document A201, 2017 Edition. Where any Article of the General Conditions is modified or any Section, Paragraph, Subparagraph or Clause thereof is modified or deleted by these supplements, the unaltered provisions of that Section, Article, Paragraph, Subparagraph or Clause shall remain in effect.

Articles, Sections, Paragraphs, Subparagraphs or Clauses modified or deleted have the same numerical designation as those occurring in the General Conditions.

ARTICLE 1

GENERAL PROVISIONS

1.1 BASIC DEFINITIONS

1.1.1. The Contract Documents

In Section 1.1.1 delete the third sentence, and add the following sentence:

The Contract Documents shall include the Bid Documents as listed in the Instructions to Bidders and any modifications made thereto by addenda.

1.1.8 Initial Decision Maker

Delete all after the words, “shall not show partiality to the Owner or Contractor”.

1.5 OWNERSHIP AND USE OF DRAWINGS, SPECIFICATIONS AND OTHER INSTRUMENTS OF SERVICE [REFER TO *La R.S. 38:2317*]

1.5.1 Delete the first sentence of the paragraph.

1.5.1 In the third sentence: delete the remainder after the word “publication”.

1.7 DIGITAL DATA USE AND TRANSMISSION

In the first sentence after the words, “in digital form” delete “. The parties will use AIA Document E203 2013, Building Information Modeling and Digital Data Exhibit”.

1.8 BUILDING INFORMATION MODELS USE AND RELIANCE

Delete Section 1.8.

ARTICLE 2

OWNER

2.2 EVIDENCE OF THE OWNER’S FINANCIAL ARRANGEMENTS

Delete Section 2.2.

2.3 INFORMATION AND SERVICES REQUIRED OF THE OWNER

2.3.1 In the first sentence, delete: all before “the Owner shall secure...”

Delete Section 2.3.2 and substitute the following:

2.3.2 The term Architect, when used in the Contract Documents, shall mean the prime Designer (Architect, Engineer, or Landscape Architect), or his authorized representative, lawfully licensed to practice architecture, engineering, or landscape architecture in the State of Louisiana, identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number.

2.3.3 Delete the words: “to whom the Contractor has no reasonable objection and”.

ARTICLE 3

CONTRACTOR

3.4 LABOR AND MATERIALS

3.4.2 Delete Section 3.4.2.

Delete Section 3.4.3 and substitute with the following:

3.4.3 Contractor and its employees, officers, agents, representatives, and Subcontractors shall conduct themselves in an appropriate and professional manner, in accordance with the Owner’s requirements, at all times while working on the Project. Any such individual who behaves in an inappropriate manner or who engages in the use of inappropriate language or conduct while on Owner’s property, as determined by the Owner, shall be removed from the Project at the Owner’s request. Such individual shall not be permitted to return without the written permission of the Owner. The Owner shall not be responsible or liable to Contractor or any Subcontractor for any additional costs, expenses, losses, claims or damages incurred by Contractor or its Subcontractor as a result of the removal of an individual from the Owner’s property pursuant to this Section. The Contractor shall not permit employment of unfit persons or persons not properly skilled in tasks assigned to them.

3.5 WARRANTY

3.5.2 Replace reference to “Section 9.8.4” with “Section 9.8.6”.

3.7 PERMITS, FEES, NOTICES, AND COMPLIANCE WITH LAWS (La R.S. 40:1724[A])

3.7.1 Delete Section 3.7.1.

3.7.2 In Section 3.7.2, replace the word “public” with the word “State”.

Delete Section 3.7.5 and substitute the following:

- 3.7.5 If, during the course of the Work, the Contractor discovers human remains, unmarked burial or archaeological sites, burial artifacts, or wetlands, which are not indicated in the Contract Documents, the Contractor shall follow all procedures mandated by State and Federal law, including but not limited to La R.S. 8:671 et seq., the Office of Coastal Protection and Restoration, and Sections 401 & 404 of the Federal Clean Water Act. Request for adjustment of the Contract Sum and Contract Time arising from the existence of such remains or features shall be submitted in writing to the Owner pursuant to the Contract Documents.

3.8 ALLOWANCES

Delete Sections 3.8.1, 3.8.2, and 3.8.3 in their entirety and add the following new Section 3.8.1:

- 3.8.1 Allowances shall not be made on any of the Work.

3.9 SUPERINTENDENT

- 3.9.1 Add the following to the end of the paragraph:
Important communications shall be confirmed in writing. Other communications shall be similarly confirmed on written request in each case.

3.10 CONTRACTOR'S CONSTRUCTION AND SUBMITTAL SCHEDULES

- 3.10.1 Add the following: For projects with a contract sum greater than \$1,000,000.00, the Contractor shall include with the schedule, for the Owner's and Architect's information, a network analysis to identify those tasks which are on the critical path, i.e., where any delay in the completion of these tasks will lengthen the project timescale, unless action is taken. A revised schedule shall be submitted with each Application and Certificate for Payment. No payment shall be made until this schedule is received.

- 3.10.3 In the first sentence, delete the word "general".

After the first sentence, add the following:

If the Work is not on schedule, as determined by the Architect, and the Contractor fails to take action to bring the Work on schedule, then the Contractor shall be deemed in default under this Contract and the progress of the Work shall be deemed unsatisfactory. Such default may be considered grounds for termination by the Owner for cause in accordance with Section 14.2.

Add the following Sections:

- 3.10.4 Add the following: Submittal by the contractor of a schedule or other documentation showing a completion date for his Work prior to the completion date stated in the contract shall not impose any obligation or responsibility on the Owner or Architect for the earlier completion date.
- 3.10.5 In the event the Owner employs a commissioning consultant, the Contractor shall cooperate fully in the commissioning process and shall require all subcontractors and

others under his control to cooperate. The purpose of such services shall be to ensure that all systems perform correctly and interactively according to the provisions of the Contract Documents.

3.11 DOCUMENTS AND SAMPLES AT THE SITE

Add the following: This requirement is of the essence of the contract. The Architect shall determine the value of these documents and this amount shall not be approved for payment to the Contractor until all of the listed documents are delivered to the Architect in good order, completely marked with field changes and otherwise complete in all aspects.

ARTICLE 4

ARCHITECT

4.2 ADMINISTRATION OF THE CONTRACT

4.2.1 In the first sentence, delete the phrase: “the date the Architect issues the final Certificate for Payment” and replace with the phrase “final payment is due, and with the Owner’s concurrence, from time to time during the one year period for correction of Work described in Section 12.2.”

4.2.2 In the first sentence, after the phrase: “become generally familiar with”; insert the following: “and to keep the Owner informed about”.

In the first sentence, after the phrase “portion of the Work completed”, insert the following: “to endeavor to guard the Owner against defects and deficiencies in the Work,”

4.2.4 In the first sentence, delete all after “The Owner and Contractor”, and add the following “may communicate directly with each other, when deemed necessary by the Owner, and the Owner will notify the Architect of any decision.”

4.2.10 Add the following sentence to the end of Section 4.2.10: There shall be no restriction on the Owner having a Representative.

4.2.11 Add the following sentence to the end of Section 4.2.11:

If no agreement is made concerning the time within which interpretation required of the Architect shall be furnished in compliance with this Section 4.2, then delay shall not be recognized on account of failure by the Architect to furnish such interpretation until 15 days after written request is made for them.

4.2.14 Insert the following sentence between the second and third sentences of Section 4.2.14:

If no agreement is made concerning the time within which interpretation required of the Architect shall be furnished in compliance with this Section 4.2, then delay shall not be recognized on account of failure by the Architect to furnish such interpretation until 15 days after written request is made for them.

ARTICLE 5

SUBCONTRACTORS

5.2 AWARD OF SUBCONTRACTS AND OTHER CONTRACTS FOR PORTIONS OF THE WORK

Delete Section 5.2.1, and substitute the following:

- 5.2.1 Unless otherwise required by the Contract Documents, the Contractor shall furnish at the Pre-Construction Conference, to the Owner and the Architect, in writing, the names of the persons or entities (including those who are to furnish materials or equipment fabricated to a special design) proposed for each of the principal portions of the Work. No Contractor payments shall be made until this information is received.

Delete Section 5.2.2, and substitute the following:

- 5.2.2 The Contractor shall be solely responsible for selection and performance of all subcontractors. The Contractor shall not be entitled to claims for additional time and/or an increase in the contract sum due to a problem with performance or nonperformance of a subcontractor.

Delete Sections 5.2.3 and 5.2.4 and substitute the following:

- 5.2.3 The Contractor shall notify the Architect and the Owner when a subcontractor is to be changed and substituted with another subcontractor.

5.4 CONTINGENT ASSIGNMENT OF SUBCONTRACTS

Delete Sections 5.4, 5.4.1, 5.4.2 and 5.4.3

ARTICLE 7

CHANGES IN THE WORK

7.1 GENERAL

Add the following Sections:

- 7.1.4 As part of the pre-construction conference submittals, the Contractor shall submit the following prior to the Contractor's initial request for payment:
- 7.1.4.1 Fixed job site overhead cost itemized with documentation to support daily rates.
 - 7.1.4.2 Bond Premium Rate with supporting information from the General Contractor's carrier.

7.1.4.3 Labor Burden by trade for both Subcontractors and General Contractor. The Labor Burden shall be supported by the Worker's Compensation and Employer's Liability Insurance Policy Information Page. Provide for all trades.

7.1.4.4 Internal Rate Charges for all significant company owned equipment.

7.1.5 If the General Contractor fails to submit the aforementioned documentation as part of the pre-construction submittals, then pay applications shall not be processed until such time as the Owner receives this information.

7.2 CHANGE ORDERS

Delete Section 7.2.1, and substitute the following Sections:

7.2.1 A Change Order is a written instrument prepared by the Architect and signed by the Owner, the Architect, and the Contractor issued after execution of the Contract, authorizing a change in the Work and/or an adjustment in the Contract Sum and/or the Contract Time. The Contract Sum and the Contract Time may be changed only by Change Order. A Change Order signed by the Contractor indicates his agreement therewith, including the adjustment in the Contract Sum or the Contract Time. Any reservation of rights, stipulation, or other modification made on the change order by the contractor shall have no effect.

7.2.2 "Cost of the Work" for the purpose of Change Orders shall be the eligible costs required to be incurred in performance of the Work and paid by the Contractor and Subcontractors which eligible costs shall be limited to:

7.2.2.1 Actual wages paid directly to labor personnel, with a labor burden markup exclusively limited to applicable payroll taxes, worker's compensation insurance, unemployment compensation, and social security taxes for those labor personnel performing the Work. Wages shall be the basic hourly labor rate paid an employee exclusive of fringe benefits or other employee costs. The labor burden percentage for the "Cost of the Work" is limited to categories listed herein. Employer-provided health insurance, fringe benefits, employee training (whether a requirement of employment or not), vacation pay, etc., are examples of ineligible labor burden costs which **shall not** be included, as these costs are already compensated by the Overhead and Profit markup.

Supervision shall not be included as a line item in the "Cost of the Work", except when the change results in a documented delay in the critical path, as described in Section 7.2.7.

7.2.2.2 Cost of all materials and supplies necessary and required to perform the Work, identifying each item and its individual cost, including taxes. Incidental consumables are not eligible costs and shall not be included.

7.2.2.3 Cost of each necessary piece of machinery and equipment required to perform the Work, identifying each item and its individual cost, including taxes. Incidental small tools of a specific trade (i.e., shovels, saws, hammers, air compressors, etc.,) and general use vehicles, such as pickup trucks even for

moving items around the site, fuel for these general use vehicles, travel, lodging, and/or meals are not eligible and shall not be included.

7.2.2.4 Eligible Insurance costs shall be limited to documented increases in “Builder’s Risk” insurance premium / costs only. Commercial General Liability, Automobile Liability, and all other required insurances, where referenced in the Contract shall be considered part of normal overhead. These costs are already compensated by the Overhead and Profit markup.

7.2.2.5 Cost for the General Contractor Performance and Payment Bond premium, where the documented cost of the premiums have been increased due to the Change Order.

7.2.3 Overhead and Profit - The Contractor and Subcontractor shall be due home office fixed overhead and profits on the Cost of the Work, but shall not exceed a total of 16% of the direct cost of any portion of Work.

The credit to the Owner resulting from a change in the Work shall be the sum of those items above, including overhead and profit. Where a change results in both credits to the Owner and extras to the Contractor for related items, overhead and profit shall be computed for credits to the Owner and extras to the Contractor. The Owner shall receive full credit for the computed overhead and profit on credit change order items.

7.2.4 The cost to the Owner resulting from a change in the Work shall be the sum of: Cost of the Work (as defined at Section 7.2.2) and Overhead and Profit (as defined at Section 7.2.3), and shall be computed as follows:

7.2.4.1 When all of the Work is General Contractor Work; 8% markup on the Cost of the Work.

7.2.4.2 When the Work is all Subcontract Work; 8% markup on the Cost of the Work for Subcontractor’s Overhead and Profit, plus 8% markup on the Cost of the Work, not including the Subcontractor’s Overhead and Profit markup, for General Contractor’s Overhead and Profit.

7.2.4.3 When the Work is a combination of General Contractor Work and Subcontract Work; that portion of the direct cost that is General Contract Work shall be computed per Section 7.2.4.1 and that portion of the direct cost that is Subcontract Work shall be computed per Section 7.2.4.2.

Premiums for the General Contractor’s bond may be included, but after the markup is added to the Cost of the Work.

Premiums for the Subcontractor’s Bond shall not be included.

7.2.4.4 Subcontract cost shall consist of the items in Section 7.2.2 above plus Overhead and Profit as defined in Section 7.2.3.

7.2.5 Before a Change Order is prepared, the Contractor shall prepare and deliver to the Architect the following information concerning the Cost of the Work, not subject to waiver, within a reasonable time after being notified to prepare said Change Order:

A detailed, itemized list of labor, material and equipment costs for the General Contractor's Work including quantities and unit costs for each item of labor, material and equipment.

An itemized list of labor, material and equipment costs for each Subcontractor's and/or Sub-Subcontractor's Work including quantities and unit costs for each item of labor, material and equipment.

7.2.6 After a Change Order has been approved, no future requests for extensions of time or additional cost shall be considered for that Change Order.

7.2.7 Extended fixed job-site costs are indirect costs that are necessary to support the work in the field. Examples of fixed job-site costs are field office rental, salaries of field office staff, field office utilities, and telephone.

Extended fixed job-site costs or equitable adjustment may be included in a Change Order due to a delay in the critical path, with the exception of weather related delays. In the event of a delay in the critical path, the Contractor shall submit all changes or adjustments to the Contract Time **within twenty-one (21) days** of the event giving rise to the delay. The Contractor shall submit documentation and justification for the adjustment by performing a critical path analysis of its most recent schedule in use prior to the change, which shows an extension in critical path activities.

The Contractor shall notify the Architect in writing that the Contractor is making a claim for extended fixed job-site overhead as required by Section 15.1.2. The Contractor shall provide proof that the Contractor is unable to mitigate financial damages through Alternate Work within this Contract or replacement work. "Replacement Work" is that work which the Contractor is obligated to perform under any construction contract separate from this Contract. Reasonable proof shall be required by the Architect that the delays affected the Completion Date.

7.2.8 "Cost of the Work" whether General Contractor cost or Subcontractor cost shall not apply to the following:

7.2.8.1 Salaries or other compensation of the Contractor's personnel at the Contractor's principal office and branch offices.

7.2.8.2 Any part of the Contractor's capital expenses, including interest on the Contractor's capital employed for the Work.

7.2.8.3 Overhead and general expenses of any kind or the cost of any item not specifically and expressly included above in Cost of the Work.

7.2.8.4 Cost of supervision refer to section 7.2.2.1, with exception as provided in Section 7.2.7.

7.2.9 When applicable as provided by the Contract, the cost to Owner for Change Orders shall be determined by quantities and unit prices. The quantity of any item shall be as

submitted by the Contractor and approved by the Architect. Unit prices shall cover cost of Material, Labor, Equipment, Overhead and Profit.

7.3 CONSTRUCTION CHANGE DIRECTIVES

7.3.3 In the first sentence after “following methods” insert: “, but not to exceed a specified amount”.

7.3.4 From .1 of the list, delete all after “Costs of labor, including” and substitute the following “social security, old age and employment insurance, applicable payroll taxes, and workers’ compensation insurance;”

Delete the following from .4 of the list: “permit fees,”

Delete Section 7.3.9 and substitute the following:

7.3.9 Pending final determination of the total costs of a Construction Change Directive to the Owner, amounts not in dispute for such changes in the Work shall be included in Applications for Payment accompanied by a Change Order indicating the parties’ agreement with part or all of such costs.

ARTICLE 8

TIME

8.1 DEFINITIONS

Add the following:

8.1.5 The Contract Time shall not be changed by the submission of a schedule that shows an early completion date unless specifically authorized by change order.

8.2 PROGRESS AND COMPLETION

Add to Section 8.2.1 the following:

Completion of the Work must be within the Time for Completion stated in the Agreement, subject to such extensions as may be granted under Section 8.3. The Contractor agrees to commence Work not later than fourteen (14) days after the transmittal date of Written Notice to Proceed from the Owner and to substantially complete the project within the time stated in the Contract. The Owner will suffer financial loss if the project is not substantially complete in the time set forth in the Contract Documents. The Contractor and the Contractor’s Surety shall be liable for and shall pay to the Owner the sum stated in the Contract Documents as fixed, agreed and liquidated damages for each consecutive calendar day (Saturdays, Sundays and holidays included) of delay until the Work is substantially complete. The Owner shall be entitled to the sum stated in the Contract Documents. Such Liquidated Damages shall be withheld by the Owner from the amounts due the Contractor for progress payments.

Delete Section 8.2.2.

8.3 DELAYS AND EXTENSIONS OF TIME

- 8.3.1 In the first sentence after the words “Owner pending” delete the words “mediation and binding dispute resolution” and add the word “litigation”, and delete the last word “determine” and add the following: “recommend, subject to Owner’s approval of Change Order. If the claim is not made within the limits of Article 15, all rights for future claims for that month are waived.”

ARTICLE 9

PAYMENTS AND COMPLETION

9.1 CONTRACT SUM

Delete Section 9.1.2.

Delete Section 9.2 and substitute the following:

9.2 SCHEDULE OF VALUES

At the Pre-Construction Conference, the Contractor shall submit to the Owner and the Architect a Schedule of Values prepared as follows:

- 9.2.1 The attached Schedule of Values Format shall be used. If applicable, the cost of Work for each section listed under each division, shall be given. The cost for each section shall include Labor, Materials, Overhead and Profit.
- 9.2.2 The Total of all items shall equal the Total Contract Sum. This schedule, when approved by the Architect, shall be used as a basis for the Contractor’s Applications for Payment and it may be used for determining the cost of the Work in deductive change orders, when a specific item of Work listed on the Schedule of Values is to be removed. Once the Schedule of Values is submitted at the Pre-Construction Conference, the schedule shall not be modified without approval from the Owner and Architect.

9.3 APPLICATIONS FOR PAYMENT

Delete Sections 9.3.1, 9.3.1.1, and 9.3.1.2 and substitute the following:

- 9.3.1 Monthly, the Contractor shall submit to the Architect a Facility Planning and Control – Application and Certification for Payment form, supported by any additional data substantiating the Contractor’s right to payment as the Owner or the Architect may require. Application for Payment shall be submitted on or about the first of each month for the value of labor and materials incorporated into the Work and of materials, suitably stored, at the site as of the twenty-fifth day of the preceding month, less normal retainage as follows, per La R.S. 38:2248:

9.3.1.1 Projects with Contract price up to \$500,000.00 – 10% of the Contract price.

9.3.1.2 Projects with Contract price of \$500,000.00, or more – 5% of the Contract price.

9.3.1.3 No payment shall be made until the revised schedule required by Section 3.10.1 is received.

9.3.1.4 The normal retainage shall not be due the Contractor until after substantial completion and expiration of the forty-five day lien period and submission to the Architect of a clear lien certificate, consent of surety, and invoice for retainage.

Delete Section 9.3.2 and substitute the following:

9.3.2 Unless otherwise provided in the Contract Documents, payments shall be made on account of materials and equipment delivered and suitably stored at the site for subsequent incorporation in the Work. Payments for materials or equipment stored on the site shall be conditioned upon submission by the Contractor of bills of sale or such other procedures satisfactory to the Owner to establish the Owner's title to such materials and equipment or otherwise protect the Owner's interest, including applicable insurance.

9.5 DECISIONS TO WITHHOLD CERTIFICATION

Section 9.5.1.7: Delete the word "repeated".

Delete Section 9.5.4.

9.6 PROGRESS PAYMENTS

Delete Section 9.6.1 and substitute the following:

9.6.1 After the Architect has issued a Certificate for Payment, the Owner shall make payment within twenty days except for projects funded fully or in part by a Federal reimbursement program. For such projects the Owner will make payment in a timely manner consistent with reimbursement.

9.6.2 Delete the phrase: "no later than seven days" from the first sentence.

After the end of the second sentence, add the following:

La R.S. 9:2784 (A) and (C) require a Contractor or Subcontractor to make payment due to each Subcontractor and supplier within fourteen (14) consecutive days of the receipt of payment from the Owner. If not paid, a penalty in the amount of ½ of 1% per day is due, up to a maximum of 15% from the expiration date until paid. The contractor or subcontractor, whichever is applicable, is solely responsible for payment of a penalty.

9.6.4 Delete the first two sentences of Section 9.6.4 and add the following to the end of the Section:

Pursuant to La. R.S. 38:2242 and La. R.S. 38:2242.2, when the Owner receives any claim of nonpayment arising out of the Contract, the Owner shall deduct 125% of such claim from the Contract Sum. The Contractor, or any interested party, may deposit security, in accordance with La. R.S. 38:2242.2, guaranteeing payment of the claim with the recorder

of mortgages of the parish where the Work has been done. When the Owner receives original proof of such guarantee from the recorder of mortgages, the claim deduction will be added back to the Contract Sum.

Delete Section **9.7 FAILURE OF PAYMENT.**

Delete Section 9.8 and substitute the following:

9.8 SUBSTANTIAL COMPLETION

- 9.8.1 Substantial Completion is the stage in the progress of the Work when the Work is sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work for its intended use. The Architect shall determine if the project is substantially complete in accordance with this Section.
- 9.8.2 When the Contractor considers that the Work is Substantially Complete, the Contractor shall prepare and submit to the Architect a comprehensive list of items to be completed or corrected prior to final payment. Failure to include an item on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents.
- 9.8.3 Upon receipt of the Contractor's list, the Architect shall make an inspection to determine whether the Work is substantially complete. A prerequisite to the Work being considered as substantially complete is the Owner's receipt of the executed Roofing Contractor's and Roofing Manufacturer's guarantees, where roofing Work is part of the Contract. Prior to inspection by the Architect, the Contractor shall notify the Architect that the project is ready for inspection by the State Fire Marshal's office. If the Architect's inspection discloses any item, whether or not included on the Contractor's list, which is not sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work for its intended use, the Contractor shall, before the Work can be considered as Substantially Complete, complete or correct such item upon notification by the Architect. In such case, the Contractor shall then submit a request for another inspection by the Architect to determine Substantial Completion.
- 9.8.4 When the Architect determines that the project is Substantially Complete, he shall prepare a punch list of exceptions and the dollar value related thereto. The monetary value assigned to this list will be the sum of the cost estimate for each particular item of Work the Architect develops based on the mobilization, labor, material and equipment costs of correcting the item and shall be retained from the monies owed the contractor, above and beyond the standard lien retainage. The cost of these items shall be prepared in the same format as the schedule of values. At the end of the forty-five day lien period payment shall be approved for all punch list items completed up to that time. After that payment, none of the remaining funds shall be due the contractor until all punch list items are completed and are accepted by the Architect. If the dollar value of the punch list exceeds the amount of funds, less the retainage amount, in the remaining balance of the Contract, then the Project shall not be considered as substantially complete. If funds remaining are less than that required to complete the Work, the Contractor shall pay the difference.

- 9.8.5 When the preparation of the punch list is complete the Architect shall prepare a Recommendation of Acceptance incorporating the punch list and submit it to the Owner. Upon approval of the Recommendation of Acceptance, the Owner may issue a Notice of Acceptance of Building Contract which shall establish the Date of Substantial Completion. The Contractor shall record the Notice of Acceptance with the Clerk of Court in the Parish in which the Work has been performed. If the Notice of Acceptance has not been recorded seven (7) days after issuance, the Owner may record the Acceptance at the Contractor's expense. All additive change orders must be processed before issuance of the Recommendation of Acceptance. The Owner shall not be responsible for payment for any Work associated with change orders that is not incorporated into the contract at the time of the Recommendation of Acceptance.
- 9.8.6 Warranties required by the Contract Documents shall commence on the date of Acceptance of the Work unless otherwise agreed to in writing by the Owner and Contractor. Unless otherwise agreed to in writing by the Owner and Contractor, security, maintenance, heat, utilities, damage to the Work not covered by the punch list and insurance shall become the Owner's responsibility on the Date of Substantial Completion.
- 9.8.7 If all punch list items have not been completed by the end of the forty-five (45) day lien period, through no fault of the Architect or Owner, the Owner may hold the Contractor in default. If the Owner finds the Contractor is in default, the Surety shall be notified. If within forty-five (45) days after notification, the Surety has not completed the punch list, through no fault of the Architect or Owner, the Owner may, at his option, contract to have the balance of the Work completed and pay for such Work with the unpaid funds remaining in the Contract sum. Finding the Contractor in default shall constitute a reason for disqualification of the Contractor from bidding on future state contracts. If the surety fails to complete the punch list within the stipulated time period, the Owner may not accept bonds submitted, in the future, by the surety.

9.9 PARTIAL OCCUPANCY OR USE

Delete Section 9.9.1 and substitute the following:

- 9.9.1 Partial Occupancy is that stage in the progress of the Work when a designated portion of the Work is sufficiently complete in accordance with the Contract Documents so the Owner can occupy or utilize the designated portion of the Work for its intended use. The Owner may occupy or use any substantially completed portion of the Work so designated by separate agreement with the Contractor and authorized by public authorities having jurisdiction over the Work. Such occupancy or use may commence provided the Owner and Contractor have accepted in writing the responsibilities assigned to each of them for payments, if any, security, maintenance, heat, utilities, damage to the Work and insurance, and have agreed in writing concerning the period for correction of the Work and commencement of warranties required by the Contract Documents. When the Contractor considers the designated portion substantially complete the Contractor shall prepare and submit a list to the Architect as provided under Section 9.8.2. Consent of the Contractor to partial occupancy or use shall not be unreasonably withheld.

9.10 FINAL COMPLETION AND FINAL PAYMENT

Delete Section 9.10.4 and replace with the following:

9.10.4 The making of final payment shall not constitute a waiver of Claims by the Owner for the following:

9.10.4.1 Claims, security interests, or encumbrances arising out of the Contract and unsettled;

9.10.4.2 failure of the Work to comply with the requirements of the Contract Documents irrespective of when such failure is discovered;

9.10.4.3 terms of special warranties required by the Contract Documents; or

9.10.4.4 audits performed by the Owner, after final payment.

ARTICLE 10

PROTECTION OF PERSONS AND PROPERTY

10.2 SAFETY OF PERSONS AND PROPERTY

10.2.2 In the first sentence, between the words: “bearing on” and “safety”, add the words: “the health and,”

10.3 HAZARDOUS MATERIALS

10.3.1 In the second sentence after (PCB) add: “or lead”.

10.3.2 After the first sentence, delete all remaining sentences.

Add at the end: “The Contract time shall be extended appropriately.”

Delete Section 10.4 and substitute the following:

10.4 EMERGENCIES

In an emergency affecting the safety of persons or property, the Contractor shall notify the Owner and Architect immediately of the emergency, simultaneously acting at his discretion to prevent damage, injury or loss. Any additional compensation or extension of time claimed by the Contractor on account of emergency Work shall be determined as provided in Article 15 and Article 7.

ARTICLE 11

INSURANCE AND BONDS

AIA A101 – 2017 Exhibit A is not a part of these documents. Delete all of Sections 11.1, 11.2, 11.3, 11.4, and 11.5, and substitute the following:

INSURANCE REQUIREMENTS FOR NEW CONSTRUCTION, ADDITIONS AND RENOVATIONS

11.1 CONTRACTOR'S LIABILITY INSURANCE

The Contractor shall purchase and maintain without interruption for the duration of the contract insurance against claims for injuries to persons or damages to property which may arise from or in connection with the performance of the Work hereunder by the Contractor, its agents, representatives, employees or subcontractors. The duration of the contract shall be from the inception of the contract until the date of final payment.

11.2 MINIMUM SCOPE AND LIMITS OF INSURANCE

11.2.1 Worker's Compensation

Worker's Compensation insurance shall be in compliance with the Worker's Compensation law of the Contractor's headquarters. Employers Liability is included with a minimum limit of \$1,000,000 per accident/per disease/per employee. If Work is to be performed over water and involves maritime exposure, applicable LHWCA, Jones Act or other maritime law coverage shall be included. A.M. Best's insurance company rating requirement may be waived for Worker's compensation coverage only.

11.2.2 Commercial General Liability

Commercial General Liability insurance, including Personal and Advertising Injury Liability and Products and Completed Operations Liability, shall have a minimum limit per occurrence based on the project value. The Insurance Services Office (ISO) Commercial General Liability occurrence coverage form CG 00 01 (current form approved for use in Louisiana), or equivalent, is to be used in the policy. Claims-made form is unacceptable.

The aggregate loss limit must apply to each project. ISO form CG 25 03 (current form approved for use in Louisiana), or equivalent, shall also be submitted. The State project number, including part number, and project name shall be included on this endorsement.

COMBINED SINGLE LIMIT (CSL) PER OCCURRENCE

<u>Type of Construction</u>	<u>Projects up to \$1,000,000</u>	<u>Projects over \$1,000,000 up to \$10,000,000</u>	<u>Projects over \$10,000,000</u>
New Buildings:			
Each Occurrence Minimum Limit	\$1,000,000	\$2,000,000	\$4,000,000
Per Project Aggregate	\$2,000,000	\$4,000,000	\$8,000,000
Renovations:	The building(s) value for the Project is \$_____.		
Each Occurrence Minimum Limit	\$1,000,000**	\$2,000,000**	\$4,000,000**

Per Project Aggregate	2 times per occur limit**	2 times per occur limit**	2 times per occur limit**

**While the minimum Combined Single Limit of \$1,000,000 is required for any renovation, the limit is calculated by taking 10% of the building value and rounding it to the nearest \$1,000,000 to get the insurance limit. Example: Renovation on a \$33,000,000 building would have a calculated \$3,000,000 combined single limit of coverage (33,000,000 times .10 = 3,300,000 and then rounding down to \$3,000,000). If the calculated limit is less than the minimum limit listed in the above chart, then the amount needed is the minimum listed in the chart. Maximum per occurrence limit required is \$10,000,000 regardless of building value. The per project aggregate limit is then calculated as twice the per occurrence limit.

11.2.3 Automobile Liability

Automobile Liability Insurance shall have a minimum combined single limit per occurrence of \$1,000,000. ISO form number CA 00 01 (current form approved for use in Louisiana), or equivalent, is to be used in the policy. This insurance shall include third-party bodily injury and property damage liability for owned, hired and non-owned automobiles.

11.2.4 Excess Umbrella

Excess Umbrella Insurance may be used to meet the minimum requirements for General Liability and Automobile Liability only.

11.2.5 Builder's Risk

11.2.5.1 Builder's Risk Insurance shall be in an amount equal to the amount of the construction contract including any amendments and shall be upon the entire Work included in the contract. The policy shall provide coverage equivalent to the ISO form number CP 10 20, Broad Form Causes of Loss (extended, if necessary, to include the perils of wind, earthquake, collapse, vandalism/malicious mischief, and theft, including theft of materials whether or not attached to any structure). The policy must include architects' and engineers' fees necessary to provide plans, specifications and supervision of Work for the repair and/or replacement of property damage caused by a covered peril, not to exceed 10% of the cost of the repair and/or replacement.

11.2.5.2 Flood coverage shall be provided by the Contractor on the first floor and below for all projects, except as otherwise noted. The builder's risk insurance policy, sub-limit for flood coverage shall not be less than ten percent (10%) of the total contract cost per occurrence. If flood is purchased as a separate policy, the limit shall be ten percent (10%) of the total contract cost per occurrence (with a max of \$500,000 if NFIP). Coverage for roofing projects shall **not** require flood coverage.

11.2.5.3 A Specialty Contractor may provide an installation floater in lieu of a Builder's Risk policy, with the similar coverage as the Builder's Risk policy, upon the

system to be installed in an amount equal to the amount of the contract including any amendments. Flood coverage is not required.

11.2.5.4 The policy must include coverage for the Owner, Contractor and any subcontractors as their interests may appear.

11.2.6 Pollution Liability (*required when asbestos or other hazardous material abatement is included in the contract*)

Pollution Liability insurance, including gradual release as well as sudden and accidental, shall have a minimum limit of not less than \$1,000,000 per claim. A claims-made form will be acceptable. A policy period inception date of no later than the first day of anticipated Work under this contract and an expiration date of no earlier than 30 days after anticipated completion of all Work under the contract shall be provided. There shall be an extended reporting period of at least 24 months, with full reinstatement of limits, from the expiration date of the policy if the policy is not renewed. The policy shall not be cancelled for any reason, except non-payment of premium.

11.2.7 Deductibles and Self-Insured Retentions

Any deductibles or self-insured retentions must be declared to and accepted by the Owner. The Contractor shall be responsible for all deductibles and self-insured retentions.

11.3 OTHER INSURANCE PROVISIONS

11.3.1 The policies are to contain, or be endorsed to contain, the following provisions:

11.3.1.1 Worker's Compensation and Employers Liability Coverage

11.3.1.1.1 To the fullest allowed by law, the insurer shall agree to waive all rights of subrogation against the Owner, its officers, agents, employees and volunteers for losses arising from Work performed by the Contractor for the Owner.

11.3.1.2 Commercial General Liability Coverage

11.3.1.2.1 The Owner, its officers, agents, employees and volunteers are to be added as additional insureds as respects liability arising out of activities performed by or on behalf of the Contractor; products and completed operations of the Contractor, premises owned, occupied or used by the Contractor. ISO Form CG 20 10 (for ongoing work) AND CG 20 37 (for completed work) (current forms approved for use in Louisiana), or equivalent, are to be used.

11.3.1.2.2 The Contractor's insurance shall be primary as respects the Owner, its officers, agents, employees and volunteers for any and all losses that occur under the contract. The coverage shall contain no special limitations on the scope of protection afforded to the Owner, its officers, officials, employees or volunteers. Any insurance or self-

insurance maintained by the Owner shall be excess and non-contributory of the Contractor's insurance.

11.3.1.3 Builder's Risk

The policy must include an endorsement providing the following:

In the event of a disagreement regarding a loss covered by this policy, which may also be covered by a State of Louisiana self-insurance or commercial property policy through the Office of Risk Management (ORM), Contractor and its insurer agree to follow the following procedure to establish coverage and/or the amount of loss:

Any party to a loss may make written demand for an appraisal of the matter in disagreement. Within 20 days of receipt of written demand, the Contractor's insurer and either ORM or its commercial insurance company shall each select a competent and impartial appraiser and notify the other of the appraiser selected. The two appraisers shall select a competent and impartial umpire. The appraisers shall then identify the policy or policies under which the loss is insured and, if necessary, state separately the value of the property and the amount of the loss that must be borne by each policy. If the two appraisers fail to agree, they shall submit their differences to the umpire. A written decision by any two shall determine the policy or policies and the amount of the loss. Each insurance company agrees that the decision of the appraisers and the umpire if involved shall be binding and final and that neither party will resort to litigation. Each of the two parties shall pay its chosen appraiser and bear the cost of the umpire equally.

11.3.1.4 All Coverages

11.3.1.4.1 All policies must be endorsed to require 30 days written notice of cancellation to the Agency. Ten-day written notice of cancellation is acceptable for non-payment of premium. Notifications shall comply with the standard cancellation provisions in the Contractor's policy. In addition, Contractor is required to notify Agency of policy cancellations or reductions in limits.

11.3.1.4.2 Neither the acceptance of the completed Work nor the payment thereof shall release the Contractor from the obligations of the insurance requirements or indemnification agreement.

11.3.1.4.3 The insurance companies issuing the policies shall have no recourse against the Owner for payment of premiums or for assessments under any form of the policies.

11.3.1.4.4 Any failure of the Contractor to comply with reporting provisions of the policy shall not affect coverage provided to the Owner, its officers, agents, employees and volunteers.

11.3.2 Acceptability of Insurers

All required insurance shall be provided by a company or companies lawfully authorized to do business in the jurisdiction in which the Project is located. Insurance shall be placed with insurers with an A.M. Best's rating of **A-: VI or higher**. This rating requirement may be waived for Worker's compensation coverage only.

If at any time an insurer issuing any such policy does not meet the minimum A.M. Best rating, the Contractor shall obtain a policy with an insurer that meets the A.M. Best rating and shall submit another certificate of insurance within 30 days.

11.3.3 Verification of Coverage

Contractor shall furnish the Owner with Certificates of Insurance reflecting proof of required coverage. The Certificates for each insurance policy are to be signed by a person authorized by that insurer to bind coverage on its behalf. The Certificates are to be received and approved by the Owner before Work commences and upon any contract renewal or insurance policy renewal thereafter. The Certificate Holder must be listed as follows:

State of Louisiana

Name of Owner

Owner Address

City, State, Zip

Attn: Project # _____

The Owner reserves the right to request complete certified copies of all required insurance policies at any time.

Upon failure of the Contractor to furnish, deliver and maintain required insurance, this contract, at the election of the Agency, may be suspended, discontinued, or terminated. Failure of the Contractor to purchase and/or maintain any required insurance shall not relieve the Contractor from any liability or indemnification under the contract.

If the Contractor does not meet the insurance requirements at policy renewal, at the option of the Owner, payment to the Contractor may be withheld until the requirements have been met, OR the Owner may pay the renewal premium and withhold such payment from any monies due the Contractor, OR the contract may be suspended or terminated for cause.

11.3.4 Subcontractors

Contractor shall include all subcontractors as insureds under its policies OR shall be responsible for verifying and maintaining the certificates provided by each subcontractor. Subcontractors shall be subject to all of the requirements stated herein. The Owner reserves the right to request copies of subcontractor's certificates at any time.

If Contractor does not verify subcontractors' insurance as described above, Owner has the right to withhold payments to the Contractor until the requirements have been met.

11.3.5 Worker's Compensation Indemnity

In the event Contractor is not required to provide or elects not to provide Worker's compensation coverage, the parties hereby agree the Contractor, its Owners, agents and employees shall have no cause of action against, and shall not assert a claim against, the State of Louisiana, its departments, agencies, agents and employees as an employer, whether pursuant to the Louisiana Worker's Compensation Act or otherwise, under any circumstance. The parties also hereby agree that the State of Louisiana, its departments, agencies, agents and employees shall in no circumstance be, or considered as, the employer or statutory employer of Contractor, its Owners, agents and employees. The parties further agree that Contractor is a wholly independent Contractor and is exclusively responsible for its employees, Owners, and agents. Contractor hereby agrees to protect, defend, indemnify and hold the State of Louisiana, its departments, agencies, agents and employees harmless from any such assertion or claim that may arise from the performance of this contract.

11.3.6 Indemnification/Hold Harmless Agreement

Contractor agrees to protect, defend, indemnify, save, and hold harmless, the State of Louisiana, all State Departments, Agencies, Boards and Commissions, its officers, agents, servants, employees and volunteers, from and against any and all claims, damages, expenses and liability arising out of injury or death to any person or the damage, loss or destruction of any property which may occur, or in any way grow out of, any act or omission of Contractor, its agents, servants and employees, or any and all costs, expenses and/or attorney fees incurred by Contractor as a result of any claims, demands, suits or causes of action, except those claims, demands, suits or causes of action arising out of the negligence of the State of Louisiana, all State Departments, Agencies, Boards, Commissions, its officers, agents, servants, employees and volunteers.

Contractor agrees to investigate, handle, respond to, provide defense for and defend any such claims, demands, suits or causes of action at its sole expense and agrees to bear all other costs and expenses related thereto, even if the claims, demands, suits, or causes of action are groundless, false or fraudulent. The State of Louisiana may, but is not required to, consult with the Contractor in the defense of claims, but this shall not affect the Contractor's responsibility for the handling and expenses of all claims.

11.4 PERFORMANCE AND PAYMENT BOND

- 11.4.1 The Owner shall have the right to require the Contractor to furnish bonds covering faithful performance of the Contract and payment of obligations arising thereunder as stipulated in bidding requirements or specifically required in the Contract Documents on the date of execution of the Contract.
- 11.4.2 Upon the request of any person or entity appearing to be a potential beneficiary of bonds covering payment of obligations arising under the Contract, the Contractor shall promptly furnish a copy of the bonds or shall authorize a copy to be furnished.
- 11.4.3 Recordation of Contract and Bond [La R.S. 38:2241 thru 38:2241.1]

The Owner shall record within thirty (30) days the Contract Between Owner and Contractor and Performance and Payment Bond with the Clerk of Court in the Parish in which the Work is to be performed.

ARTICLE 12

UNCOVERING AND CORRECTION OF WORK

12.2 CORRECTION OF WORK

12.2.1 Before Substantial Completion

At the end of the paragraph, add the following sentences:

“If the Contractor fails to correct Work identified as defective within a thirty (30) day period, through no fault of the Designer, the Owner may hold the Contractor in default. If the Owner finds the Contractor in default, the Surety shall be notified. If within thirty (30) days after notification, the Surety has not corrected the nonconforming Work, through no fault of the Architect or Owner, the Owner may contract to have nonconforming Work corrected and hold the Surety and Contractor responsible for the cost, including architectural fees and other indirect costs. If the Surety fails to correct the Work within the stipulated time period and fails to meet its obligation to pay the costs, the Owner may elect not to accept bonds submitted in the future by the Surety. Finding the Contractor in default shall constitute a reason for disqualification of the Contractor from bidding on future state contracts.

12.2.2 After Substantial Completion

12.2.2.1 At the end of the paragraph delete the last sentence and add the following sentences:

“If the Contractor fails to correct nonconforming Work, or Work covered by warranties, within a thirty (30) day period, through no fault of the Architect or Owner, the Owner may hold the Contractor in default. If the Owner finds the Contractor is in default, the Surety shall be notified. If within thirty (30) days after notification, the Surety has not corrected the non-conforming or warranty Work, through no fault of the Architect or Owner, the Owner may contract to have the nonconforming or warranty Work corrected and hold the Surety responsible for the cost including architects fees and other indirect costs. Corrections by the Owner shall be in accordance with Section 2.4. If the Surety fails to correct the nonconforming or warranty Work within the stipulated time period and fails to meet its obligation to pay the costs, the Owner may not accept bonds submitted, in the future, by the Surety.”

ARTICLE 13

MISCELLANEOUS PROVISIONS

13.1 GOVERNING LAW

Delete all after the word “located”.

13.2 SUCCESSORS AND ASSIGNS

13.2.1 In the second sentence, delete “Except as ... 13.2.2”

Delete Section 13.2.2.

13.3 RIGHTS AND REMEDIES

Add the following Section 13.3.3:

13.3.3 The Nineteenth Judicial Court in and for the Parish of East Baton Rouge, State of Louisiana shall have sole jurisdiction and venue in any action brought under this contract.

13.4 TESTS AND INSPECTIONS

In Section 13.4.1, delete the second sentence and substitute the following:

The Contractor shall make arrangements for such tests, inspections and approvals with the Testing Laboratory provided by the Owner, and the Owner shall bear all related costs of tests, inspections and approvals.

Delete the last two sentences of Section 13.4.1.

13.5 INTEREST

Delete Section 13.5.

ARTICLE 14

TERMINATION OR SUSPENSION OF THE CONTRACT

14.1 TERMINATION BY THE CONTRACTOR

Delete Section 14.1.1.4.

In Section 14.1.3, after the word “profit,” delete the words “on Work not executed” and substitute the following: “for Work completed prior to stoppage”.

14.2 TERMINATION BY THE OWNER FOR CAUSE

Add the following Section:

14.2.1.5 failure to complete the punch list within the lien period as provided in 9.8.7.

14.2.3 Add the following sentence:

“Termination by the Owner shall not suspend assessment of liquidated damages against the Surety.”

Add the following Section:

14.2.5 If an agreed sum of liquidated damages has been established, termination by the Owner under this Article shall not relieve the Contractor and/or Surety of his obligations under the liquidated damages provisions and the Contractor and/or Surety shall be liable to the Owner for per diem liquidated damages.

14.4 TERMINATION BY THE OWNER FOR CONVENIENCE

In Section 14.4.3, delete all after “incurred by reason of the termination,” and add “along with reasonable profit on the Work not executed.”

ARTICLE 15

CLAIMS AND DISPUTES

15.1 CLAIMS

Delete Section 15.1.2, **Time Limit on Claims**, (See La R.S. 38:2189, and 38:2189.1).

15.1.3.1 Add the following to the end of the paragraph:

“A Reservation of Rights and similar stipulations shall not be recognized under this contract as having any effect. A party must make a claim as defined herein within the time limits provided.”

15.1.4.2 In the first sentence of the Section, delete “Initial Decision Maker’s” and replace with “Architect’s”. In the second sentence of the Section, delete “the decision of the Initial Decision Maker” and replace with: “his/her decision”.

Delete Section 15.1.6.2 and substitute the following:

15.1.6.2 If adverse weather conditions are the basis for a claim for additional time, the Contractor shall document that weather conditions had an adverse effect on the scheduled construction. An increase in the contract time due to weather shall not be cause for an increase in the contract sum. At the end of each month, the Contractor shall make one Claim for any adverse weather days occurring within the month. The Claim must be accompanied by sufficient documentation evidencing the adverse days and the impact on construction. Failure to make such Claim within **twenty-one (21) days** from the last day of the month shall prohibit any future claims for adverse days for that month. No additional adverse weather days shall be granted after the original or extended contract completion date, except those adverse weather days associated with a National Weather Service named storm or federally declared weather related disaster directly affecting the project site.

Add the following Section:

15.1.6.3 The following are considered reasonably anticipated days of adverse weather on a monthly basis:

January	<u>11</u> days	July	<u>6</u> days
February	<u>10</u> days	August	<u>5</u> days
March	<u>8</u> days	September	<u>4</u> days
April	<u>7</u> days	October	<u>3</u> days
May	<u>5</u> days	November	<u>5</u> days
June	<u>6</u> days	December	<u>8</u> days

The Contractor shall ask for total adverse weather days. The Contractor's request shall be considered only for days over the allowable number of days stated above.

Note: Contract is on a calendar day basis.

15.2 INITIAL DECISION

15.2.1 In the second sentence, delete the word "will" and replace with: "shall always".

In the second sentence, delete the phrase: ", unless otherwise indicated in the Agreement."

In the third sentence, delete the word "mediation" and replace with: "litigation".

At the end of the third sentence, add: "arising prior to the date final payment is due".

Delete the fourth sentence.

15.2.5 In the middle of the first sentence, delete all after the phrase: "rejecting the Claim".

In the second sentence, delete the phrase: "and the Architect, if the Architect is not serving as the Initial Decision Maker,".

In the third sentence, delete all after: "binding on the parties" and add the following: "except that the Owner may reject the decision or suggest a compromise or both".

Delete Section 15.2.6.

Delete Section 15.2.6.1.

15.3 MEDIATION

Delete Section 15.3.

15.4 ARBITRATION

Delete Section 15.4.

FOR INFORMATION ONLY

This document will be prepared by Facility Planning & Control in the form appropriate for the project.

STATE OF LOUISIANA
PARISH OF «PARISH OF PROJECT»

CONTRACT BETWEEN OWNER AND CONTRACTOR
AND PERFORMANCE AND PAYMENT BOND

This agreement entered into this _____ day of _____, 2025, by «Contractor» hereinafter called the "Contractor", whose business address is «Contractor Address», «Contractor City», «Contractor State» «Contractor Zip», and the State of Louisiana Division of Administration, herein represented by the contracting officer executing this contract, hereinafter called the "Owner".

Witnesseth that the Contractor and the Owner, in consideration of premises and the mutual covenants; consideration and agreement herein contained, agree as follows:

Statement of Work: The contractor shall furnish all labor and materials and perform all of the work required to build, construct and complete in a thorough and workmanlike manner:

«Project_Reference_1»
«Project_Reference_2»
«Project_Reference_3»
«Project_City», Louisiana
Project No.: «ProjectNo», «Part_No»«WBS»;
 «Supplement_Project_No», Part «Supplement_Part_No»
 («Supplement_WBS»)(Supplement)
State ID No.: «StateID» Site Code: «SiteCode»

in strict accordance with Contract Documents prepared by:

«Designer»
«Designer_Address»
«Designer_City», «Designer_State» «Designer_Zip»

It is recognized by the parties herein that said Contract Documents including by way of example and not of limitation, the Drawings and Specifications dated «Drawings and Specs Date», Addenda number(s) «Addenda No», the Instruction to Bidders, Bid Form, General Conditions, Supplementary Conditions, any Addenda thereto, impose duties and obligations upon the parties herein, and said parties thereby agree that they shall be bound by said duties and obligations. For these purposes, all of the provisions contained in the aforementioned Construction Documents are incorporated herein by reference with the same force and effect as though said Construction Documents were herein set out in full.

Time for Completion: The work shall be commenced on a date to be specified in a written order of the Owner and shall be completed within «Time Completion Days» («Time Completion Days») consecutive calendar days from and after the said date.

Liquidated Damages: Contractor shall be assessed Liquidated Damages in the amount of «Liquidated Damages Cost Per Day» per day for each consecutive calendar day which work is not complete beginning with the first day beyond the completion time.

Compensation to be paid to the Contractor: The Owner will pay and the Contractor will accept in full consideration for the performance of the contract the sum of «Contract Amount Words» and No/100 Dollars («Contract Amount Numeral») which sum represents the «Base Bid Only or Plus Alternates»

Taxes: Contractor hereby agrees that the responsibility for payment of taxes from the funds thus received under this Contract and/or legislative appropriation shall be contractor's obligation and identified under Federal tax identification number _____.

Performance and Payment Bond: To these presents personally came and intervened _____, herein acting for _____, a corporation organized and existing under the laws of the State of _____, and duly authorized to transact business in the State of Louisiana, as surety, who declared that having taken cognizance of this contract and of the Construction Documents mentioned herein, he hereby in his capacity as its Attorney in Fact obligates his said company, as Surety for the said Contractor, unto the said Owner, up to the sum of «Contract Amount Words» and No/100 Dollars («Contract Amount Numeral»). By issuance of this bond, the surety acknowledges they are in compliance with R.S. 38:2219.

The condition of this performance and payment bond shall be that should the Contractor herein not perform the contract in accordance with the terms and conditions hereof, or should said Contractor not fully

indemnify and save harmless the Owner, from all cost and damages which he may suffer by said Contractor's non-performance or should said Contractor not pay all persons who have and fulfill obligations to perform labor and/or furnish materials in the prosecution of the work provided for herein, including by way of example workmen, laborers, mechanics, and furnishers of materials, machinery, equipment and fixtures, then said Surety agrees and is bound to so perform the contract and make said payment(s).

Provided, that any alterations which may be made in the terms of the contract or in the work to be done under it, or the giving by the Owner of any extensions of time for the performance of the contract, or any other forbearance on the part of either the Owner or the Contractor to the other shall not in any way release the Contractor or the Surety from their liability hereunder, notice to the Surety of any such alterations, extensions or other forbearance being hereby waived.

Contractor acknowledges and agrees to comply with the provisions of La. R.S. 38:2212.10 and federal law pertaining to E-Verify in the performance of services under this Contract.

It is hereby agreed that the Legislative Auditor of the State of Louisiana and/or the Office of the Governor, Division of Administration auditors shall have the option of auditing all accounts of contractor which relate to this contract.

The continuation of this contract is contingent upon the appropriation of funds to fulfill the requirements of the contract by the legislature. If the legislature fails to appropriate sufficient monies to provide for the continuation of the contract, or if such appropriation is reduced by the veto of the Governor or by any means provided in the appropriations act to prevent the total appropriation for the year from exceeding revenues for that year, or for any other lawful purpose, and the effect of such reduction is to provide insufficient monies for the continuation of the contract, the contract shall terminate on the date of the beginning of the first fiscal year for which funds are not appropriated.

The contractor agrees to abide by the requirements of the following as applicable: Title VI of the Civil Rights Act of 1964 and Title VII of the Civil Rights Act of 1964, as amended by the Equal Employment Opportunity Act of 1972, Federal Executive Order 11246 as amended, the Rehabilitation Act of 1973, as amended, the Vietnam Era Veteran's Readjustment Assistance Act of 1974, Title IX of the Education Amendments of 1972, the Age Discrimination Act of 1975, the Fair Housing Act of 1968 as amended, and contractor agrees to abide by the requirements of the Americans with Disabilities Act of 1990.

Contractor agrees not to discriminate in its employment practices, and will render services under this contract without regard to race, color, religion, sex, sexual orientation, national origin, veteran status, political affiliation, disability, or age in any matter relating to employment. Any act of discrimination committed by Contractor, or failure to comply with these statutory obligations when applicable shall be grounds for termination of this contract.

In accordance with R.S. 39:1602.1, effective May 22, 2018, for any contract for \$100,000 or more and for any contractor with five or more employees, Contractor, or any Subcontractor, shall certify it is not engaging in a boycott of Israel, and shall, for the duration of this contract, refrain from a boycott of Israel. The State reserves the right to terminate this contract if the Contractor, or any Subcontractor, engages in a boycott of Israel during the term of the contract.

In accordance with La. R.S. 39:1602.2, the following applies to any competitive sealed bids, competitive sealed proposals, or contract(s) with a value of \$100,000 or more involving a for-profit company with at least fifty full-time employees:

Unless otherwise exempted by law, by submitting a response to this solicitation or entering into this contract, the Bidder, Proposer or Contractor certifies the following:

1. The company does not have a practice, policy, guidance, or directive that discriminates against a firearm entity or firearm trade association based solely on the entity's or association's status as a firearm entity or firearm trade association;
2. The company will not discriminate against a firearm entity or firearm trade association during the term of the contract based solely on the entity's or association's status as a firearm entity or firearm trade association.

The State reserves the right to reject the response of the Bidder, Proposer or Contractor if this certification is subsequently determined to be false, and to terminate any contract awarded based on such a false response or if the certification is no longer true.

Contractor has a continuing obligation to disclose any suspensions or debarment by any government entity, including but not limited to General Services Administration (GSA). Failure to disclosed may constitute grounds for suspension and/or termination of the Contract and debarment from future Contracts.

Contractor, and each tier of Subcontractors, shall certify that it is not on the List of Parties Excluded from Federal Procurement or Nonprocurement Programs promulgated in accordance with E.O.s 12549 and 12689, "Debarment and Suspension," as set forth at 24 CFR part 24.

In Witness whereof, the parties hereto on the day and year first above written have executed this agreement in six (6) counterparts, each of which shall, without proof or accountancy for the other counterparts, be deemed an original thereof.

THUS DONE AND SIGNED at Baton Rouge, Louisiana, on the day, month, and year first written above.

WITNESSES:

STATE OF LOUISIANA
DIVISION OF ADMINISTRATION

FP&C Witness #1 Sign Here

BY: _____
ROGER E. HUSSER, JR.,
FP&C DIRECTOR

FP&C Witness #2 Sign Here

Contractor Witness #1 Sign Here

BY: _____
«CONTRACTOR»

Contractor Witness #2 Sign Here

SURETY:

Surety Witness #1 Sign Here

BY: _____
ATTORNEY IN FACT

Surety Witness #2 Sign Here

ADDRESS

TELEPHONE NUMBER

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PROJECT NO.:	«ProjectNo», «Part No»«WBS»;
	«Supplement Project No», Part
	«Supplement Part No» («Supplement WBS»)(Supplement)
NAME:	«Project Reference 1»
	«Project Reference 2»
	«Project Reference 3»
LOCATION:	«Project City»

NON-COLLUSION AFFIDAVIT

Before me, the undersigned authority, duly commissioned and qualified within and for the State and Parish aforesaid, personally came and appeared _____ representing «Contractor» who, being by me first duly sworn deposed and said that he has read this affidavit and does hereby agree under oath to comply with all provisions herein as follows:

PART I.

Section 2224 of Part II of Chapter 10 of Title 38 of the Louisiana Revised Statutes, as amended.

(1) That affiant employed no person, corporation, firm, association, or other organization, either directly or indirectly, to secure the public contract under which he received payment, other than persons regularly employed by the affiant whose services in connection with the construction, alteration or demolition of the public building or project or in securing the public contract were in the regular course of their duties for affiant; and

(2) That no part of the Contract price received by affiant was paid or will be paid to any person, corporation, firm, association, or other organization for soliciting the Contract, other than the payment of their normal compensation to persons regularly employed by the affiant whose services in connection with the construction, alteration or demolition of the public building or project were in the regular course of their duties for affiant.

PART II.

Section 2190 of Part I of Chapter 10 of Title 38 of the Louisiana Revised Statutes, as amended.

That affiant, if an architect or engineer, or representative thereof, does not own a substantial financial interest, either directly or indirectly, in any corporation, firm, partnership, or other organization which supplies materials for the construction of a public work when the architect or engineer has performed architectural or engineering services, either directly or indirectly, in connection with the public work for which the materials are being supplied.

For the purposes of this Section, a "substantial financial interest" shall exclude any interest in stock being traded on the American Stock Exchange or the New York Stock Exchange.

That affiant, if subject to the provisions of this section, does hereby agree to be subject to the penalties involved for the violation of this section.

AFFIANT

SWORN TO AND SUBSCRIBED BEFORE ME THIS _____ DAY OF _____, 2025.

NOTARY

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**Hurricane Laura Repairs : President's
Residence Improvements**

19-627-21-01, F.19002606

01-107-05B-13

F.01004560 (Supplement)

Site Code: 5-10-004 | State ID : SO5519

STATE OF _____

PARISH OF _____

ATTESTATIONS AFFIDAVIT

Before me, the undersigned notary public, duly commissioned and qualified in and for the parish and state aforesaid, personally came and appeared Affiant, who after being duly sworn, attested as follows:

LA. R.S. 38:2227 PAST CRIMINAL CONVICTIONS OF BIDDERS

A. No sole proprietor or individual partner, incorporator, director, manager, officer, organizer, or member who has a minimum of a ten percent (10%) ownership in the bidding entity named below has been convicted of, or has entered a plea of guilty or nolo contendere to any of the following state crimes or equivalent federal crimes:

(a) Public bribery (R.S. 14:118)

(c) Extortion (R.S. 14:66)

(b) Corrupt influencing (R.S. 14:120)

(d) Money laundering (R.S. 14:230)

B. Within the past five years from the project bid date, no sole proprietor or individual partner, incorporator, director, manager, officer, organizer, or member who has a minimum of a ten percent (10%) ownership in the bidding entity named below has been convicted of, or has entered a plea of guilty or nolo contendere to any of the following state crimes or equivalent federal crimes, during the solicitation or execution of a contract or bid awarded pursuant to the provisions of Chapter 10 of Title 38 of the Louisiana Revised Statutes:

(a) Theft (R.S. 14:67)

(f) Bank fraud (R.S. 14:71.1)

(b) Identity Theft (R.S. 14:67.16)

(g) Forgery (R.S. 14:72)

(c) Theft of a business record
(R.S.14:67.20)

(h) Contractors; misapplication of
payments (R.S. 14:202)

(d) False accounting (R.S. 14:70)

(i) Malfeasance in office (R.S. 14:134)

(e) Issuing worthless checks
(R.S. 14:71)

LA. R.S. 38:2212.10 Verification of Employees

A. At the time of bidding, Appearer is registered and participates in a status verification system to verify that all new hires in the state of Louisiana are legal citizens of the United States or are legal aliens.

B. If awarded the contract, Appearer shall continue, during the term of the contract, to utilize a status verification system to verify the legal status of all new employees in the state of Louisiana.

C. If awarded the contract, Appearer shall require all subcontractors to submit to it a sworn affidavit verifying compliance with Paragraphs (A) and (B) of this Subsection.

**Hurricane Laura Repairs : President's
Residence Improvements**

19-627-21-01, F.19002606
01-107-05B-13 (Supplement)
F.01004560 (Supplement)

Site Code: 5-10-004 | State ID : S05519

LA. R.S. 23:1726(B) Certification Regarding Unpaid Workers Compensation Insurance

- A. R.S. 23:1726 prohibits any entity against whom an assessment under Part X of Chapter 11 of Title 23 of the Louisiana Revised Statutes of 1950 (Alternative Collection Procedures & Assessments) is in effect, and whose right to appeal that assessment is exhausted, from submitting a bid or proposal for or obtaining any contract pursuant to Chapter 10 of Title 38 of the Louisiana Revised Statutes of 1950 and Chapters 16 and 17 of Title 39 of the Louisiana Revised Statutes of 1950.
- B. By signing this bid /proposal, Affiant certifies that no such assessment is in effect against the bidding / proposing entity.

NAME OF BIDDER

NAME OF AUTHORIZED SIGNATORY OF BIDDER

DATE

TITLE OF AUTHORIZED SIGNATORY OF BIDDER

**SIGNATURE OF AUTHORIZED
SIGNATORY OF BIDDER/AFFIANT**

Sworn to and subscribed before me by Affiant on the ____ day of _____, 20__ .

Notary Public

Facility Planning & Control CHANGE ORDER

PROJECT NAME: _____ CHANGE ORDER No. _____
PROJECT NUMBER: _____ WBS No. _____ CONTRACT DATE: _____
CONTRACTOR: _____ CFMS / SRM No(s). _____
SITE CODE: _____ STATE ID: _____ NOTICE TO PROCEED DATE: _____

You are directed to make the following change(s) in this contract. Attach SUMMARY, BREAKDOWN and/or UNIT PRICE BREAKDOWN forms as required and give a brief description of the change(s) below.

The Original Contract Sum _____
Total Changes by Previous Change Order(s) _____
Current Contract Sum _____
Contract Sum will be (increased) (decreased) (unchanged) by this Change Order _____
New Contract Sum _____

The Original Contract Completion Date and Contract Time. Date: _____ DAYS
Total Time extended by Previous Change Order(s) _____ DAYS
Contract Time will be (increased) (decreased) (unchanged) by this Change Order _____ DAYS
New Contract Completion Date & Revised Contract Time Date: _____ DAYS

Added Building Area _____ (Sq. Ft.)

NOTE: No additional increase in time or money will be considered for a Change Order item after it has been executed.

RECOMMENDED	ACCEPTED	APPROVED
Designer's Name: _____	Contractor's Name: _____	Project Manager: _____
Address: _____	Address: _____	Facility Planning & Control
Email Address: _____	Email Address: _____	
By: _____	By: _____	By: _____
Date: _____	Date: _____	Date: _____

FACILITY PLANNING AND CONTROL USE ONLY

Classification	Amount	Classification	Amount
Omission (Type "O")*	_____	Miscellaneous (Type "M")	_____
Error (Type "E")*	_____	Owner Requested (Type "R")	_____

Senior Manager/Assistant Director approval: _____

COMMENTS: _____

Construction Contract Change Order SUMMARY

State of Louisiana
Facility Planning & Control

Item No. _____
RFI No. (or COR, CPR, etc.) _____
Date: _____

State Project No. _____
WBS No. _____
Project Name: _____

Contractor Name: _____

Description of Work: _____

General Contractor Direct Costs - Breakdown No. _____

(See attached breakdown)

Total General Contractor Cost

(General Contract Direct Cost plus OH&P)

_____%
(Max: 8%)

Subcontractor Cost Breakdowns

(See attached.)

Subcontractor Name	Breakdown No.	A	B	C
		Total Direct Cost	OH&P (Max 8%)	Total A+(A X B)
_____	_____	_____	_____%	_____
_____	_____	_____	_____%	_____
_____	_____	_____	_____%	_____
_____	_____	_____	_____%	_____
_____	_____	_____	_____%	_____
_____	_____	_____	_____%	_____
_____	_____	_____	_____%	_____
_____	_____	_____	_____%	_____

Subcontractor Direct Costs Total

(Sum column A)

\$ -

Subcontractor Direct Costs + Subcontractor OH&P

(Sum column C)

General Contractor OH&P on Subcontractor Direct Cost at

(Sum column A times General Contractor OH&P rate.)

_____%
(Max: 8%)

Total Subcontractor Costs

(Subcontractor Direct Costs + OH&P + General Contractor OH&P)

Change Order Subtotal

(Sum of Total General Contractor Costs and Total Subcontractor Costs)

Performance and Payment Bond at

(Change Order Subtotal times Performance and Payment Bond rate)

_____%

Amount will be ☐ increased ☐ decreased ☐ unchanged by

(Sum of Change Order Subtotal and Performance and Payment Bond)

Days will be ☐ increased ☐ decreased ☐ unchanged by

(Attach supporting data such as meteorological reports)

Construction Contract Change Order BREAKDOWN

State of Louisiana
Facility Planning & Control

State Project No. _____

WBS No. _____

Project Name: _____

Breakdown No. _____

Item No. _____

RFI No. (or COR, CPR, etc.) _____

Date: _____

Contractor/Subcontractor Name: _____

Direct Cost of Work :

A. Labor

Check here if explained on the Comment Sheet

		Hourly Wage Rate	Hours	Total Cost
1	☐			
2	☐			
3	☐			
4	☐			
5	☐			
6	☐			
7	☐			

Add Labor Burden @ _____ %

LABOR TOTAL

B. Material

		Unit Price	Unit	Units	Total Cost
1	☐				
2	☐				
3	☐				
4	☐				
5	☐				
6	☐				
7	☐				

(Copies of invoices may be required.)

Add Tax @ _____ %

MATERIAL TOTAL

C. Equipment

		Unit Rate	Unit	Units	Total Cost
1	☐				
2	☐				
3	☐				
4	☐				
5	☐				
6	☐				
7	☐				

(Copies of invoices may be required.)

Add Tax @ _____ %

EQUIPMENT TOTAL

TOTAL DIRECT COST FOR THIS BREAKDOWN:

(Sum A, B & C)

Construction Contract Change Order
BREAKDOWN COMMENT SHEET

State of Louisiana	Breakdown No. _____
Facility Planning & Control	Item No. _____
State Project No. _____	RFI No. (or COR, CPR, etc.) _____
WBS No. _____	Date: _____
Project Name: _____	

Contractor/Subcontractor Name: _____

A. Labor

No. (From BREAKDOWN Sheet)

—	_____
—	_____
—	_____
—	_____
—	_____
—	_____
—	_____
—	_____
—	_____
—	_____

B. Material

—	_____
—	_____
—	_____
—	_____
—	_____
—	_____
—	_____
—	_____
—	_____
—	_____

C. Equipment

—	_____
—	_____
—	_____
—	_____
—	_____
—	_____
—	_____
—	_____
—	_____
—	_____

Construction Contract Change Order

UNIT PRICE BREAKDOWN

State of Louisiana

Facility Planning & Control

State Project No. _____

WBS No. _____

Project Name: _____

Breakdown No.

Item No.

RFI No. (or COR, CPR, etc.)

Date: _____

Contractor/Subcontractor Name: _____

Unit Price Tabulation

(Unit prices must be included in the bid or clearly defined in a standard, industry recognized pricing reference.
The pricing reference shall be identified herein.)

Unit Price Description	Reference*	Unit Price	Units
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

* Reference Legend: _____

Unit Price Total:

(Sum Total column)

State of Louisiana
Division of Administration
Facility Planning and Control
Instructions for Change Order Back Up Forms

The General Conditions of the Contract for Construction, AIA Document A201, 2017 Edition, and the Supplementary Conditions provide for changes in the contract in the form of change orders. The costs of such changes must be carefully, clearly and accurately documented. Facility Planning & Control has prepared a set of forms to be used to provide this documentation in a consistent format that is in accordance with the Contract Documents.

Change orders will typically contain one or more items of work. Each item of work will typically include work by the general contractor and/or one or more subcontractors. The documentation begins with a breakdown of the work of the contractor and each subcontractor. This is prepared using the form entitled "BREAKDOWN." One form for the General Contractor and one for each subcontractor. Each breakdown will be summarized on the form entitled "SUMMARY." Each item of work will, in turn, be summarized on the change order itself. This should be on the face of the change order.

The forms are available as a Microsoft Excel worksheet for ease of preparation, with formulas established for mark-ups and other basic mathematical operations.

These forms are to be used as provided. Any alteration to the forms may cause the change order to be rejected.

GENERAL: (Refer to Article 7 of the Supplementary and General Conditions)

Forms - There are five forms to be used for all Facility Planning and Control change orders: CHANGE ORDER form, SUMMARY, BREAKDOWN, BREAKDOWN COMMENT SHEET and UNIT PRICE BREAKDOWN. The CHANGE ORDER form is the highest level and is the official, signed document. A CHANGE ORDER form may include one or more items of work, each of which is backed up by a SUMMARY. Each SUMMARY will be backed up with one or more BREAKDOWNs. Any unusual rates, unit costs or quantities may be explained on the COMMENT SHEET. It's simple. The BREAKDOWN form must be used for the general contractor and any subcontractor, at any level, that is to get OH&P. Use as many as needed.

Unit Pricing - Labor, material and equipment breakdown is the standard method of pricing change orders for Facility Planning and Control. However, unit pricing may be considered in some circumstances if the unit prices are clearly established such as by unit prices that were included in the bid. These prices may also be derived from a construction industry standard reference such as R.S. Means. If unit prices were included in the bid they are acceptable for pricing change order work and, in fact, must be used for any work that is included in the change order for which they were established. The UNIT PRICE BREAKDOWN is provided for this purpose.

CHANGE ORDER:

Project identification information: Complete as required. The Site Code, State ID and CFMS / SRM No(s). (contract numbers) can be obtained from the FP&C Project Manager.

Description: This will include a list of each attached SUMMARY that makes up this change order and a brief statement of the work included in each.

New Contract Sum: Calculate the new contract amount using the original contract amount, previous change orders and the new change order. Select the appropriate word for increase, decrease or unchanged, and delete the terms that don't apply.

New Contract Completion Date and Revised Time: Calculate the new contract time using the original Contract Completion Date and Contract Time, previous changes in time and the change in time by this change order. Select the appropriate word for increase, decrease or unchanged and delete the terms that don't apply. Show days in the main column and the date in the blank indicated.

Added Building Area: Show any building area added by this change order. If none, enter "None."

RECOMMENDED: Show the Designer's name and address, sign on the line indicated as "By:" and date on the indicated line.

ACCEPTED: Show the Contractor's name and address, sign on the line indicated as "By:" and date on the indicated line.

APPROVED: For approval by FP&C.

SUMMARY: (Refer to Article 7 of the Supplementary and General Conditions)

Item No.: Show the Item number as it will appear on the CHANGE ORDER Form. Note: This may be one of several items included in one CHANGE ORDER form.

RFI No.: Show the number of the request for information. This may be known by another name such as COR (Change Order Request,) CPR (Change Proposal Request,) etc.

Project No., WBS No., Date, Project Name. Complete as appropriate.

Contractor: Name of General Contractor.

Description of Work: Give a brief description of the work included in this **Item**.

General Contractor Direct Costs: Show the total General Contractor Cost from the BREAKDOWN and show the Breakdown No. in the space provided.

General Contractor Total Cost: Show the total General Contractor Cost plus the General Contractor's overhead and profit. The overhead and profit shall not exceed 8% of the Direct Cost.

Subcontractor Cost Breakdowns: List each subcontractor, Breakdown No. and Total Direct Cost (in column "A") from the attached BREAKDOWN sheets. Show the subcontractor's overhead and profit percentage in column "B" and show the calculated total of the direct cost plus the percentage of the direct cost in column "C." If the electronic version of the form is being used, column "C" will be automatically calculated. The overhead and profit shall not exceed 8% of the Total Direct Cost.

Subcontractor Direct Costs Total: Sum of column "A." This will be used to calculate the General Contractor's overhead and profit on the subcontractors' work. If the electronic version is being used, this will be an automatic calculation.

Subcontractor Direct Costs + Subcontractor OH&P: Sum of column "C." This represents the total amount that subcontractors will be paid. Automatic calculation.

General Contractor OH&P on Subcontractor Direct Cost at ____%. The contractors overhead and profit on the subcontractors' direct cost (without subcontractor OH&P.) Enter the percentage of the contractor's OH&P on the subcontractors' work (not to exceed 8%) and show the calculated total of the subcontractors' direct cost plus the percentage of the direct cost in the space. Automatic calculation.

Total Subcontractor Costs: Total of the last two spaces.

Change Order Subtotal: Total of change order except bond.

Performance and Payment Bond at ____%: Enter bond percentage (from amount provided by the contractor at the Pre-Construction Conference) and calculate the amount for the bond.

Amount will be (increased) (decreased) (unchanged) by: Add bond and calculate total change order amount. Indicate "increase," "decrease" or "unchanged", and **delete the terms that don't apply**.

Days will be (increased) (decreased) (unchanged) by: Show the number of days to be added or deleted from the contract, if any, due to changes in scope, adverse weather, unusual delays or other factors, **only** if it is proven the critical path is affected. Note that a change in scope does not necessarily indicate a change in time. Indicate "increased," "decreased" or "unchanged", and **delete the terms that don't apply.**

BREAKDOWN:

Item No. Show the Item number as it will appear on the CHANGE ORDER Form and the SUMMARY.

Note: This may be one of several items included in one CHANGE ORDER form.

RFI No.: Show the number of the request for information. This may be known by another name such as COR (Change Order Request,) CPR (Change Proposal Request,) etc.

Project No., WBS No., Date, Project Name. Complete as appropriate.

Contractor: Name of General Contractor or Subcontractor.

Direct Cost of Work:

Check here if explained on the Comment Sheet: If rates, unit costs or quantities may appear unreasonable compared to standard costs or quantities the reasons may be explained on the attached comment sheet and the box checked to indicate that there is an explanation.

A. Labor: Include the “wages paid” hourly direct labor and/or foreman necessary to perform the required change. “Wages paid” is the amount actually paid the employee, not the fully burdened charge rate used in the bid, etc. Supervisory personnel in district or home office shall not be included. Do not include the project superintendent, except as permitted by Section 7.2 of Supplementary Conditions. Supervisory personnel on the job-site, but with broad supervisory responsibility shall not be included as Direct Labor, except as permitted by Section 7.2 of Supplementary Conditions. Typically there will be only one superintendent on the job and his/her time shall not be included, except as permitted by Section 7.2 of Supplementary Conditions. Typically all other employees are eligible for inclusion. List by job title each person employed on the work, his/her hourly rate, the number hours work and the extended Total Cost. Do not list crews unless the rates for them are readily available in standard cost estimating references such as R. S. Means. Add the labor burden that was provided at the Pre-Construction conference and in compliance with the Contract Documents, and total the amounts in LABOR TOTAL.

B. Material: Include the acquisition cost of all materials directly required to perform the required change. List each material used in the work, the price per unit, name of the unit, the number of units used and the extended Total Cost. Add the tax rate and tax and total the amounts in MATERIAL TOTAL.

C. Equipment: Include the rental cost of equipment items necessary to perform the change. For company-owned equipment items, include documentation of internal rental rates submitted at the pre-construction conference. Charges for small tools, and craft specific tools are not allowed. List each piece of equipment used in the work, the rate by units of time (hour, day, week, etc.,) number of units of time the piece was in service on the work and the extended total cost. Add the tax rate, calculate the tax and total the amounts in EQUIPMENT TOTAL.

TOTAL DIRECT COST FOR THIS BREAKDOWN: Total of A. Labor, B. Material and C. Equipment. This is the amount that will be carried forward to the SUMMARY Sheet. This amount does **NOT** include Overhead and Profit. This will be added on the SUMMARY Sheet.

COMMENTS SHEET:

The COMMENTS SHEET uses the same heading as the SUMMARY and BREAKDOWN.

The COMMENTS SHEET includes three sections, one each for A. Labor, B. Materials and C. Equipment. These correspond to the sections in the BREAKDOWN. Each comment should be entered in the section to which it corresponds on the BREAKDOWN and numbered to correspond to the appropriate line. Comments are to used only to explain unusual rates, costs or quantities.

UNIT PRICE BREAKDOWN:

The UNIT PRICE BREAKDOWN uses the same heading as the BREAKDOWN.

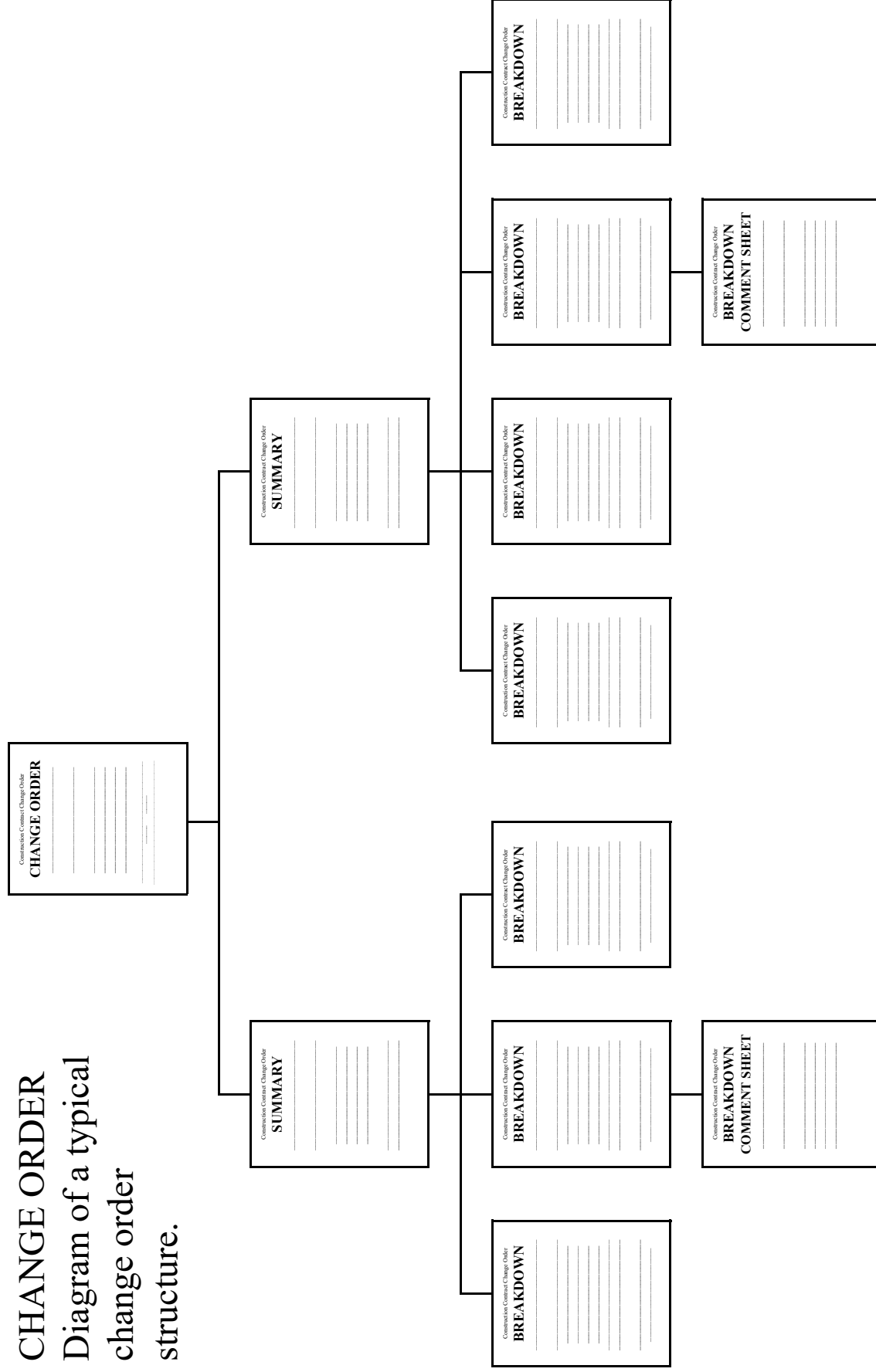
The UNIT PRICE BREAKDOWN is similar to the BREAKDOWN.

Unit Price Tabulation: Each unit price is listed along with its corresponding price and the number of units used in the work. The price and number of units are multiplied to provide the total cost of each unit price item. The pricing reference, such as the bid form for the project or a construction industry standard reference, must be cited for each unit price. This may be more fully described in "Reference Legend,"

Unit Price Total: Sum the unit prices to obtain the total cost for unit prices.

CHANGE ORDER

Diagram of a typical change order structure.



❖ NOT FOR RECORDATION PURPOSES ❖

Facility Planning & Control **PARTIAL OCCUPANCY**

PROJECT NAME:

PROJECT LOCATION:

PROJECT / PART NUMBER:

CFMS / SRM No.

WBS NUMBER:

CONTRACTOR:

USER AGENCY:

The below described portion of subject project is, to the best of my knowledge and belief, complete to a point where the User desires to use in according with the Contract Documents.

DATE OCCUPIED: _____ .

WARRANTY items covered by Occupancy:

_____ Designer	_____ Date
_____ Contractor	_____ Date
_____ Facility Planning and Control	_____ Date

Punch List: Attached ☐

 None ☐

c: User Agency, ORM

❖ NOT FOR RECORDATION PURPOSES ❖

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❖ NOT FOR RECORDATION PURPOSES ❖

Facility Planning & Control
RECOMMENDATION OF ACCEPTANCE

TO: FACILITY PLANNING AND CONTROL
P.O. Box 94095
Baton Rouge, LA 70804-9095

FROM: _____

Design Firm Name and Address

DATE: _____

PROJECT NAME: _____

PROJECT NUMBER: _____ WBS No. _____

SITE CODE: _____ STATE ID: _____ CFMS/SRM #: _____

CONTRACTOR: _____

ORIGINAL CONTRACT AMOUNT: \$ _____

FINAL CONTRACT AMOUNT: \$ _____

FINAL BUILDING AREA (SQ. FEET): _____

I certify that, to the best of my knowledge and belief, this project is substantially complete in accordance with the Plans and Specifications to the point where it can be used for the purpose which was intended. It is recommended that it be accepted.

DATE OF ACCEPTANCE: _____

CONTRACT DATE OF COMPLETION: _____

NUMBER OF DAYS (OVERRUN) (UNDERRUN) (As of Acceptance Date) _____

LIQUIDATED DAMAGES PER DAY STIPULATED IN CONTRACT \$ _____

VALUE OF PUNCH LIST \$ _____

Was part of project occupied prior to Acceptance? ☐ No ☐ Yes, see attached Partial Occupancy Forms

ADA Certificate of Compliance Required? ☐ No ☐ Yes, see attached form.

La. Building Code Certificate of Compliance Required? ☐ No ☐ Yes, see attached form.

ROOF GUAR-MANUF: _____ START DATE: _____ END DATE: _____

ROOFER: _____ START DATE: _____ END DATE: _____

Signed: _____
DESIGNER

FOR USE OF PROJECT MANAGER:

Signed: _____
PROJECT MANAGER

c: User Agency

❖ NOT FOR RECORDATION PURPOSES ❖

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Facility Planning & Control
LIQUIDATED DAMAGES ASSESSMENT

TO: FACILITY PLANNING & CONTROL
P.O. Box 94095
Baton Rouge, LA 70804-9095

FROM: _____

Design Firm Name and Address

DATE: _____

PROJECT NAME: _____

PROJECT NUMBER: _____ WBS No: _____

SITE CODE: _____ STATE ID: _____ CFMS: _____

CONTRACTOR: _____

ORIGINAL CONTRACT AMOUNT: \$ _____

FINAL CONTRACT AMOUNT: \$ _____

DATE OF ACCEPTANCE: _____

CONTRACT DATE OF COMPLETION: _____

NUMBER OF DAYS OVERRUN (As of Acceptance Date) _____

LIQUIDATED DAMAGES PER DAY STIPULATED IN CONTRACT \$ _____

LIQUIDATED DAMAGES ASSESSMENT \$ _____

Signed: _____
DESIGNER

Signed: _____
PROJECT MANAGER

c: User Agency

Facility Planning & Control
LIQUIDATED DAMAGES ASSESSMENT
(Procedure of How FPC Calculates Liquidate Damages at Acceptance)

- If Acceptance Date = Completion Date, then 0 days are assessed (mathematically If $AD = CD$, then $LD = 0$)
- If Acceptance Date is 1 day after Completion date, then 1 day is assessed (don't count acceptance date, mathematically If $AD - CD = 1$, then $LD = 1$)
- If Acceptance Date is 2 days after Completion date, then 1 day is assessed (don't count acceptance date or completion date, mathematically If $AD - CD > 1$, then $LD = AD - CD - 1$)
- If Acceptance date is 3 days after Completion date, then 2 days are assessed (same as line above)
- If Acceptance date is 4 days after Completion date, then 3 days are assessed... etc.

SCHEDULE OF VALUES

The Contractor is to use the following format. The total Contract Cost is to be itemized in each Subsection listed (as applicable)

DIVISION 01 – GENERAL REQUIREMENTS	Quantity	Cost
01 00 00 General Requirements	_____	_____
01 32 50 Record Drawings, Shop Drawings, Product Data, Samples and other submittals.	_____	_____
	TOTAL	_____
DIVISION 02 – EXISTING CONDITIONS		
02 30 00 Subsurface Investigation	_____	_____
02 41 00 Demolition	_____	_____
	TOTAL	_____
DIVISION 03 – CONCRETE		
03 01 00 Maintenance of Concrete	_____	_____
03 11 00 Concrete Forming	_____	_____
03 15 00 Concrete Accessories	_____	_____
03 20 00 Concrete Reinforcing	_____	_____
03 30 00 Cast-in-place Concrete	_____	_____
03 40 00 Precast Concrete	_____	_____
03 50 00 Cast Decks & Underlayment	TOTAL	_____
DIVISION 04 – MASONRY		
04 01 00 Maintenance of Masonry	_____	_____
04 05 13 Masonry Mortaring	_____	_____
04 05 19 Masonry Anchorage & Reinforcing	_____	_____
04 05 23 Masonry Accessories	_____	_____
04 20 00 Unit Masonry	TOTAL	_____
DIVISION 05 – METALS		
05 05 23 Metal Fastenings	_____	_____
05 10 00 Structural Metal Framing	_____	_____
05 20 00 Metal Joists	_____	_____
05 30 00 Metal Decking	_____	_____
05 50 00 Metal Fabrications	_____	_____
05 58 00 Formed Metal Fabrications	TOTAL	_____
DIVISION 06 – WOOD, PLASTICS, & COMPOSITES		
06 05 23 Fastening and Adhesives	_____	_____
06 10 00 Rough Carpentry	_____	_____
06 13 00 Heavy Timber	_____	_____
06 17 00 Shop-fabricated Structural Wood	_____	_____
06 20 00 Finish Carpentry	SUB-TOTAL	_____

DISISION 06 – WOOD, PLASTICS, &
COMPOSITES (CONTINUES)

06 40 00	Architectural Woodwork	_____	_____
06 60 00	Plastic Fabrications	_____	_____
06 80 00	Composite Fabrications	_____	_____
	TOTAL		_____

DIVISION 07 – THERMAL AND MOISTURE
PROTECTION

07 10 00	Dampproofing and Waterproofing	_____	_____
07 18 00	Traffic Coatings	_____	_____
07 19 00	Water Repellents	_____	_____
07 21 00	Thermal Insulation	_____	_____
07 24 00	Exterior Insulation & Finish Systems	_____	_____
07 25 00	Weather Barriers	_____	_____
07 31 00	Shingles and Shakes	_____	_____
07 32 00	Roof Tiles	_____	_____
07 40 00	Roofing and Siding Panels	_____	_____
07 50 00	Membrane Roofing	_____	_____
07 60 00	Flashing and Sheet Metal	_____	_____
07 61 00	Sheet Metal Roofing	_____	_____
07 70 00	Roof & Wall Specialties and Accessories	_____	_____
07 80 00	Fire and Smoke Protection	_____	_____
07 90 00	Joint Protection	_____	_____
07 95 00	Expansion Control	_____	_____
	TOTAL		_____

DIVISION 08 – OPENINGS

08 11 00	Metal Doors and Frames	_____	_____
08 14 00	Wood Doors	_____	_____
08 15 00	Plastic Doors	_____	_____
08 30 00	Specialty Doors and Frames	_____	_____
08 41 00	Entrances and Storefronts	_____	_____
08 44 00	Curtain Wall and Glazed Assemblies	_____	_____
08 51 00	Metal Windows	_____	_____
08 52 00	Wood Windows	_____	_____
08 53 00	Plastic Windows	_____	_____
08 56 00	Special Function Windows	_____	_____
08 60 00	Roof Windows and Skylights	_____	_____
08 70 00	Hardware	_____	_____
08 80 00	Glazing	_____	_____
08 90 00	Louvers and Vents	_____	_____
	TOTAL		_____

DIVISION 09 – FINISHES

09 22 00	Supports for Plaster and Gypsum Board	_____	_____
09 23 00	Gypsum Plastering	_____	_____
09 24 00	Portland Cement Plastering	_____	_____
09 29 00	Gypsum Board	_____	_____
09 30 00	Tiling	_____	_____
	SUB-TOTAL		_____

DIVISION 09 – FINISHES (CONTINUED)

09 50 00	Acoustical Ceilings	_____	_____
09 54 00	Specialty Ceilings	_____	_____
	Quantity	_____	_____
09 61 00	Flooring Treatment	_____	_____
09 62 00	Specialty Flooring	_____	_____
09 63 00	Masonry Flooring	_____	_____
09 64 00	Wood Flooring	_____	_____
09 65 00	Resilient Flooring	_____	_____
09 66 00	Terrazzo Flooring	_____	_____
09 68 00	Carpeting	_____	_____
09 69 00	Access Flooring	_____	_____
09 97 00	Wall Finishes	_____	_____
09 91 00	Painting	_____	_____
09 97 00	Special Coatings	_____	_____
	TOTAL	_____	_____

DIVISION 10 – SPECIALTIES

10 11 00	Visual Display Surfaces	_____	_____
10 14 00	Signage	_____	_____
10 21 00	Compartments and Cubicles	_____	_____
10 22 00	Partitions	_____	_____
10 26 00	Wall and Door Protection	_____	_____
10 28 00	Toilet, Bath, and Laundry Accessories	_____	_____
10 44 00	Fire Protection Specialties	_____	_____
10 51 00	Lockers	_____	_____
10 56 00	Storage Assemblies	_____	_____
10 82 00	Grilles and Screens	_____	_____
	TOTAL	_____	_____

DIVISION 11 – EQUIPMENT

11 15 00	Security, Detention, and Banking Equipment	_____	_____
11 19 00	Detention Equipment	_____	_____
11 23 00	Commercial Laundry and Dry Cleaning Equipment	_____	_____
11 26 00	Unit Kitchens	_____	_____
11 27 00	Photographic Processing Equipment	_____	_____
11 40 00	Foodservice Equipment	_____	_____
11 51 00	Library Equipment	_____	_____
11 52 00	Audio-Visual Equipment	_____	_____
11 53 00	Laboratory Equipment	_____	_____
11 61 00	Theater and Stage Equipment	_____	_____
11 65 00	Athletic and Recreational Equipment	_____	_____
11 70 00	Healthcare Equipment	_____	_____
	TOTAL	_____	_____

DIVISION 12 – FURNISHINGS

12 20 00	Window Treatments	_____	_____
12 30 00	Casework	_____	_____
12 40 00	Furnishings and Accessories	_____	_____
12 50 00	Furniture	_____	_____
	TOTAL	_____	_____

DIVISION 13 – SPECIAL CONSTRUCTION

13 10 00	Special Facility Components	_____	_____
13 34 00	Fabricated Engineered Structures	_____	_____
13 49 00	Radiation Protection	_____	_____
	TOTAL	_____	_____

DIVISION 14 – CONVEYING EQUIPMENT

14 20 00	Elevators	_____	_____
14 30 00	Escalators and Moving Walks	_____	_____
14 40 00	Lifts	_____	_____
14 80 00	Scaffolding	_____	_____
	TOTAL	_____	_____

DIVISION 21 – FIRE SUPPRESSION

21 10 00	Water-Based Fire-Suppression Systems		
	Piping	_____	_____
21 20 00	Fire-Extinguishing Systems	_____	_____
21 30 00	Fire Pumps	_____	_____
	TOTAL	_____	_____

DIVISION 22 – PLUMBING

22 07 00	Plumbing Insulation	_____	_____
22 11 00	Facility Water Distribution	_____	_____
22 13 00	Facility Sanitary Sewerage	_____	_____
22 14 00	Facility Storm Drainage	_____	_____
22 30 00	Plumbing Equipment	_____	_____
22 40 00	Plumbing Fixtures	_____	_____
	TOTAL	_____	_____

DIVISION 23 – HEATING, VENTILATING, & AIR-CONDITIONING

23 05 93	Testing, Adjusting, & Balancing for HVAC	_____	_____
23 07 00	HVAC Insulation	_____	_____
23 09 00	Instrumentation & Control for HVAC	_____	_____
23 13 00	Facility Fuel-Storage Tanks	_____	_____
23 20 00	HVAC Piping and Pumps	_____	_____
23 30 00	HVAC Air Distribution	_____	_____
23 40 00	HVAC Air Cleaning Devices	_____	_____
23 50 00	Central Heating Equipment	_____	_____
23 60 00	Central Cooling Equipment	_____	_____
23 70 00	Central HVAC Equipment	_____	_____
	TOTAL	_____	_____

DIVISION 26 – ELECTRICAL

26 09 00	Instrumentation & Control for Electrical Systems	_____	_____
26 10 00	Medium-Voltage Electrical Distribution	_____	_____
26 20 00	Low-Voltage Electrical Transmission	_____	_____
26 27 00	Low-Voltage Distribution Equipment	_____	_____
26 30 00	Facility Electrical Power Generating & Storage Equipment	_____	_____
26 40 00	Electrical and Cathodic Protection	_____	_____
26 50 00	Lighting	_____	_____
	TOTAL	_____	_____

DIVISION 27 – COMMUNICATIONS

27 10 00	Structured Cabling	_____	_____
27 20 00	Data Communications	_____	_____
27 30 00	Voice Communications	_____	_____
27 40 00	Audio-Video Communications	_____	_____
27 50 00	Distributed Communications & Monitoring Systems	_____	_____
		TOTAL	_____

DIVISION 28 – ELECTRONIC SAFETY AND SECURITY

28 10 00	Electronic Access Control & Intrusion Detection	_____	_____
28 20 00	Electronic Surveillance	_____	_____
28 30 00	Electronic Detection and Alarm	_____	_____
28 40 00	Electronic Monitoring and Control	_____	_____
		TOTAL	_____

DIVISION 31 – EARTHWORK

31 10 00	Site Clearing	_____	_____
31 20 00	Earth Moving	_____	_____
31 31 00	Soil Treatment	_____	_____
31 32 00	Soil Stabilization	_____	_____
31 40 00	Shoring and Underpinning	_____	_____
31 50 00	Excavation Support and Protection	_____	_____
31 60 00	Special Foundations and Load- Bearing Elements	_____	_____
		TOTAL	_____

DIVISION 32 – EXTERIOR IMPROVEMENTS

32 10 00	Bases, Ballasts, and Paving	_____	_____
32 30 00	Site Improvements	_____	_____
32 90 00	Planting	_____	_____
		TOTAL	_____

DIVISION 33 – UTILITIES

33 10 00	Water Utilities	_____	_____
33 30 00	Sanitary Sewerage Utilities	_____	_____
33 40 00	Storm Drainage Utilities	_____	_____
33 50 00	Fuel Distribution Utilities	_____	_____
33 60 00	Hydronic & Steam Energy Utilities	_____	_____
33 70 00	Electrical Utilities	_____	_____
33 80 00	Communications Utilities	_____	_____
		TOTAL	_____

DIVISION 34 – TRANSPORTATION

34 00 00	Transportation	_____	_____
		TOTAL	_____

DIVISION 35 – WATERWAY AND MARINE CONSTRUCTIONS

35 00 00	Waterway and Marine construction	_____	_____
		TOTAL	_____

DIVISION 40-43 – PROCESS EQUIPMENT

DIVISION 44 – POLLUTION CONTROL
EQUIPMENT

44 40 00	Water Treatment Equipment	_____	_____
44 41 00	Packaged Water Treatment Plants	_____	_____
44 50 00	Solid Waste Control	_____	_____
		TOTAL	_____

DIVISION 45 – INDUSTRY SPECIFIC
MANUFACTURING
EQUIPMENT

DIVISION 48 – ELECTRICAL POWER
GENERATION

48 10 00	Electrical Power Generation Equipment	_____	_____
48 70 00	Electrical Power Generation Testing	_____	_____
		TOTAL	_____

ROOFING GUARANTEE R-1

OWNER: STATE OF LOUISIANA

ADDRESS: OFFICE OF FACILITY PLANNING AND CONTROL
POST OFFICE BOX 94095 CAPITOL STATION
BATON ROUGE, LOUISIANA 70804-9095

WHEREAS _____

Address _____

Telephone (____)_____ Email _____

herein called the "Roofing Contractor", has performed roofing and flashing in accordance with the Contract Documents for Project / Part No. _____, WBS No. _____
(hereinafter called the "Work") under a

Subcontract with _____

General Contractor on the Following Project: _____

Name of Project: _____

User Agency: _____

Location/Address: _____

Name and Type of Building(s): _____

_____ Building I.D. _____

Type(s) of Roof Deck(s): _____

Total Roof Area: _____ SF; Flashing, Edge: _____ LF; Base: _____ LF

Date of Acceptance: _____ Guarantee Period: 2 Years

Date of Expiration: _____

AND WHEREAS the Roofing Contractor has contracted (as a Subcontractor) to guarantee said work against water entry from faulty or defective materials and workmanship for the designated Guarantee period;

AND WHEREAS the General Contractor, by its acceptance of the Contract for the above described project, has jointly assumed with the Roofing Contractor the obligations to the Owner of said guarantee against leaks and faulty or defective materials and workmanship;

NOW THEREFORE the Roofing Contractor and the General Contractor jointly and severally guarantee, subject to the terms and conditions herein set forth, that during the Guarantee Period they will at their own cost and expense, make or cause to be made with approved procedures and materials such repairs to or replacements of said work resulting from water entry or faults or defects of said Work as are necessary to correct faulty and defective work and as are necessary to maintain said Work in watertight conditions and further to respond on or within two (2) working days upon written notification of leaks or defects by the Owner/User Agency. Furthermore, they will at their own cost and expense maintain the roof for (2) years after acceptance, in accordance with the current edition of the Roof Maintenance Manual published by the Roofing Industry Educational Institute. The roof shall be inspected a minimum of twice each year, and a report prepared documenting the conditions observed at each inspection. These inspections shall be made once during the months of April or May and once during the months of September and October. Two copies of each report shall be forwarded to the Owner and User Agency.

This Guarantee is made subject to the following terms and conditions:

1. Specifically excluded from this guarantee are damages to the Work, other parts of the building and building contents caused by: A) lightning, and storm (includes hurricanes and tornadoes), hailstorm, earthquakes and other unusual phenomena of the elements; B) fire; and C) structural failures causing excessive roof deck, edgings and related roof components movement. When the Work has been damaged by any of the foregoing causes, the Guarantee will be null and void until such damage has been repaired by the Roofing Contractor, and until the cost and expense thereof has been paid by the Owner or another responsible party so designated.
2. During the Guarantee Period, if the Owner/User Agency allows alteration of the Work by anyone other than a Contractor approved in writing by the Roofing Subcontractor, General Contractor, and Roofing Material Manufacturer prior to the work being performed, including cutting, patching and maintenance in connection with penetrations, attachment of other work, and positioning of anything on the roof, this Guarantee shall become null and void upon the date of said alterations. If the Owner/User Agency engages the Roofing Contractor to perform said alterations, the Guarantee shall not become null and void, unless the Roofing Contractor, prior to proceeding with said work, shall have notified the Owner/User Agency in writing, showing reasonable cause for claim that said alterations would likely damage or deteriorate the Work, thereby reasonably justifying a termination of this Guarantee.
3. During the Guarantee Period, if the original use of the roof is changed and it becomes used for, but for which it was not originally designed or specified, as a promenade, work deck, spray-cooled surface, flooded basin, or other use of service more severe than originally specified, this Guarantee shall become null and void upon the date of said change.
4. During the Guarantee Period, if any building or area of a building is changed to uses creating extremes of interior temperature and/or humidity, but for which it was not originally designed and specified, without provisions and alterations made to the building which effectively contain or control these conditions, this guarantee shall become null and void upon the date of said change.
5. The Owner/User Agency shall promptly notify the Roofing Contractor in writing of observed, known or suspected leaks, defects or deterioration, and shall afford reasonable opportunity for the Roofing Contractor to inspect the Work, and to examine the evidence of such leaks, defects or deterioration.

6. This Guarantee is recognized to be the only guarantee of the General and Roofing Contractor on said work, and shall not operate to restrict or cut off the Owner from other remedies and recourses lawfully available to him in case of roofing failure. Specifically, this Guarantee shall not operate to relieve the Roofing Contractor of his responsibility for performance of the original work, regardless of whether the Contract was a Contract directly with the Owner or a Subcontract with the Owner's General Contractor.

IN WITNESS THEREOF, this instrument has been duly executed this _____
day of _____, 20____.

Roofing Contractor's Signature: _____

Typed Name: _____

Representing: _____

Telephone (____)_____, Email _____

Witness:_____

Witness:_____

And has been countersigned by the General Contractor issuing the Roofing Contractor's Subcontract for said work:

Name of General Contractor: _____

Date: _____ Authorized Signature: _____

Representing: _____

Typed Name: _____

Telephone (____)_____, Email _____

Witness:_____

Witness:_____

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ROOFING GUARANTEE R-3 (Metal)

OWNER: STATE OF LOUISIANA OFFICE OF FACILITY PLANNING AND CONTROL
POST OFFICE BOX 94095 CAPITOL STATION
BATON ROUGE, LOUISIANA 70804-9095

Whereas _____

Address _____

Telephone (____) _____ Email _____

herein called the Contractor, has provided pre-formed, pre-finished metal roofing, flashing, accessories and miscellaneous items required for a complete roof system installation in accordance with the Contract Documents for the PROJECT:

Name of Project: _____

Project / Part No. _____, WBS No. _____

User Agency: _____

Location/Address: _____

Name and Type of Building(s): _____ Bldg. I.D. _____

Type of System: (Standing Seam, SR, Flat Seam, etc. _____

Total Roof Area: _____ SF; Total Length of Ridge _____ LF ;

Total Length of Valley: _____ LF: Total Length of gutter/fascia trim: _____

Date of Acceptance _____ Two year Guarantee Expiration _____

AND WHEREAS the Contractor has contracted to guarantee said work against water entry from faulty or defective materials and workmanship for the designated Guarantee period of TWO (2) YEARS from the date of the Final acceptance of the Project;

NOW THEREFORE the Contractor guarantees, subject to the terms and conditions herein set forth, that during the Guarantee Period the Contractor will at his own cost and expense, make or cause to be made with approved procedures and materials such repairs to or replacements of said work (including any wetted thermal insulation) resulting from water entry or faults or defects of said Work as are necessary to maintain said Work in watertight conditions and further, respond on or within TWO (2) working days upon written notification of leaks or defects by the Owner/User Agency.

This Guarantee is made subject the following terms and conditions

1. Specifically excluded from this guarantee are damages to the Work, other parts of the building(s) and building contents caused by: A) lighting; windstorm (including hurricanes and tornadoes), hailstorm,

July 2022

Roofing Guarantee R-3

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Proj No. _____ Pt _____

WBS No. _____

earthquake and other unusual phenomena of the elements; B) fire; and C) structural failures causing excessive roof deck, edges and related roof component movement. When the Work has been damaged by any of the foregoing causes, the Guarantee will be suspended until such time as the damage has been repaired, and until the cost and expense thereof has been assigned or paid by the Owner or the responsible party. The guarantee shall be reinstated upon Final Acceptance of the damage repair Work by both the Owner & Contractor.

2. During the Guarantee Period, if the Owner/ User Agency allows alteration of the Work by anyone other than a Contractor approved in writing by the original Contractor and/or Roofing Material Supplier prior to the work being performed, including cutting, patching and maintenance in connection with penetrations, attachment of other work, and positioning of anything (i.e. signs) onto the roof, this Guarantee shall become null and void as of the date of said alterations. If the Owner/ User Agency engages the original Contractor for said alterations, the Guarantee shall be maintained in force unless the Contractor presents written notification to the Owner that the intended work will likely damage or cause deterioration of the base work, thereby justifying a termination of the original Guarantee.

3. The Owner/User Agency shall promptly notify the Contractor in writing of observed, known or suspected leaks, defects, or condition deterioration and shall afford a reasonable opportunity for the Contractor to inspect the work and examine evidence of such leaks, defects or deterioration.

4. This Guarantee is recognized to be the only guarantee of the Contractor of said work, and shall not operate to restrict or cut-off the Owner from any other remedies and recourse lawfully available to him in case of roofing failure to any cause or degree. Specifically, this Guarantee shall not operate to relieve the Contractor of his responsibility for the performance of the original work.

IN WITNESS THEREOF, this instrument has been duly executed

this _____ day of _____, 20____.

Contractor's Signature: _____

Typed Name: _____

Telephone (____)_____, Email _____

Witness:_____ Witness:_____

And if applicable, is countersigned by the following Sub Contractor, Installer, or other party (as indicated) who acted as agent or represented the Contractor during the performance of the work:

Countersignee Name: _____
(Type or Print)

Date: _____ Signature: _____

Representing: _____

Address: _____

Telephone (____)_____, Email _____

Witness:_____ Witness:_____

July 2022

Roofing Guarantee R-3

Page 2 of 2

Proj No. _____ Pt _____

WBS No. _____

Facility Planning and Control State of Louisiana

TWENTY (20) YEAR WEATHERTIGHTNESS METAL ROOF SYSTEM - LIMITED WARRANTY

We, Manufacturer the manufacturer; warrants to the State of Louisiana herein referenced as "Owner" of the building described below that subject to the terms, conditions, limitations and warranty responsibility stated herein ; Manufacturer warrants with no dollar limit (NDL) the undersigned Contractor workmanship and material defects, and will repair any leaks in the Manufacturer roofing system (Roofing System); and further, agrees to make provisions for satisfactorily drying all wetted thermal roof insulation caused by said leak(s), of the installed roof over the life of this TWENTY (20) YEAR WARRANTY commencing with the date of Acceptance of the Project (as defined in the Contract Documents).

Satisfactory repair of reported leaks shall not serve to extend the term of the original 20-Year Warranty period for either the repair or the entire Roof System, but rather serve to maintain the Roof System weathertightness condition for the entire term of the original warranty.

Neither Manufacturer nor undersigned Contractor makes any other warranty whatever, expressed or implied. All implied warranties of merchantability and all implied warranties of fitness for any particular purpose which exceed or differ from the warranties herein expressed are disclaimed by each and all of said parties and are hereby excluded from this 20-Year Weathertightness Limited Warranty.

In no event shall Manufacturer be held liable for any commercial loss, claims for labor or consequential damages of any other type not specifically referenced herein, whether owner's claim be based in contract, tort, or strict liability.

TERMS, CONDITIONS, LIMITATIONS

1. A "Leak" is defined as water entry into any location where water entry is not specifically planned for. This can include insulation, cornices, attic spaces and other portions of the building assembly. Water entry through fastener holes, all flashings including valley, hip, ridge, closure, rake, wall runner, eave, curb, pipe penetration and other penetration flashings, and the roof panels and seams (side and end) are to be considered "leaks" as pertains to this weathertightness warranty.
2. Owner shall provide Manufacturer with written notice within THIRTY (30) days of discovery of any leaks in the Roof System; after which date, the principal to this warranty shall be expected to respond to said leak report within a period of TEN (10) working days.
 - a) Failure to respond, shall enable the Owner to engage service of "others" to address the problem without jeopardizing Owner's protection under terms of the original warranty.
 - b) Further, by Manufacturer's failure to respond as specified, subjects manufacturer to liability for full reimburse to the Owner for all costs incurred to engage the services of "others" in order to protect the building from further damage by roof leak(s).
 - c) Manufacturer cannot be held responsible for lack of performance or liable under the terms of this warranty due to Owner's failure to report claims as specified.

20-Year Weathertightness Warranty continued;

20-Year Weathertightness Warranty continued;

3. After a leak report is filed; Manufacturer shall determine whether the leak is caused by defects in manufactured material or in the workmanship and affect the Roof System repair in accordance with repair obligations herein. In the event a determination is made that neither defect in manufactured material or workmanship is at fault, the Owner shall be so advised in writing and permitted to exercise other remedies without jeopardy to provisions of the original warranty.
4. The Manufacturer shall not have any liability under the terms of this 20-Year Weathertightness Warranty for any NDL repair or replacement caused by one or more of the following:
 - a) Acts of Nature - including but not limited to; lightning, hurricane, tornado, earthquake, hailstorm and falling trees or limbs.
 - b) Deterioration caused by marine (salt water) atmosphere or by regular spray of either salt or fresh water.
 - c) Corrosion caused by heavy fall out or exposure to corrosive chemicals, ash or fumes from chemical plants, foundries, plating works, kilns, fertilizing manufacture and paper manufacturing plants - if either cause is located less than one-half mile radius distant from the building.
 - d) Deterioration caused by corrosive or condensates generated or released from within the building itself.
 - e) Damages caused by workers or work activity on the roof after issuance of the warranty.
 - f) Structural failures affecting (but not part of) the Roof System.
 - g) Unauthorized alterations or modifications of the Work by anyone other than a Contractor agreed to in writing by all parties to this warranty.
 - h) Failure of the Owner to exercise reasonable care and maintenance.
5. During the Term of this warranty; and within 72 hours of formal request, the Owner shall permit Manufacturer, or manufacturer's agent access to the roof during regular business hours.
6. Failure of either party to exercise or enforce specific terms, conditions or provisions shall not be construed to be a waiver of same.
7. The Manufacturer shall not be responsible for consequential damage or loss to the building, its contents, or other material as a provision of this warranty.
8. The Manufacturer shall not have any liability or responsibility at any time for, or as a consequence of any condensation or underside corrosion which is or was caused at anytime by any condensation resulting from either or both of the following:
 - a) Inadequate ventilation of the attic space between the roof panel and insulation, when insulation is installed on top of existing roof.
 - b) The use of inadequate vapor barrier where the insulation is installed immediately beneath roof panels.
9. The Nineteenth Judicial Court in and for the Parish of East Baton Rouge, State of Louisiana shall have sole jurisdiction in any action brought as a result of this warranty by any party hereto.
10. This Warranty instrument supersedes and is in lieu of any and all other expressed or implied warranties that are or may be in conflict with terms and conditions stated herein.
11. A fully executed original of this Warranty is required prior to recommendation of acceptance, and Acceptance of the project.

20-Year Weathertightness Warranty continued;

WARRANTY RESPONSIBILITY

FIRST (1st.) year through the TWENTIETH (20th) year from date of Acceptance of the project by Roof System Manufacturer whose legal entity is Manufacturer; except that the first recourse of the Owner for Warranty Benefits during Year 1 and Year 2 after date of Project Acceptance will be the Contractor per provisions of Roofing Guarantee R-3 (Metal).

EXCEPT AS EXPRESSLY PROVIDED HEREIN, Manufacturer MAKES NO REPRESENTATIONS OR WARRANTIES OF ANY KIND WITH RESPECT TO MATERIALS COVERED HEREBY, INCLUDING WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, NOR DOES SELLER MAKE ANY WARRANTY OR ASSUME ANY OBLIGATION WITH RESPECT TO THE VALIDITY OF ANY PATENTS, DESIGNS, COPYRIGHTS OR TRADEMARKS WHICH MAY COVER SUCH GOODS EXCEPT; THAT THE OWNER SHALL HAVE THE RIGHT TO RELY ON SAME BY REPRESENTATION OF THE MANUFACTURER THAT BY OFFERING THE MATERIAL, ROOF SYSTEM AND MISCELLANEOUS ITEMS FOR THE PURPOSES OF THIS PROJECT THERE IS NO VIOLATION OF THE RIGHTS OF OTHER PARTIES WITH RESPECT TO PATENTS, DESIGNS, COPYRIGHTS OR TRADEMARKS, FURTHER; THE CONDITIONS OF LIABILITY, RIGHTS, OBLIGATIONS AND REMEDIES OF THE PARTIES RELATING TO CLAIMS ARISING FROM DEFECTIVE GOODS SHALL BE GOVERNED EXCLUSIVELY BY THE TERMS HEREOF: THIS WARRANTY MAY NOT BE CHANGED ORALLY.

IN CONSIDERATION FOR PAYMENT RECEIVED, THIS WARRANTY IS TENDERED FOR THE BENEFIT OF THE OWNER AND IS NOT TRANSFERABLE OR ASSIGNABLE WITHOUT THE WRITTEN CONSENT OF THE MANUFACTURER Manufacturer.

THIS WARRANTY REQUIRES THE ORIGINAL SIGNATURES OF AN OFFICER OF THE MANUFACTURER, AND THREE FULLY EXECUTED COPIES WILL BE PROVIDED TO THE OWNER AS A PREREQUISITE FOR PROJECT ACCEPTANCE. THE OWNER'S SIGNATURE SHALL NOT BE A REQUIREMENT FOR IMPLEMENTATION OF, OR CAUSE TO VALIDATE THE WARRANTY.

A SEPARATE AND INDEPENDENT WARRANTY SHALL BE ISSUED FOR EACH BUILDING OR INDEPENDENT ROOF SYSTEM IN THE CASE OF MULTIPLE BUILDINGS OR MIXED ROOFED PROJECTS.

PROJECT DATA / SIGNATORS

Building/Project Description: _____

Roof Type and Quantity: _____

Location: _____

La. State Building I.D. (if known): _____

Site Code: _____

La. State Project Number _____; and Part # _____ WBS: _____

Date of Project Acceptance and Commencement of Warranty: _____ Ends: _____

Manufacturer:

Manufacturer

S _____ Title _____ Date _____

ADDITIONAL PARTIES FOR FILE AND RECORD

20-Year Weathertightness Warranty continued;

File Reference:
Contractor or
Roofing Contractor
Address:

S _____

Title _____ Date: _____

File Reference #2:
Contractor or
Roofing Contractor
Address:

S _____

Title _____ Date: _____

Direct to:

STATE of LOUISIANA (Owner)
DIVISION OF ADMINISTRATION
Facility Planning and Control
Statewide Roofing Program
PO Box 94095
Baton Rouge, Louisiana 70804-9095

//////////////////// END 20- YEAR WEATHERTIGHTNESS WARRANTY //////////////////////////////////////

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FP&C Project Managers & To Whom It May Concern
METAL ROOF SYSTEM 20 - YEAR WEATHERTIGHTNESS
No Dollar Limit (NDL) WARRANTY

To: FP&C PROJECT MANAGERS & TO WHOM IT MAY CONCERN

From: STATE of LOUISIANA, DIVISION OF ADMINISTRATION
FACILITY PLANNING AND CONTROL
STATEWIDE ROOFING PROGRAM SECTION

Re: METAL ROOF SYSTEM 20 - YEAR WEATHERTIGHTNESS
No Dollar Limit (NDL) WARRANTY

Present policy will require that new metal roofing system installation on either new construction projects; or, retrofit construction projects; or, reroofing construction projects will require a 20-Year Manufacturer's Weathertightness (or, Weathertight) (or, No Leak) No Dollar Limit Warranty to be provided.

Since the inception of this policy, Facility Planning and Control has received numerous warranties with varying provisions unrelated to the State of Louisiana, provisions contradictory to the best interest of the State of Louisiana (and in some cases for Contractors as well) or just simply unrelated to the State's general project requirements. In an effort to promote a clearer understanding of what is required, the Statewide Roofing Program Section has compiled and edited provisions of currently available Industry Standard warranties and has composed an acceptable warranty format required for use on State of Louisiana projects.

The following FOUR (4) page "Sample Warranty" is to be included in the Project Manual as reference of the acceptable warranty. Bidders are to be advised that this warranty, complete and fully executed must be used; or, at the option of the successful bidder (or metal roof system manufacturer) a "Manufacturer's Warranty" may be used provided it is written exactly as the attached State version.

Manufacturer's Warranties are to be approved for use on a project by project basis by FP&C prior to Bidding. Submittal of all proposed warranties shall be per Instructions to Bidders; Article 4. BID DOCUMENTS; 4.3 "Substitutions". Failing to receive Pre-Bid Approval will not relieve manufacturer from compliance with provisions of "Sample Warranty". All Bidders are advised that an approved warranty is required before completed project Acceptance can be given.

Significant points regarding warranty provisions:

- * "No Dollar Limit" (NDL) warranties are consistent with the present requirements of the State for low-slope and other roofing systems. Other "Limited Warranties" offered base their total value on: a) cost of materials; b) original Owner's cost; c) a form of prorated cost; and d) other undefined limitations related to costs.

- * The "Term" of the warranty is stated to be 20 years (not 18 years beginning the second year after acceptance); however, we have acquiesced by agreeing to rely initially on R-3 (Contractor's Warranty) for the first two years – see page 3, "Warranty Responsibility".

- * We have reasonably excluded manufacturer liability for Acts of Nature, and other uncontrollable circumstances. We HAVE NOT absolved the manufacturer from poor workmanship (as appeared in some warranties) because this is the reason manufacturer's certify and approve contractors and installers in the first

July 2021

FP&C Project Managers & To Whom It May Concern
METAL ROOF SYSTEM 20 - YEAR WEATHERTIGHTNESS
No Dollar Limit (NDL) WARRANTY

place. We've excluded circumstances like "damage by strong gales", "unpaid bills for supplies, installation and services", and the like.

* The venue for dispute resolution is the 19th Judicial Court in and for the Parish of East Baton Rouge, State of Louisiana.

* We have included a provision for drying of wet insulation caused by a roof leak as a warranty responsibility – other damages may occur but are difficult to assign total responsibility. An engineered provision for drying of insulation wetted by roof leaks is to be agreed on by the State prior to implementation.

* Details about reporting and principal's response are typical of most warranties except we've protected the Owner's right to safeguard the building without risk of voiding the warranty.

* Warranty Responsibility – a typical warranty absolves the manufacturer from patent & design copyright violations, etc. As buyer, we have the right to rely on the Seller to have taken care of that business and absolve the State from claim action. False claims as to merchantability and suitability are better tied to Designer recommendations/specifications.

.....

This information is for your use. Further refinements of this warranty may occur; please consult with your project manager to obtain the latest version. Please forward any and all comments you may have (or, those you may receive from others) - it is our intent to provide FP&C with a fair, manageable and enforceable warranty document.

Facility Planning & Control

4. RECOMMENDED AGENDA FOR ROOFING CONFERENCES

Project Name: _____

Project Number: _____ WBS No. : _____

Conference Location: _____ Date: _____

Type of Conference: _____Preliminary _____Pre-Application

Architect:_____

Roofing Contractor: _____

General Contractor: _____

CONFERENCES ATTENDEES:

[illegible]

AGENDA FOR PRELIMINARY ROOFING CONFERENCE

PURPOSE: Establish a direct line of communication, iron out initial questions regarding the project and to review project submittal requirements.

TIMING: The meeting should be held shortly after award of the Contract and at least six weeks prior to the anticipated start of roofing.

1. A complete set of Contract Documents (plans and specifications) to be available for review.
2. All meeting minutes to be furnished by the Designer to all parties within 7 days. Establish project record keeping procedures.
3. Review tentative progress schedule for roofing. Set approximate date.
4. Review roofing system and insulation requirements.
5. Weather considerations as they may apply to the project roofing installation.
6. Temporary roofing guidelines for the project. Who and when, will final decision be made, if necessary.
7. Inspection and Testing Requirements:

Name of Inspection Firm:
Name of inspector:
Phone:

- _____
a. On-Site Inspection - Discuss project requirements.
b. Laboratory Tests

8. Roof Deck:

Type and Thickness:

Slope: _____ Location and Type of Drains:

Tentative Schedule for Erection:

Nailers, curbs, and sheet metal must be completed prior to roofing application. Review FM or UL requirements

9. Anticipated material storage areas and equipment set-up locations touched upon. Review requirements.

10. Specific submittals from the Roofing Contractor:

- a. Material approval list
- b. Shop drawings (if any)
- c. Product material brochures and samples
- d. Manufacturer's Guarantee review for compliance with specifications

11. Specific project detail discussion. (Include perimeter wall construction and rooftop mechanical equipment details.)

12. Other:

13. Review above items briefly and establish date for tentative Pre-Application Conference.

AGENDA FOR ROOFING PRE-APPLICATION CONFERENCE

PURPOSE:

- To verify readiness of the project structure
- To review assignments of Preliminary Conference
- To scan last minute details, changes or corrections
- To review anticipated schedule of progress

TIMING: Within one week of roofing application

ATTENDANCE: List attendees

(The roofing job superintendent or foreman and the project roofing inspector should attend this meeting.)

1. Copies of approved submittals should be available for review. Are any material changes required due to availability problems or other? Reminder that formal approvals are still required.
2. Review minutes of Preliminary Conference.
3. Discuss revised Roofing Application Schedule.
4. Equipment set-up and on-site material storage.
5. Deck Readiness:
 - a. Any required roof deck certifications must be in order
 - b. Rooftop inspection by those in attendance
 - c. Drain hookups complete
 - d. Curbs, nailers, roof deck penetrations, perimeter edges and mechanical equipment - should all be set and complete

6. Review roof system, including insulation above deck. Discuss the required application of each to the other components.

- a. Bitumens, felts, use of EVT, all typical application methods and any special techniques required for specified system.
- b. Mechanical or adhesive attachments.
- c. Vapor Retarders
- d. Flashings
- e. Saddles and/or crickets
- f. Venting
- g. Sheet metal

7. Phase Construction Guidelines for project. Factors affecting guidelines include local practices, climate and weather considerations. Tie-offs at days end.

8. Temporary roofing final decisions.

9. Housekeeping, material handling and finished work protection requirements.

10. Inspection and testing requirements - who, frequency, type method of testing, point of application temperature readings, reporting, etc.

11. Project changes in plans, specifications or procedures to be followed - discuss and establish who can approve and how documented.

12. Warranties, guarantees, manufacturer bonds or maintenance agreements (terms, types, who issues, when) for roofing and sheet metal material.

NOTES

AGENDA FOR ROOFING FINAL INSPECTION AND WRAP-UP

PURPOSE: To assure 100% completion of project requirements.

TIMING: Just before the Roofing Contractor concludes his work at the site.

1. Attendance should include those in attendance at the Pre-Application Conference.

2. Complete rooftop walk over and review:

- a. Perimeter edges
- b. Walls
- c. Curbs and other equipment
- d. Drains
- e. Rooftop penetrations
- f. Site cleanup
- g. Sheet metal

3. Final Punch List establishment of items to be completed. Copies to all parties.

4. Summary of project records. Organize for final file. Wrap up any loose ends. Checklist for final documents should include:

- a. Warranties, guarantees, manufacturer bonds, or maintenance agreements
- b. Inspection forms, reports, certificate of final completion
- c. Laboratory final reports (if any required)

5. Recommendation for routine maintenance program to owner.

6. Discuss responsibility for roof system protection until project completed. Responsibility for coordination usually rests with General Contractor. Any damage or additional work to be conducted by original Roofing Contractor in order to keep original guarantee valid.

7. Final acceptance by the owner will not be made without submittal and approval of fully executed guarantees for each type of roof installed, which shall include, but not necessarily be limited to the Roofing Material Manufacturer's Guarantee (FP&C forms), Roof Completion Information Form and Contractor's Guarantee on FPC-R1, FPC-R2 or FPC-R3.

NOTES

ROOF COMPLETION INFORMATION

Facility Name _____ Building Name _____
Site I.D.. _____ Building I.D. _____ Project No. _____ WBS No. _____
Roof Section _____ Replacement _____

Roof Type:	Surfacing Type:	Bitumen Type:	Drainage Type:
1. BUR	1. Gravel	1. Hot Asphalt	1. Over the Edge
2. SBS Mod. Bit.	2. Smooth Uncoated	2. Torched Asphalt	2. Roof Drains
3. APP Mod. Bit.	3. Modified Asphalt	3. Cold Process	3. Perimeter Gutter
4. PVC/CPV	4. Ceramic Granules	4. Pitch	4. Internal Gutter
5. PUF	5. Silicone	5. Modified	5. _____
6. Metal	6. Acrylic	6. None	
7. Shingle	7. Urethane	7. _____	Total Penetrations:
8. Tile	8. Aluminum		_____
9. _____	9. _____		
Slope:	Deck Type:	Insulation:	No. of Piles:
1. None	1. Structural Concrete	1. Polyurethane Foam	_____
2. 1/8 in./ft.	2. Gypsum	2. Fiberglass	Insulation Thickness:
3. 1/4 in./ft.	3. Metal	3. Perlite	_____
4. 1/2 in./ft.	4. Lt. Wt. Concrete	4. Tapered Perlite	Roof Area (sq. ft.)
5. _____	5. Cement Fiber	5. Polystyrene	_____
	6. Wood	6. Wood Fiber	
	7. _____		

Roofing Contractor:

Address: _____

Roofing Contractor's Telephone: _____

Roofing Manufacturer:

Address: _____

Roofing Manufacturer's Telephone: _____

Warranty Beginning Date: _____

Warranty Ending Date: _____

Roof Warranty Number: _____

Beginning Date: _____

Ending Date: _____

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**SECTION 01 10 00
SUMMARY**

PART 1 GENERAL

1.1 PROJECT

- A. Project Name: Hurricane Laura Repairs : President's Residence Improvements.
- B. Project Name: McNeese State University
- C. Owner's Name: Louisiana State Facility Planning and Control.
- D. Architect's Name: Tipton Associates, APAC.
- E. The Project consists of the alteration of the existing President's Residence to address hurricane damages and update to meet current functional needs..

1.2 CONTRACT DESCRIPTION

- A. Contract Type: A single prime contract based on a Stipulated Price as described in Document 00 52 00 - Agreement Form.

1.3 DESCRIPTION OF ALTERATIONS WORK

- A. Scope of demolition and removal work is indicated on drawings and specified in Section 02 41 00.
- B. Scope of alterations work is indicated on drawings.
 - 1. Refer to Drawings Series "BB" for items associated with Base Bid requirements.
 - 2. Add Alternate Scope of work shall consist of additional work beyond the "BB" series identified by the "L, A, S, M, P, and E" Series Drawings.
- C. Plumbing: Alter existing system and add new construction, keeping existing in operation.
- D. HVAC: Replace existing system with new construction.
- E. Electrical Power and Lighting: Replace existing system with new construction.
- F. Security System: Alter existing system and add new construction, keeping existing in operation.

1.4 WORK BY OWNER

- A. Items noted NIC (Not in Contract) will be supplied and installed by Owner after Date of Substantial Completion. Some items include:
 - 1. Movable cabinets.
 - 2. Furnishings.
 - 3. Small equipment.

1.5 OWNER OCCUPANCY

- A. Owner intends to occupy the Project upon Substantial Completion.

1.6 CONTRACTOR USE OF SITE AND PREMISES

- A. Construction Operations: Limited to areas noted on Drawings.

1. Locate and conduct construction activities in ways that will limit disturbance to site.

- B. Provide access to and from site as required by law and by Owner:

1. Emergency Building Exits During Construction: Keep all exits required by code open during construction period.

2. Do not obstruct roadways, sidewalks, or other public ways without permit.

- C. Utility Outages and Shutdown:

1. Prevent accidental disruption of utility services to other facilities.

1.7 WORK SEQUENCE

- A. Coordinate construction schedule and operations with Architect.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

**SECTION 01 20 00
PRICE AND PAYMENT PROCEDURES**

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Procedures for preparation and submittal of applications for progress payments.
- B. Documentation of changes in Contract Sum and Contract Time.
- C. Change procedures.
- D. Correlation of Contractor submittals based on changes.
- E. Procedures for preparation and submittal of application for final payment.

1.2 RELATED REQUIREMENTS

- A. Section 00 52 00 - Agreement Form: Contract Sum, retainages, payment period, monetary values of unit prices.
- B. Section 00 72 00 - General Conditions: Additional requirements for progress payments, final payment, changes in the Work.
- C. Section 00 73 00 - Supplementary Conditions: Percentage allowances for Contractor's overhead and profit.
- D. Section 01 22 00 - Unit Prices: Monetary values of unit prices; Payment and modification procedures relating to unit prices.
- E. Section 01 78 00 - Closeout Submittals: Project record documents.

1.3 SCHEDULE OF VALUES

- A. Use Schedule of Values Form: As specified in Section 00 62 73 Schedule of Values Form.
- B. Forms filled out by hand will not be accepted.
- C. At the Pre-Construction Conference, the Contractor shall submit to the Owner and the Architect a Schedule of Values prepared as follows:
 - 1. The specified and attached Schedule of Values Format shall be used
 - 2. If applicable, the cost of work for each section listed under each division shall be given.
 - 3. The cost for each section shall include Labor, Material, Overhead, and Profit.
 - 4. The total of all items shall equal the Total Contract Sum.
- D. Once the Schedule of Values is submitted at the Pre-Construction Conference, the schedule shall not be modified without approval from the Owner and Architect.

- E. This schedule, when approved by the Owner and Architect, shall be used as the basis for the Contactor's Application for PAYment and it may be used for determining the cost of work in deductive change orders when a specific item of work listed on the Schedule of Values is to be removed.
- F. Revise the schedule to list approved Change Orders, with each Application for Payment.

1.4 APPLICATIONS FOR PROGRESS PAYMENTS

- A. Payment Period: Submit at intervals stipulated in the Agreement and modified by Section 00 73 00- Supplementary Conditions
- B. Use Form As specified in Section 00 50 00 - Agreement. Contractor to confirm on Facility Planning nad Controls Web Page for latest edition..
- C. Forms filled out by hand will not be accepted.
- D. Execute certification by the signature of an authorized officer.
- E. Use data from the approved Schedule of Values. Provide dollar values in each column for each line item for the portion of work performed and for suitably stored materials at the site.
- F. List each approved Change Order as a separate line item, listing Change Order Number and dollar amount as for an original item of work.
- G. Submit one electronic and three hard-copies of each Application for Payment.
- H. Include the following with the application for payment:
 - 1. Transmittal letter as specified for submittals in Section
 - 2. Construction progress schedule, revised and current as specified in Section 01 30 00 and as modified by Section 00 73 00 - Supplementary Conditions
- I. When Architect requires substantiating information, submit data justifying dollar amounts in question. Provide one copy of data with cover letter for each copy of submittal. Show application number and date, and line item by number and description.

1.5 MODIFICATION PROCEDURES

- A. For minor changes not involving an adjustment to the Contract Sum or Contract Time, Architect will issue instructions directly to Contractor and copy Owner
- B. For other required changes, Architect will issue a document signed by Owner instructing Contractor to proceed with the change, for subsequent inclusion in a Change Order.
 - 1. The document will describe the required changes and will designate method of determining any change in Contract Sum or Contract Time.
 - 2. Promptly execute the change.
- C. For changes for which advance pricing is desired, Architect will issue a document that includes a detailed description of a proposed change with supplementary or revised drawings and

specifications, a change in Contract Time for executing the change and the period of time during which the requested price will be considered valid. Contractor shall prepare and submit a fixed price quotation within 14 days.

- D. Contractor may propose a change by submitting a request for change to Architect, describing the proposed change and its full effect on the work, with a statement describing the reason for the change, and the effect on the Contract Sum and Contract Time with full documentation. Document any requested substitutions in accordance with Section 01 60 00.
- E. Computation of Change in Contract Amount: As specified in the Agreement and Conditions of the Contract.
- F. Substantiation of Costs: Provide full information required for evaluation following Facility Planning and Control Forms and direction in General and Supplementary Conditions.
- G. Execution of Change Orders: Architect will issue Change Orders for signatures of parties as provided in the Conditions of the Contract.
- H. After execution of Change Order, promptly revise Schedule of Values and Application for Payment forms to record each authorized Change Order as a separate line item and adjust the Contract Sum.
- I. Promptly revise progress schedules to reflect any change in Contract Time, revise sub-schedules to adjust times for other items of work affected by the change, and resubmit.
- J. Promptly enter changes in Project Record Documents.

1.6 APPLICATION FOR FINAL PAYMENT

- A. Prepare Application for Final Payment as specified for progress payments, identifying total adjusted Contract Sum, previous payments, and sum remaining due and as modified in Section 00 73 00-Supplem.
- B. Application for Final Payment will not be considered until the following have been accomplished:
 - 1. All closeout procedures specified in Section 01 70 00.

END OF SECTION

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**SECTION 01 25 00
SUBSTITUTION PROCEDURES**

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Procedural requirements for proposed substitutions.
- B. See CSI/CSC form 13.1A-Substitution Request, following this document and bound into the Project Manual

1.2 RELATED REQUIREMENTS

- A. Section 00 21 13 - Instructions to Bidders: Restrictions on timing of substitution requests.
- B. Section 00 43 25 - Substitution Request Form - During Procurement: Required form for substitution requests made prior to award of contract (During procurement).
- C. Section 00 63 25 - Substitution Request Form - During Construction: Required form for substitution requests made after award of contract (During construction).
- D. Section 01 30 00 - Administrative Requirements: Submittal procedures, coordination.
- E. Section 01 60 00 - Product Requirements: Fundamental product requirements, product options, delivery, storage, and handling.

1.3 DEFINITIONS

- A. Substitutions: Changes from Contract Documents requirements proposed by Contractor to materials, products, assemblies, and equipment.
 - 1. Substitutions for Cause: Proposed due to changed Project circumstances beyond Contractor's control.
 - a. Unavailability.
 - b. Regulatory changes.
 - 2. Substitutions for Convenience: Proposed due to possibility of offering substantial advantage to the Project.
 - a. Substitution requests offering advantages solely to the Contractor will not be considered.

1.4 REFERENCE STANDARDS

- A. CSI/CSC Form 1.5C - Substitution Request (During the Bidding/Negotiating Stage); Current Edition.
- B. CSI/CSC Form 13.1A - Substitution Request (After the Bidding/Negotiating Phase); Current Edition.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.1 GENERAL REQUIREMENTS

- A. A Substitution Request for products, assemblies, materials, and equipment constitutes a representation that the submitter:
 - 1. Has investigated proposed product and determined that it meets or exceeds the quality level of the specified product, equipment, assembly, or system.
 - 2. Agrees to provide the same warranty for the substitution as for the specified product.
 - 3. Agrees to provide same or equivalent maintenance service and source of replacement parts, as applicable.
 - 4. Agrees to coordinate installation and make changes to other work that may be required for the work to be complete, with no additional cost to Owner.
 - 5. Waives claims for additional costs or time extension that may subsequently become apparent.
 - 6. Agrees to reimburse Owner and Architect for review or redesign services associated with re-approval by authorities.
- B. A Substitution Request for specified installer constitutes a representation that the submitter:
 - 1. Has acted in good faith to obtain services of specified installer, but was unable to come to commercial, or other terms.
- C. Document each request with complete data substantiating compliance of proposed substitution with Contract Documents. Burden of proof is on proposer.
 - 1. Note explicitly any non-compliant characteristics.
- D. Content: Include information necessary for tracking the status of each Substitution Request, and information necessary to provide an actionable response.
 - 1. Forms indicated and included in the Project Manual are adequate for this purpose and must be used.
- E. Limit each request to a single proposed substitution item.
 - 1. Submit an electronic document, combining the request form with supporting data into single document.

3.2 SUBSTITUTION PROCEDURES DURING PROCUREMENT

- A. Submittal Time Restrictions:
 - 1. Section 00 21 13 - Instructions to Bidders specifies time restrictions and the documents required for submitting substitution requests during the bidding period.

B. Submittal Form (before award of contract):

1. Submit substitution requests by completing CSI/CSC Form 1.5C - Substitution Request. See this form for additional information and instructions. Use only this form; other forms of submission are unacceptable.

3.3 SUBSTITUTION PROCEDURES DURING CONSTRUCTION

A. Submittal Form (after award of contract):

1. Submit substitution requests by completing CSI/CSC Form 13.1A - Substitution Request (After Bidding/Negotiating). See this form for additional information and instructions. Use only this form; other forms of submission are unacceptable.

B. Submit request for Substitution for Cause within 14 days of discovery of need for substitution, but not later than 14 days prior to time required for review and approval by Architect, in order to stay on approved project schedule.

C. Substitutions will not be considered under one or more of the following circumstances:

1. When they are indicated or implied on shop drawing or product data submittals, without having received prior approval.
2. Without a separate written request.
3. When acceptance will require revisions to Contract Documents.

3.4 RESOLUTION

A. Architect may request additional information and documentation prior to rendering a decision. Provide this data in an expeditious manner.

B. Architect will notify Contractor in writing of decision to accept or reject request.

1. Architect's decision following review of proposed substitution will be noted on the submitted form.

3.5 ACCEPTANCE

A. Accepted substitutions change the work of the Project. They will be documented and incorporated into work of the project by Change Order, Construction Change Directive, Architectural Supplementary Instructions, or similar instruments provided for in the Conditions of the Contract.

3.6 CLOSEOUT ACTIVITIES

A. See Section 01 78 00 - Closeout Submittals, for closeout submittals.

B. Include completed Substitution Request Forms as part of the Project record. Include both approved and rejected Requests.

END OF SECTION

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**SECTION 01 30 00
ADMINISTRATIVE REQUIREMENTS**

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. General administrative requirements.
- B. Electronic document submittal service.
- C. Preconstruction meeting.
- D. Progress meetings.
- E. Construction progress schedule.
- F. Contractor's daily reports.
- G. Progress photographs.
- H. Submittals for review, information, and project closeout.
- I. Number of copies of submittals.
- J. Requests for Interpretation (RFI) procedures.
- K. Submittal procedures.
- L. Pre-Close Out Conference

1.2 RELATED REQUIREMENTS

- A. Section 00 72 00 - General Conditions: Dates for applications for payment.
- B. Section 00 73 00 - Supplementary Conditions: Modifications to Section 00 72 00- General Conditions.
- C. Section 01 60 00 - Product Requirements: General product requirements.
- D. Section 01 78 00 - Closeout Submittals: Project record documents; operation and maintenance data; warranties and bonds.

1.3 REFERENCE STANDARDS

- A. CSI/CSC Form 13.2A - Request for Information; Current Edition.

1.4 GENERAL ADMINISTRATIVE REQUIREMENTS

- A. Comply with requirements of Section 01 70 00 - Execution and Closeout Requirements for coordination of execution of administrative tasks with timing of construction activities.
- B. Make the following types of submittals to Architect:

1. Requests for Interpretation (RFI).
2. Requests for substitution.
3. Shop drawings, product data, and samples.
4. Test and inspection reports.
5. Design data.
6. Manufacturer's instructions and field reports.
7. Applications for payment and change order requests.
8. Progress schedules.
9. Coordination drawings.
10. Correction Punch List and Final Correction Punch List for Substantial Completion.
11. Closeout submittals.

C. ALL Submittals, Reports and communications to include Project Name and Project Numbers.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.1 ELECTRONIC DOCUMENT SUBMITTAL SERVICE

- A. All documents transmitted for purposes of administration of the contract are to be in electronic (PDF, MS Word, or MS Excel) format, as appropriate to the document, and transmitted via an Internet-based email service.
1. Besides submittals for review, information, and closeout, this procedure applies to Requests for Interpretation (RFIs), progress documentation, contract modification documents (e.g. supplementary instructions, change proposals, change orders), applications for payment, field reports and meeting minutes, Contractor's correction punchlist, and any other document any participant wishes to make part of the project record.
 2. It is Contractor's responsibility to submit documents in allowable format.
 3. Project Managers need an e-mail address, internet access, and PDF review software that includes the ability to mark-up and apply electronic stamps (Such as Adobe Acrobat, BlueBeam PDF Revu)
 4. Paper document submittals will not be reviewed.
 5. All other specified submittal and document transmission procedures apply, except that electronic document requirements do not apply to samples or color selection charts.

3.2 PRECONSTRUCTION MEETING

- A. After notification that the contract has been awarded, the Architect shall arrange 2with the Owner. User Agency and Contractor, and conduct a Pre-Construction Conference to be held at the project site. The Contractor shall be responsible to see that their principal Subcontractors are in attendance and shall furnish to the Architect and Owner:
1. Schedule of Values
 2. List of the Subcontractors and material suppliers
 3. The information listed in Paragraph 7.1 of the Supplementary Conditions
 4. Construction Schedule
- B. Attendance Required:
1. Owner.
 2. User Agency
 3. Architect.
 4. Contractor.
 5. Contractor's Superintendent
- C. Agenda:
1. See Pre-Construction Conference Agenda published June 2022 by the State of Louisiana Division of Administration, Facility Planning and Control following this document and bound in the Project Manual.
 2. Editanle, digital copies of all required and specified project forms shall be provided to the contractor in the appropriate format.
- D. Architect to Record minutes and distribute copies withinSeven days after meeting to participants, with Digital copies to participants, and those affected by decisions made.

3.3 PROGRESS MEETINGS

- A. The general contractor will make arrangements for weekly and monthly meetings, prepare agendas with copies for participants, and preside at meetings.
- B. Attendance Required:
1. Contractor. (Weekly and Monthly OAC)
 2. Owner. (Monthly OAC)
 3. Architect. (weekly and Monthly OAC)
 4. User Agency (Monthly OAC)

5. Contractor's superintendent. (Weekly and Monthly OAC)
 6. Major subcontractors. (As needed based upon specific discussion items)
- C. Agenda:
1. Review minutes of previous meetings.
 2. Review of work progress.
 3. Field observations, problems, and decisions.
 4. Identification of problems that impede, or will impede, planned progress.
 5. Review of submittals schedule and status of submittals.
 6. Review of RFIs log and status of responses.
 7. Review of off-site fabrication and delivery schedules.
 8. Maintenance of progress schedule.
 9. Corrective measures to regain projected schedules.
 10. Planned progress during succeeding work period.
 11. Coordination of projected progress.
 12. Maintenance of quality and work standards.
 13. Effect of proposed changes on progress schedule and coordination.
 14. Other business relating to work.
- D. Architect to Record minutes and distribute copies within seven days after meeting to participants, with digital copies to participants, and those affected by decisions made.

3.4 ROOFING CONFERENCES

- A. Pre-Roofing/ Preliminary Conference
1. General Contractor to make arrangements for meetings, and preside at meetings
 2. Agenda to follow Louisiana Division of Administration, Facility Planning and Control Pre-Roofing Conference.
 3. Conference to be held a minimum of (4) weeks prior to the anticipated start of roofing work.
 4. The General Contractor shall furnish to the Architect and Owner:
 - a. A letter from the roofing manufacturer stating the roofer is an approved applicator.

- b. Sample Warranties
 - c. All additional items identified in the Pre-Roofing agenda.
- 5. Attendance Required:
 - a. Contractor
 - b. Owner
 - c. User Agency
 - d. Architect
 - e. Contractor's Superintendent
 - f. Roofing Subcontractor
 - g. Roofing Manufacturer's Representative

B. Pre-Application Conference

- 1. General Contractor to make arrangements for meetings, and preside at meetings
- 2. Agenda to follow Louisiana Division of Administration, Facility Planning and Control Pre-Application Conference published July 2021.
- 3. Conference to be held within (1) one week prior to the anticipated start of roofing work.
- 4. The General Contractor shall furnish for the conference:
 - a. Copies of approved submittals
 - b. Meeting minutes from Pre-Roofing/ Preliminary Conference for Review
 - c. Roofing application schedule
 - d. Phase Construction Guidelines
- 5. Attendance Required:
 - a. Contr
 - b. Owner
 - c. User Agency
 - d. Architect
 - e. Project Roofing Inspector
 - f. Contractor's Superintendent and/ or roofing foreman
 - g. The Roofing Manufacturer's representative

- C. Final Inspection and Wrap-Up Conference
 - 1. General Contractor to make arrangements for the meeting, and preside at meetings
 - 2. Agenda to follow Louisiana Division of Administration, Facility Planning and Control Pre-Application Conference published July 2021.
 - 3. Conference to be held just prior to the anticipated completion of roofing work.
 - 4. Final punch list for roofing scope to be established at this conference.
 - 5. Attendance Required
 - a. All in attendance at the Pre-Application Conference

3.5 CONSTRUCTION PROGRESS SCHEDULE

- A. As part of the pre-construction conference, submit a Construction Schedule defining the planned operations of the work.
- B. Comply with all requirements of Section 00 73 00- Supplementary Conditions, including but not limited to Article 3.10 Contractor's Construction and Submittal Schedules.
- C. Submit an updated schedule with each Application for Payment
- D. No Payments shall be made until this schedule is received.

3.6 DAILY CONSTRUCTION REPORTS

- A. Include only factual information. Do not include personal remarks or opinions regarding operations and/or personnel.
- B. Prepare a daily construction report recording the following information concerning events at Project site and project progress:
 - 1. Date.
 - 2. High and low temperatures, and general weather conditions.
 - 3. List of subcontractors at Project site.
 - 4. Approximate count of personnel at Project site.
 - 5. Safety, environmental, or industrial relations incidents.
 - 6. Meetings and significant decisions.
 - 7. Unusual events (submit a separate special report).
 - 8. Stoppages, delays, shortages, and losses. Include comparison between scheduled work activities (in Contractor's most recently updated and published schedule) and actual activities. Explain differences, if any. Note days or periods when no work was in progress and explain the reasons why.

9. Testing and/or inspections performed.
10. Signature of Contractor's authorized representative.

3.7 PROGRESS PHOTOGRAPHS

- A. Submit new photographs at least once a month, within 3 days after being taken.
- B. Photography Type: Digital; electronic files.
- C. Provide photographs of site and construction throughout progress of work produced
- D. In addition to periodic, recurring views, take photographs of each of the following events:
 1. Excavations in progress.
 2. Foundations in progress and upon completion.
 3. Structural framing in progress and upon completion.
 4. Enclosure of building, upon completion.
 5. Final completion, minimum of ten (10) photos.
- E. Take photographs as evidence of existing project conditions prior to the commencement of any work. Items identified as damaged that are not documented during construction will be the responsibility of the contractor to repair.
- F. Digital Photographs: 24 bit color, minimum resolution of 1024 by 768, in JPG format; provide files unaltered by photo editing software.
 1. Delivery Medium: Via email.
 2. File Naming: Include project identification, date and time of view

3.8 REQUESTS FOR INTERPRETATION (RFI)

- A. Definition: A request seeking one of the following:
 1. An interpretation, amplification, or clarification of some requirement of Contract Documents arising from inability to determine from them the exact material, process, or system to be installed; or when the elements of construction are required to occupy the same space (interference); or when an item of work is described differently at more than one place in Contract Documents.
 2. A resolution to an issue which has arisen due to field conditions and affects design intent.
- B. Whenever possible, request clarifications at the next appropriate project progress meeting, with response entered into meeting minutes, rendering unnecessary the issuance of a formal RFI.
- C. Preparation: Prepare an RFI immediately upon discovery of a need for interpretation of Contract Documents. Failure to submit a RFI in a timely manner is not a legitimate cause for claiming additional costs or delays in execution of the work.

1. Prepare a separate RFI for each specific item.
 - a. Review, coordinate, and comment on requests originating with subcontractors and/or materials suppliers.
 - b. Do not forward requests which solely require internal coordination between subcontractors.
 2. Prepare in a format and with content acceptable to Owner.
 - a. Use CSI/CSC Form 13.2A - Request for Interpretation following this section and bound in the project manual.
 3. Combine RFI and its attachments into a single electronic file. PDF format is preferred.
- D. Reason for the RFI: Prior to initiation of an RFI, carefully study all Contract Documents to confirm that information sufficient for their interpretation is definitely not included.
1. Include in each request Contractor's signature attesting to good faith effort to determine from Contract Documents information requiring interpretation.
 2. Unacceptable Uses for RFIs: Do not use RFIs to request the following::
 - a. Approval of submittals (use procedures specified elsewhere in this section).
 - b. Approval of substitutions (see Section - 01 60 00 - Product Requirements)
 - c. Changes that entail change in Contract Time and Contract Sum (comply with provisions of the Conditions of the Contract).
 - d. Different methods of performing work than those indicated in the Contract Drawings and Specifications (comply with provisions of the Conditions of the Contract).
 3. Improper RFIs: Requests not prepared in compliance with requirements of this section, and/or missing key information required to render an actionable response. They will be returned without a response, with an explanatory notation.
 4. Frivolous RFIs: Requests regarding information that is clearly indicated on, or reasonably inferable from, Contract Documents, with no additional input required to clarify the question. They will be returned without a response, with an explanatory notation.
 - a. The Owner reserves the right to assess the Contractor for the costs (on time-and-materials basis) incurred by the Architect, and any of its consultants, due to processing of such RFIs.
- E. Content: Include identifiers necessary for tracking the status of each RFI, and information necessary to provide an actionable response.
1. Official Project name and number, and any additional required identifiers established in Contract Documents.
 2. Owner's, Architect's, and Contractor's names.

3. Discrete and consecutive RFI number, and descriptive subject/title.
 4. Issue date, and requested reply date.
 5. Reference to particular Contract Document(s) requiring additional information/interpretation. Identify pertinent drawing and detail number and/or specification section number, title, and paragraph(s).
 6. Annotations: Field dimensions and/or description of conditions which have engendered the request.
 7. Contractor's suggested resolution: A written and/or a graphic solution, to scale, is required in cases where clarification of coordination issues is involved, for example; routing, clearances, and/or specific locations of work shown diagrammatically in Contract Documents. If applicable, state the likely impact of the suggested resolution on Contract Time or the Contract Sum.
- F. Attachments: Include sketches, coordination drawings, descriptions, photos, submittals, and other information necessary to substantiate the reason for the request.
- G. RFI Log: Prepare and maintain a tabular log of RFIs for the duration of the project.
1. Indicate current status of every RFI. Update log promptly and on a regular basis.
 2. Note dates of when each request is made, and when a response is received.
 3. Highlight items requiring priority or expedited response.
 4. Highlight items for which a timely response has not been received to date.
 5. Identify and include improper or frivolous RFIs.
- H. Review Time: Architect will respond and return RFIs to Contractor within 10 calendar days of receipt. For the purpose of establishing the start of the mandated response period, RFIs received after 12:00 noon will be considered as having been received on the following regular working day.
1. Response period may be shortened or lengthened for specific items, subject to mutual agreement, and recorded in a timely manner in progress meeting minutes.
- I. Responses: The content of answered RFIs will not constitute in any manner a directive or authorization to perform extra work or delay the project. If in the Contractor's belief it is likely to lead to a change to Contract Sum or Contract Time, promptly issue a notice to this effect, and follow up with an appropriate Change Order request to Architect.
1. Response may include a request for additional information, in which case the original RFI will be deemed as having been answered, and an amended one is to be issued forthwith. Identify the amended RFI with an R suffix to the original number.
 2. Do not extend applicability of a response to specific item to encompass other similar conditions, unless specifically so noted in the response.
 3. Upon receipt of a response, promptly review and distribute it to all affected parties, and update the RFI Log.

4. Notify Architect within ten calendar days if an additional or corrected response is required by submitting an amended version of the original RFI, identified as specified above.

3.9 SUBMITTAL SCHEDULE

- A. Submit to Architect for review a schedule for submittals in tabular format.
 1. Submit at the same time as the preliminary schedule.
 2. Coordinate with Contractor's construction schedule and schedule of values.
 3. Format schedule to allow tracking of status of submittals throughout duration of construction.
 4. Arrange information to include scheduled date for initial submittal, specification number and title, submittal category (for review or for information), description of item of work covered, and role and name of subcontractor.
 5. Account for time required for preparation, review, manufacturing, fabrication and delivery when establishing submittal delivery and review deadline dates.
 - a. For assemblies, equipment, systems comprised of multiple components and/or requiring detailed coordination with other work, allow for additional time to make corrections or revisions to initial submittals, and time for their review.

3.10 SUBMITTALS FOR REVIEW

- A. When the following are specified in individual sections, submit them for review:
 1. Product data.
 2. Design data.
 3. Shop drawings.
 4. Samples for selection.
 5. Samples for verification.
- B. Submit to Architect for review for the limited purpose of checking for compliance with information given and the design concept expressed in Contract Documents.
- C. Samples will be reviewed for aesthetic, color, or finish selection.
- D. After review, provide copies and distribute in accordance with SUBMITTAL PROCEDURES article below and for record documents purposes described in Section 01 78 00 - Closeout Submittals.

3.11 SUBMITTALS FOR INFORMATION

- A. When the following are specified in individual sections, submit them for information:
 1. Certificates.
 2. Test reports.

3. Inspection reports.
4. Manufacturer's instructions.
5. Manufacturer's field reports.
6. Other types indicated.

B. Submit for Architect's knowledge as contract administrator or for Owner.

3.12 SUBMITTALS FOR PROJECT CLOSEOUT

- A. Submit Correction Punch List for Substantial Completion.
- B. Submit Final Correction Punch List for Substantial Completion.
- C. When the following are specified in individual sections, submit them at project closeout in compliance with requirements of Section 01 78 00 - Closeout Submittals:

1. Project record documents.
2. Operation and maintenance data.
3. Warranties.
4. Bonds.
5. Other types as indicated.

D. Submit for Owner's benefit during and after project completion.

3.13 NUMBER OF COPIES OF SUBMITTALS

- A. Electronic Documents: Submit one electronic copy in PDF format; an electronically marked- up file will be returned. Create PDFs at native size and right-side up; illegible files will be rejected.
- B. Samples: Submit the number specified in individual specification sections; one of which will be retained by Architect.
 1. After review, produce duplicates.
 2. Retained samples will not be returned to Contractor unless specifically so stated.

3.14 SUBMITTAL PROCEDURES

- A. General Requirements:
 1. Use a separate transmittal for each item.
 2. Submit separate packages of submittals for review and submittals for information, when included in the same specification section.
 3. Transmit using approved form.

- a. Use Contractor's form, subject to prior approval by Architect.
 4. Sequentially identify each item. For revised submittals use original number and a sequential numerical suffix.
 5. Identify: Project; Contractor; subcontractor or supplier; pertinent drawing and detail number; and specification section number and article/paragraph, as appropriate on each copy.
 6. Apply Contractor's stamp, signed or initialed certifying that review, approval, verification of products required, field dimensions, adjacent construction work, and coordination of information is in accordance with the requirements of the work and Contract Documents.
 - a. Submittals from sources other than the Contractor, or without Contractor's stamp will not be acknowledged, reviewed, or returned.
 7. Deliver each submittal on date noted in submittal schedule, unless an earlier date has been agreed to by all affected parties, and is of the benefit to the project.
 - a. Send submittals in electronic format via email to Architect.
 8. Schedule submittals to expedite the Project, and coordinate submission of related items.
 - a. For each submittal for review, allow 15 days excluding delivery time to and from the Contractor.
 - b. For sequential reviews involving Architect's consultants, Owner, or another affected party, allow an additional 10 days.
 - c. For sequential reviews involving approval from authorities having jurisdiction (AHJ), in addition to Architect's approval, allow an additional 30 days.
 9. Provide space for Contractor and Architect review stamps.
 10. When revised for resubmission, identify all changes made since previous submission.
 11. Distribute reviewed submittals. Instruct parties to promptly report inability to comply with requirements.
 12. Incomplete submittals will not be reviewed, unless they are partial submittals for distinct portion(s) of the work, and have received prior approval for their use.
 13. Submittals not requested will be recognized, and will be returned "Not Reviewed",
- B. Product Data Procedures:
1. Submit only information required by individual specification sections.
 2. Collect required information into a single submittal.
- C. Shop Drawing Procedures:
1. Prepare accurate, drawn-to-scale, original shop drawing documentation by interpreting Contract Documents and coordinating related work.

2. Do not reproduce Contract Documents to create shop drawings.
 3. Generic, non-project-specific information submitted as shop drawings do not meet the requirements for shop drawings.
- D. Samples Procedures:
1. Transmit related items together as single package.
 2. Identify each item to allow review for applicability in relation to shop drawings showing installation locations.
 3. Include with transmittal high-resolution image files of samples to facilitate electronic review and approval. Provide separate submittal page for each item image.

3.15 SUBMITTAL REVIEW

- A. Submittals for Review: Architect will review each submittal, and approve, or take other appropriate action.
- B. Submittals for Information: Architect will acknowledge receipt and review. See below for actions to be taken.
- C. Architect's actions will be reflected by marking each returned submittal using virtual stamp on electronic submittals.
1. Notations may be made directly on submitted items and/or listed on appended Submittal Review cover sheet.

3.16 PRE-CLOSE OUT CONFERENCE

- A. The architect shall arrange with the Owner, User Agency, and General Contractor a Pre-Close Out meeting at the project site. The contractor to prepare agendas with copies for participants and preside at the meeting.
- B. Contractor shall be responsible for ensuring principal subcontractors are in attendance
- C. Conference to be held when the project is approximately 90% complete.
- D. Agenda:
1. See the Pre-Close Out Conference Agenda published July 2021 by the State of Louisiana, Division of Administration, Facility Planning and Control following this Section and bound in the Project Manual.

END OF SECTION

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**SECTION 01 40 00
QUALITY REQUIREMENTS**

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Submittals.
- B. Quality assurance.
- C. References and standards.
- D. Testing and inspection agencies and services.
- E. Contractor's construction-related professional design services.
- F. Contractor's design-related professional design services.
- G. Control of installation.
- H. Mock-ups.
- I. Tolerances.
- J. Manufacturers' field services.
- K. Defect Assessment.

1.2 RELATED REQUIREMENTS

- A. Document 00 31 00 - Available Project Information:
- B. Document 00 72 00 - General Conditions: Inspections and approvals required by public authorities.
- C. Section 01 30 00 - Administrative Requirements: Submittal procedures.
- D. Section 01 60 00 - Product Requirements: Requirements for material and product quality.

1.3 DEFINITIONS

- A. Contractor's Professional Design Services: Design of some aspect or portion of the project by party other than the design professional of record. Provide these services as part of the Contract for Construction.
 - 1. Design Services Types Required:
 - a. Construction-Related: Services Contractor needs to provide in order to carry out the Contractor's sole responsibilities for construction means, methods, techniques, sequences, and procedures.
 - b. Design-Related: Design services explicitly required to be performed by another design professional due to highly-technical and/or specialized nature of a portion

of the project. Services primarily involve engineering analysis, calculations, and design, and are not intended to alter the aesthetic aspects of the design.

- B. Design Data: Design-related, signed and sealed drawings, calculations, specifications, certifications, shop drawings and other submittals provided by Contractor, and prepared directly by, or under direct supervision of, appropriately licensed design professional.

1.4 CONTRACTOR'S CONSTRUCTION-RELATED PROFESSIONAL DESIGN SERVICES

- A. Coordination: Contractor's professional design services are subject to requirements of project's Conditions for Construction Contract.
- B. Provide such engineering design services as may be necessary to plan and safely conduct certain construction operations, pertaining to, but not limited to the following:
 - 1. Temporary sheeting, shoring, or supports.
 - 2. Temporary scaffolding.
 - 3. Temporary bracing.
 - 4. Temporary foundation underpinning.
 - 5. Temporary stairs or steps required for construction access only.

1.5 CONTRACTOR'S DESIGN-RELATED PROFESSIONAL DESIGN SERVICES

- A. Coordination: Contractor's professional design services are subject to requirements of project's Conditions for Construction Contract.
- B. Base design on performance and/or design criteria indicated in individual specification sections.
 - 1. Submit a Request for Interpretation to Architect if the criteria indicated are not sufficient to perform required design services.
- C. Scope of Contractor's Professional Design Services: Provide for the following items of work:
 - 1. As indicated per each individual specification Section. Review all requirements in detail.

1.6 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Designer's Qualification Statement: Submit for Architect's knowledge as contract administrator, or for Owner's information.
 - 1. Include information for each individual professional responsible for producing, or supervising production of, design-related professional services provided by Contractor.
 - a. Full name.
 - b. Professional licensure information.

- c. Statement addressing extent and depth of experience specifically relevant to design of items assigned to Contractor.
- C. Design Data: Submit for Architect's knowledge as contract administrator for the limited purpose of assessing compliance with information given and the design concept expressed in the Contract Documents, or for Owner's information.
 1. Include calculations that have been used to demonstrate compliance to performance and regulatory criteria provided, and to determine design solutions.
 2. Include required product data and shop drawings.
 3. Include a statement or certification attesting that design data complies with criteria indicated, such as building codes, loads, functional, and similar engineering requirements.
 4. Include signature and seal of design professional responsible for allocated design services on calculations and drawings.
- D. Test Reports: After each test/inspection, promptly submit digital copies of report to Architect, owner, user agency, engineer and to Contractor.
 1. Include:
 - a. Date issued.
 - b. Project title and number.
 - c. Name of inspector.
 - d. Date and time of sampling or inspection.
 - e. Identification of product and specifications section.
 - f. Location in the Project.
 - g. Type of test/inspection.
 - h. Date of test/inspection.
 - i. Results of test/inspection.
 - j. Compliance with Contract Documents.
 - k. When requested by Architect, provide interpretation of results.
 2. Test report submittals are for Architect's knowledge as contract administrator for the limited purpose of assessing compliance with information given and the design concept expressed in the Contract Documents, or for Owner's information. The testing laboratory shall not be responsible for evaluating test results.
- E. Certificates: When specified in individual specification sections, submit certification by the manufacturer and Contractor or installation/application subcontractor to Architect, in quantities specified for Product Data.

1. Indicate material or product complies with or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.
 2. Certificates may be recent or previous test results on material or product, but must be acceptable to Architect.
- F. Manufacturer's Instructions: When specified in individual specification sections, submit printed instructions for delivery, storage, assembly, installation, start-up, adjusting, and finishing, for the Owner's information. Indicate special procedures, perimeter conditions requiring special attention, and special environmental criteria required for application or installation.
- G. Manufacturer's Field Reports: Submit reports for Architect's benefit as contract administrator or for Owner.
1. Submit for information for the limited purpose of assessing compliance with information given and the design concept expressed in the Contract Documents.

1.7 QUALITY ASSURANCE

- A. Designer Qualifications: Where professional engineering design services and design data submittals are specifically required of Contractor by Contract Documents, provide services of a Professional Engineer experienced in design of this type of work and licensed in State.

1.8 REFERENCES AND STANDARDS

- A. For products and workmanship specified by reference to a document or documents not included in the Project Manual, also referred to as reference standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.
- B. Comply with reference standard of date of issue current on date of Contract Documents, except where a specific date is established by applicable code.
- C. Obtain copies of standards where required by product specification sections.
- D. Maintain copy at project site during submittals, planning, and progress of the specific work, until Substantial Completion.
- E. Should specified reference standards conflict with Contract Documents, request clarification from Architect before proceeding.
- F. Neither the contractual relationships, duties, or responsibilities of the parties in Contract nor those of Architect shall be altered from Contract Documents by mention or inference otherwise in any reference document.

1.9 TESTING AND INSPECTION AGENCIES AND SERVICES

- A. Owner will employ and pay for services of an independent testing agency to perform specified testing and inspections or materials and construction as defined in the General Conditions and Supplementary Conditions of the Contract.
1. In the event a test has failed, the contractor will be responsible for paying to have the scope re-tested for compliance.

- B. Employment of agency in no way relieves Contractor of obligation to perform Work in accordance with requirements of Contract Documents.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.1 CONTROL OF INSTALLATION

- A. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce work of specified quality.
- B. Comply with manufacturers' instructions, including each step in sequence.
- C. Should manufacturers' instructions conflict with Contract Documents, request clarification from Architect before proceeding.
- D. Comply with specified standards as minimum quality for the work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.
- E. Have work performed by persons qualified to produce required and specified quality.
- F. Verify that field measurements are as indicated on shop drawings or as instructed by the manufacturer.
- G. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, and disfigurement.

3.2 MOCK-UPS

- A. Before installing portions of the Work where mock-ups are required, construct mock-ups in location and size indicated for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work. The purpose of mock-up is to demonstrate the proposed range of aesthetic effects and workmanship.
- B. Accepted mock-ups establish the standard of quality the Architect will use to judge the Work.
- C. Integrated Exterior Mock-ups: Construct integrated exterior mock-up as indicated on drawings. Coordinate installation of exterior envelope materials and products as required in individual Specification Sections. Provide adequate supporting structure for mock-up materials as necessary.
- D. Provide supervisory personnel who will oversee mock-up construction. Provide workers that will be employed during the construction at Project.
- E. Tests shall be performed under provisions identified in this section and identified in the respective product specification sections.
- F. Assemble and erect specified items with specified attachment and anchorage devices, flashings, seals, and finishes.
- G. Obtain Architect's approval of mock-ups before starting work, fabrication, or construction.

1. Architect will issue written comments within seven (7) working days of initial review and each subsequent follow up review of each mock-up.
 2. Make corrections as necessary until Architect's approval is issued.
- H. Architect will use accepted mock-ups as a comparison standard for the remaining Work.
- I. Where mock-up has been accepted by Architect and is specified in product specification sections to be removed, protect mock-up throughout construction, remove mock-up and clear area when directed to do so by Architect.

3.3 TOLERANCES

- A. Monitor fabrication and installation tolerance control of products to produce acceptable Work. Do not permit tolerances to accumulate.
- B. Comply with manufacturers' tolerances. Should manufacturers' tolerances conflict with Contract Documents, request clarification from Architect before proceeding.
- C. Adjust products to appropriate dimensions; position before securing products in place.

3.4 TESTING AND INSPECTION

- A. See individual specification sections for testing and inspection required.
- B. Testing Agency Duties:
1. Provide qualified personnel at site. Cooperate with Architect and Contractor in performance of services.
 2. Perform specified sampling and testing of products in accordance with specified standards.
 3. Ascertain compliance of materials and mixes with requirements of Contract Documents.
 4. Promptly notify Architect and Contractor of observed irregularities or non-compliance of Work or products.
 5. Perform additional tests and inspections required by Architect.
 6. Submit reports of all tests/inspections specified.
- C. Limits on Testing/Inspection Agency Authority:
1. Agency may not release, revoke, alter, or enlarge on requirements of Contract Documents.
 2. Agency may not approve or accept any portion of the Work.
 3. Agency may not assume any duties of Contractor.
 4. Agency has no authority to stop the Work.
- D. Contractor Responsibilities:

1. Deliver to agency at designated location, adequate samples of materials proposed to be used that require testing, along with proposed mix designs.
 2. Cooperate with laboratory personnel, and provide access to the Work and to manufacturers' facilities.
 3. Provide incidental labor and facilities:
 - a. To provide access to Work to be tested/inspected.
 - b. To obtain and handle samples at the site or at source of Products to be tested/inspected.
 - c. To facilitate tests/inspections.
 - d. To provide storage and curing of test samples.
 4. Notify Architect and laboratory 24 hours prior to expected time for operations requiring testing/inspection services.
 5. Employ services of an independent qualified testing laboratory and pay for additional samples, tests, and inspections required by Contractor beyond specified requirements.
 6. Arrange with Owner's agency and pay for additional samples, tests, and inspections required by Contractor beyond specified requirements.
- E. Re-testing required because of non-compliance with specified requirements shall be performed by the same agency on instructions by Architect.
- F. Re-testing required because of non-compliance with specified requirements shall be paid for by Contractor.

3.5 MANUFACTURERS' FIELD SERVICES

- A. When specified in individual specification sections, require material or product suppliers or manufacturers to provide qualified staff personnel to observe site conditions, conditions of surfaces and installation, quality of workmanship, start-up of equipment, test, adjust, and balance equipment as applicable, and to initiate instructions when necessary.
- B. Report observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturers' written instructions.

3.6 DEFECT ASSESSMENT

- A. Replace Work or portions of the Work not complying with specified requirements.
- B. If, in the opinion of Architect, it is not practical to remove and replace the work, Architect will direct an appropriate remedy or adjust payment.

END OF SECTION

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**SECTION 01 50 00
TEMPORARY FACILITIES AND CONTROLS**

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Dewatering
- B. Temporary utilities.
- C. Temporary telecommunications services.
- D. Temporary sanitary facilities.
- E. Temporary Controls: Barriers, enclosures, and fencing.
- F. Security requirements.
- G. Vehicular access and parking.
- H. Waste removal facilities and services.
- I. Project identification sign.
- J. Field offices.

1.2 DEWATERING

- A. Provide temporary means and methods for dewatering all temporary facilities and controls.
- B. Maintain temporary facilities in operable condition.

1.3 TEMPORARY UTILITIES - SEE SECTION 01 51 00

- A. Provide and pay for all electrical power, lighting, water, heating and cooling, and ventilation required for construction purposes.
 - 1. Utilities during construction may be purchased from the University (User Agency), if available
 - 2. Contractor is responsible for providing temporary meter information for billing purposes.
 - 3. The contractor is to coordinate with McNeese on process for establishing an account for billing purposes prior to commencement of construction.
- B. Existing facilities may not be used unless approved by the Owner and User Agency.

1.4 TELECOMMUNICATIONS SERVICES

- A. Provide, maintain, and pay for telecommunications services to field office at time of project mobilization.
- B. Telecommunications services shall include:

1. Windows-based personal computer dedicated to project telecommunications, with necessary software and laser printer.
2. Telephone
3. Internet Connections: Minimum of one; DSL modem or faster.
4. Email: .

1.5 TEMPORARY SANITARY FACILITIES

- A. Provide and maintain required facilities and enclosures. Provide at time of project mobilization.
- B. Locate toilets within staging area or where directed by user agency.
- C. Maintain daily in clean and sanitary condition.

1.6 BARRIERS

- A. Provide barriers to prevent unauthorized entry to construction areas, to prevent access to areas that could be hazardous to workers or the public and to protect existing facilities and adjacent properties from damage from construction operations and demolition.
- B. Provide protection for plants designated to remain. Replace damaged plants.
- C. Protect non-owned vehicular traffic, stored materials, site, and structures from damage.

1.7 FENCING

- A. Construction: Commercial grade chain link fence.
- B. Provide 6 foot high fence around construction site; equip with vehicular and pedestrian gates with locks.
- C. Provide temporary barriers at drip lines of each tree identified to remain. These shall be maintained by the contractor for the duration of the project.

1.8 SECURITY - SEE SECTION 01 35 53

- A. Provide security and facilities to protect Work, existing facilities, and Owner's operations from unauthorized entry, vandalism, or theft.

1.9 VEHICULAR ACCESS AND PARKING - SEE SECTION 01 55 00

- A. Comply with regulations relating to use of streets and sidewalks, access to emergency facilities, and access for emergency vehicles.
- B. Coordinate access and haul routes with governing authorities and Owner.
- C. Provide and maintain access to fire hydrants, free of obstructions.
- D. Provide means of removing mud from vehicle wheels before entering streets.
- E. Provide temporary parking areas to accommodate construction personnel.

- F. The contractor shall be responsible for any repairs and/or replacement of existing lawns, ditches, concrete sidewalks/ gutters, fencing, or any other structures including utilities damaged by the contractors' operations. The contractor shall conduct a pre-construction site survey to document the existing conditions of the project site, access routes, and/or any adjacent areas that could be affected during construction and to report any damages that have not been identified. If no such damage is recorded, then any structure over which the contractor has crossed during construction which are later found to be damaged, shall be considered to be damaged by construction and shall be repaired/ replaced by the contractor at no cost to the owner. All damaged items must be returned to original condition.
- G. Use of User Agency dumpsters is prohibited.

1.10 WASTE REMOVAL

- A. Provide waste removal facilities and services as required to maintain the site in clean and orderly condition.
- B. If materials to be recycled or re-used on the project must be stored on-site, provide suitable non-combustible containers; locate containers holding flammable material outside the structure unless otherwise approved by the authorities having jurisdiction.

1.11 PROJECT IDENTIFICATION

- A. Provide project identification sign of design and construction indicated on drawings.
- B. Erect on site at location indicated.
- C. No other signs are allowed without Owner permission except those required by law.

1.12 FIELD OFFICES - SEE SECTION 01 52 13

- A. Office: Weathertight, with lighting, electrical outlets, heating, cooling equipment, and equipped with sturdy furniture.
- B. Provide space for Project meetings, with table and chairs to accommodate 6 persons.
- C. Locate offices a minimum distance of 30 feet from existing and new structures.

1.13 REMOVAL OF UTILITIES, FACILITIES, AND CONTROLS

- A. Remove temporary utilities, equipment, facilities, materials, prior to Date of Substantial Completion inspection.
- B. Remove underground installations to a minimum depth of 2 feet. Grade site as indicated.
- C. Clean and repair damage caused by installation or use of temporary work.
- D. Restore new permanent facilities used during construction to specified condition.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

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**SECTION 01 60 00
PRODUCT REQUIREMENTS**

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. General product requirements.
- B. Re-use of existing products.
- C. Transportation, handling, storage and protection.
- D. Product option requirements.
- E. Substitution limitations.
- F. Procedures for Owner-supplied products.
- G. Maintenance materials, including extra materials, spare parts, tools, and software.

1.2 RELATED REQUIREMENTS

- A. Section 01 10 00 - Summary: Identification of Owner-supplied products.
- B. Section 01 25 00 - Substitution Procedures: Substitutions made during procurement and/or construction phases.
- C. Section 01 40 00 - Quality Requirements: Product quality monitoring.
- D. Section 01 74 19 - Construction Waste Management and Disposal: Waste disposal requirements potentially affecting product selection, packaging and substitutions.

1.3 SUBMITTALS

- A. Product Data Submittals: Submit manufacturer's standard published data. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information specific to this Project.
- B. Shop Drawing Submittals: Prepared specifically for this Project; indicate utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.
- C. Sample Submittals: Illustrate functional and aesthetic characteristics of the product, with integral parts and attachment devices. Coordinate sample submittals for interfacing work.
 - 1. For selection from standard finishes, submit samples of the full range of the manufacturer's standard colors, textures, and patterns.

PART 2 PRODUCTS

2.1 EXISTING PRODUCTS

- A. Do not use materials and equipment removed from existing premises unless specifically required or permitted by Contract Documents.
- B. Unforeseen historic items encountered remain the property of the Owner; notify Owner promptly upon discovery; protect, remove, handle, and store as directed by Owner.
- C. Existing materials and equipment indicated to be removed, but not to be re-used, relocated, reinstalled, delivered to the Owner, or otherwise indicated as to remain the property of the Owner, become the property of the Contractor; remove from site.

2.2 NEW PRODUCTS

- A. Provide new products unless specifically required or permitted by Contract Documents.
- B. See Section 01 40 00 - Quality Requirements, for additional source quality control requirements.
- C. Use of products having any of the following characteristics is not permitted:
 - 1. Made using or containing CFC's or HCFC's.
 - 2. Made of wood from newly cut old growth timber.
 - 3. Containing lead, cadmium, or asbestos.

2.3 PRODUCT OPTIONS

- A. Products Specified by Reference Standards or by Description Only: Use any product meeting those standards or description.
- B. Products Specified by Naming One or More Manufacturers with a Provision for Substitutions: Submit a request for substitution for any manufacturer not named.

2.4 MAINTENANCE MATERIALS

- A. Furnish extra materials, spare parts, tools, and software of types and in quantities specified in individual specification sections.
- B. Deliver to Project site; obtain receipt prior to final payment.

PART 3 EXECUTION

3.1 SUBSTITUTION LIMITATIONS

- A. See Section 01 25 00 - Substitution Procedures.

3.2 OWNER-SUPPLIED PRODUCTS

- A. See Section 01 10 00 - Summary for identification of Owner-supplied products.
- B. Owner's Responsibilities:

1. Arrange for and deliver Owner reviewed shop drawings, product data, and samples, to Contractor.
 2. Arrange and pay for product delivery to site.
 3. On delivery, inspect products jointly with Contractor.
 4. Submit claims for transportation damage and replace damaged, defective, or deficient items.
 5. Arrange for manufacturers' warranties, inspections, and service.
- C. Contractor's Responsibilities:
1. Review Owner reviewed shop drawings, product data, and samples.
 2. Receive and unload products at site; inspect for completeness or damage jointly with Owner.
 3. Handle, store, install and finish products.
 4. Repair or replace items damaged after receipt.

3.3 TRANSPORTATION AND HANDLING

- A. Package products for shipment in manner to prevent damage; for equipment, package to avoid loss of factory calibration.
- B. If special precautions are required, attach instructions prominently and legibly on outside of packaging.
- C. Coordinate schedule of product delivery to designated prepared areas in order to minimize site storage time and potential damage to stored materials.
- D. Transport and handle products in accordance with manufacturer's instructions.
- E. Transport materials in covered trucks to prevent contamination of product and littering of surrounding areas.
- F. Promptly inspect shipments to ensure that products comply with requirements, quantities are correct, and products are undamaged.
- G. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement, or damage, and to minimize handling.
- H. Arrange for the return of packing materials, such as wood pallets, where economically feasible.

3.4 STORAGE AND PROTECTION

- A. Provide protection of stored materials and products against theft, casualty, or deterioration.
- B. Designate receiving/storage areas for incoming products so that they are delivered according to installation schedule and placed convenient to work area in order to minimize waste due to excessive materials handling and misapplication. See Section 01 74 19.

1. Structural Loading Limitations: Handle and store products and materials so as not to exceed static and dynamic load-bearing capacities of project floor and roof areas.
- C. Store and protect products in accordance with manufacturers' instructions.
- D. Store with seals and labels intact and legible.
- E. Store sensitive products in weathertight, climate-controlled enclosures in an environment favorable to product.
- F. For exterior storage of fabricated products, place on sloped supports above ground.
- G. Protect products from damage or deterioration due to construction operations, weather, precipitation, humidity, temperature, sunlight and ultraviolet light, dirt, dust, and other contaminants.
- H. Comply with manufacturer's warranty conditions, if any.
- I. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of products.
- J. Prevent contact with material that may cause corrosion, discoloration, or staining.
- K. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.
- L. Arrange storage of products to permit access for inspection. Periodically inspect to verify products are undamaged and are maintained in acceptable condition.

END OF SECTION

**SECTION 01 70 00
EXECUTION AND CLOSEOUT REQUIREMENTS**

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Examination, preparation, and general installation procedures.
- B. Requirements for alterations work, including selective demolition.
- C. Pre-installation meetings.
- D. Cutting and patching.
- E. Surveying for laying out the work.
- F. Cleaning and protection.
- G. Starting of systems and equipment.
- H. Demonstration and instruction of Owner personnel.
- I. Closeout procedures, including Contractor's Correction Punch List, except payment procedures.
- J. General requirements for maintenance service.

1.2 RELATED REQUIREMENTS

- A. Section 01 10 00 - Summary: Limitations on working in existing building; continued occupancy; work sequence; identification of salvaged and relocated materials.
- B. Section 01 30 00 - Administrative Requirements: Submittals procedures, Electronic document submittal service.
- C. Section 01 40 00 - Quality Requirements: Testing and inspection procedures.
- D. Section 01 50 00 - Temporary Facilities and Controls: Temporary exterior enclosures.
- E. Section 01 51 00 - Temporary Utilities: Temporary heating, cooling, and ventilating facilities.
- F. Section 01 76 10 - Temporary Protective Coverings: Materials for protection of installed work.
- G. Section 01 78 00 - Closeout Submittals: Project record documents, operation and maintenance data, warranties, and bonds.
- H. Section 02 41 00 - Demolition: Demolition of whole structures and parts thereof; site utility demolition.
- I. Section 07 84 00 - Firestopping.
- J. Individual Product Specification Sections:
 - 1. Advance notification to other sections of openings required in work of those sections.

2. Limitations on cutting structural members.

1.3 REFERENCE STANDARDS

- A. NFPA 241 - Standard for Safeguarding Construction, Alteration, and Demolition Operations; 2022, with Errata (2021).

1.4 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Survey work: Submit name, address, and telephone number of Surveyor before starting survey work.
 1. On request, submit documentation verifying accuracy of survey work.
 2. Submit a copy of site drawing signed by the Land Surveyor, that the elevations and locations of the work are in compliance with Contract Documents.
 3. Submit surveys and survey logs for the project record.
- C. Cutting and Patching: Submit written request in advance of cutting or alteration that affects:
 1. Structural integrity of any element of Project.
 2. Integrity of weather exposed or moisture resistant element.
 3. Efficiency, maintenance, or safety of any operational element.
 4. Visual qualities of sight exposed elements.
 5. Work of Owner or separate Contractor.
 6. Include in request:
 - a. Identification of Project.
 - b. Location and description of affected work.
 - c. Necessity for cutting or alteration.
 - d. Description of proposed work and products to be used.
 - e. Alternatives to cutting and patching.
 - f. Effect on work of Owner or separate Contractor.
 - g. Written permission of affected separate Contractor.
 - h. Date and time work will be executed.
- D. Project Record Documents: Accurately record actual locations of capped and active utilities.

1.5 QUALIFICATIONS

- A. For demolition work, employ a firm specializing in the type of work required.
- B. For surveying work, employ a land surveyor registered in State and acceptable to Architect. Submit evidence of surveyor's Errors and Omissions insurance coverage in the form of an Insurance Certificate. Employ only individual(s) trained and experienced in collecting and recording accurate data relevant to ongoing construction activities,
- C. For design of temporary shoring and bracing, employ a Professional Engineer experienced in design of this type of work and licensed in State.

1.6 PROJECT CONDITIONS

- A. Use of explosives is not permitted.
- B. Grade site to drain. Maintain excavations free of water. Provide, operate, and maintain pumping equipment.
- C. Protect site from puddling or running water. Provide water barriers as required to protect site from soil erosion.
- D. Perform dewatering activities, as required, for the duration of the project.
- E. Ventilate enclosed areas to assist cure of materials, to dissipate humidity, and to prevent accumulation of dust, fumes, vapors, or gases.
- F. Erosion and Sediment Control: Plan and execute work by methods to control surface drainage from cuts and fills, from borrow and waste disposal areas. Prevent erosion and sedimentation.
 - 1. Periodically inspect earthwork to detect evidence of erosion and sedimentation; promptly apply corrective measures.
- G. Pest and Rodent Control: Provide methods, means, and facilities to prevent pests and insects from damaging the work.
- H. Rodent Control: Provide methods, means, and facilities to prevent rodents from accessing or invading premises.
- I. Pollution Control: Provide methods, means, and facilities to prevent contamination of soil, water, and atmosphere from discharge of noxious, toxic substances, and pollutants produced by construction operations. Comply with federal, state, and local regulations.

1.7 COORDINATION

- A. See Section 01 10 00 for occupancy-related requirements.
- B. Coordinate scheduling, submittals, and work of the various sections of the Project Manual to ensure efficient and orderly sequence of installation of interdependent construction elements, with provisions for accommodating items installed later.
- C. All utility shut-downs to be coordinated and approved in advance by McNeese State University. Provide written require at a minimum of seven days in advance of any utility modifications.

- D. Notify affected utility companies and comply with their requirements.
- E. Verify that utility requirements and characteristics of new operating equipment are compatible with building utilities. Coordinate work of various sections having interdependent responsibilities for installing, connecting to, and placing in service, such equipment.
- F. Coordinate space requirements, supports, and installation of mechanical and electrical work that are indicated diagrammatically on drawings. Follow routing indicated for pipes, ducts, and conduit, as closely as practicable; place runs parallel with lines of building. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance, and for repairs.
- G. In finished areas except as otherwise indicated, conceal pipes, ducts, and wiring within the construction. Coordinate locations of fixtures and outlets with finish elements.
- H. Coordinate completion and clean-up of work of separate sections.
- I. After Owner occupancy of premises, coordinate access to site for correction of defective work and work not in accordance with Contract Documents, to minimize disruption of Owner's activities.

PART 2 PRODUCTS

2.1 PATCHING MATERIALS

- A. New Materials: As specified in product sections; match existing products and work for patching and extending work.
- B. Type and Quality of Existing Products: Determine by inspecting and testing products where necessary, referring to existing work as a standard.
- C. Product Substitution: For any proposed change in materials, submit request for substitution described in Section 01 60 00 - Product Requirements.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that existing site conditions and substrate surfaces are acceptable for subsequent work. Start of work means acceptance of existing conditions.
- B. Verify that existing substrate is capable of structural support or attachment of new work being applied or attached.
- C. Examine and verify specific conditions described in individual specification sections.
- D. Take field measurements before confirming product orders or beginning fabrication, to minimize waste due to over-ordering or misfabrication.
- E. Verify that utility services are available, of the correct characteristics, and in the correct locations.
- F. Prior to Cutting: Examine existing conditions prior to commencing work, including elements subject to damage or movement during cutting and patching. After uncovering existing work, assess conditions affecting performance of work. Beginning of cutting or patching means acceptance of existing conditions.

3.2 PREPARATION

- A. Clean substrate surfaces prior to applying next material or substance.
- B. Seal cracks or openings of substrate prior to applying next material or substance.
- C. Apply manufacturer required or recommended substrate primer, sealer, or conditioner prior to applying any new material or substance in contact or bond.

3.3 PREINSTALLATION MEETINGS

- A. When required in individual specification sections, convene a preinstallation meeting at the site prior to commencing work of the section.
- B. Require attendance of parties directly affecting, or affected by, work of the specific section.
- C. Notify Architect Seven days in advance of meeting date.
- D. Prepare agenda and preside at meeting:
 - 1. Review conditions of examination, preparation and installation procedures.
 - 2. Review coordination with related work.
- E. Record minutes and distribute copies within Ten days after meeting to participants, with Digital copies to Architect, Owner, participants, and those affected by decisions made.

3.4 LAYING OUT THE WORK

- A. Verify locations of survey control points prior to starting work.
- B. Promptly notify Architect of any discrepancies discovered.
- C. Control datum for survey is that established by Owner provided survey.
- D. Protect survey control points prior to starting site work; preserve permanent reference points during construction.
- E. Promptly report to Architect the loss or destruction of any reference point or relocation required because of changes in grades or other reasons.
- F. Replace dislocated survey control points based on original survey control. Make no changes without prior written notice to Architect.
- G. Utilize recognized engineering survey practices.
- H. Establish a minimum of two permanent bench marks on site, referenced to established control points. Record locations, with horizontal and vertical data, on project record documents.
- I. Establish elevations, lines and levels. Locate and lay out by instrumentation and similar appropriate means:
 - 1. Site improvements including pavements; stakes for grading, fill and topsoil placement; utility locations, slopes, and invert elevations

2. Grid or axis for structures.
 3. Building foundation, column locations, ground floor elevations, and _____.
- J. Periodically verify layouts by same means.
- K. Maintain a complete and accurate log of control and survey work as it progresses.

3.5 GENERAL INSTALLATION REQUIREMENTS

- A. Install products as specified in individual sections, in accordance with manufacturer's instructions and recommendations, and so as to avoid waste due to necessity for replacement.
- B. Make vertical elements plumb and horizontal elements level, unless otherwise indicated.
- C. Install equipment and fittings plumb and level, neatly aligned with adjacent vertical and horizontal lines, unless otherwise indicated.
- D. Make consistent texture on surfaces, with seamless transitions, unless otherwise indicated.
- E. Make neat transitions between different surfaces, maintaining texture and appearance.

3.6 ALTERATIONS

- A. Drawings showing existing construction and utilities are based on casual field observation and existing record documents only.
 1. Verify that construction and utility arrangements are as indicated.
 2. Report discrepancies to Architect before disturbing existing installation.
 3. Beginning of alterations work constitutes acceptance of existing conditions.
- B. Maintain weatherproof exterior building enclosure except for interruptions required for replacement or modifications; take care to prevent water and humidity damage.
 1. Where openings in exterior enclosure exist, provide construction to make exterior enclosure weatherproof.
 2. Insulate existing ducts or pipes that are exposed to outdoor ambient temperatures by alterations work.
- C. Remove existing work as indicated and as required to accomplish new work.
 1. Remove rotted wood, corroded metals, and deteriorated masonry and concrete; replace with new construction specified.
 2. Remove items indicated on drawings.
 3. Relocate items indicated on drawings.
 4. Where new surface finishes are to be applied to existing work, perform removals, patch, and prepare existing surfaces as required to receive new finish; remove existing finish if necessary for successful application of new finish.

5. Where new surface finishes are not specified or indicated, patch holes and damaged surfaces to match adjacent finished surfaces as closely as possible.
- D. Services (Including but not limited to HVAC, Plumbing, Fire Protection, Electrical, and Telecommunications): Remove, relocate, and extend existing systems to accommodate new construction.
 1. Maintain existing active systems that are to remain in operation; maintain access to equipment and operational components; if necessary, modify installation to allow access or provide access panel.
 2. Verify that abandoned services serve only abandoned facilities.
 3. Remove abandoned pipe, ducts, conduits, and equipment , including those above accessible ceilings; remove back to source of supply where possible, otherwise cap stub and tag with identification; patch holes left by removal using materials specified for new construction.
- E. Protect existing work to remain.
 1. Prevent movement of structure; provide shoring and bracing if necessary.
 2. Perform cutting to accomplish removals neatly and as specified for cutting new work.
 3. Repair adjacent construction and finishes damaged during removal work.
- F. Adapt existing work to fit new work: Make as neat and smooth transition as possible.
 1. When existing finished surfaces are cut so that a smooth transition with new work is not possible, terminate existing surface along a straight line at a natural line of division and make recommendation to Architect.
 2. Where removal of partitions or walls results in adjacent spaces becoming one, rework floors, walls, and ceilings to a smooth plane without breaks, steps, or bulkheads.
 3. Where a change of plane of 1/4 inch or more occurs in existing work, submit recommendation for providing a smooth transition for Architect review and request instructions.
- G. Patching: Where the existing surface is not indicated to be refinished, patch to match the surface finish that existed prior to cutting. Where the surface is indicated to be refinished, patch so that the substrate is ready for the new finish.
- H. Refinish existing surfaces as indicated:
 1. Where rooms or spaces are indicated to be refinished, refinish all visible existing surfaces to remain to the specified condition for each material, with a neat transition to adjacent finishes.
- I. Remove demolition debris and abandoned items from alterations areas and dispose of off-site; do not burn or bury.
- J. Do not begin new construction in alterations areas before demolition is complete.

K. Comply with all other applicable requirements of this section.

3.7 CUTTING AND PATCHING

A. Whenever possible, execute the work by methods that avoid cutting or patching.

B. See Alterations article above for additional requirements.

C. Perform whatever cutting and patching is necessary to:

1. Complete the work.
2. Fit products together to integrate with other work.
3. Provide openings for penetration of mechanical, electrical, and other services.
4. Match work that has been cut to adjacent work.
5. Repair areas adjacent to cuts to required condition.
6. Repair new work damaged by subsequent work.
7. Remove samples of installed work for testing when requested.
8. Remove and replace defective and non-complying work.

D. Execute work by methods that avoid damage to other work and that will provide appropriate surfaces to receive patching and finishing. In existing work, minimize damage and restore to original condition.

E. Employ original installer to perform cutting for weather exposed and moisture resistant elements, and sight exposed surfaces.

F. Cut rigid materials using masonry saw or core drill. Pneumatic tools not allowed without prior approval.

G. Restore work with new products in accordance with requirements of Contract Documents.

H. Fit work air tight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.

I. At penetrations of fire rated walls, partitions, ceiling, or floor construction, completely seal voids with fire rated material in accordance with Section 07 84 00, to full thickness of the penetrated element.

J. Patching:

1. Finish patched surfaces to match finish that existed prior to patching. On continuous surfaces, refinish to nearest intersection or natural break. For an assembly, refinish entire unit.
2. Match color, texture, and appearance.
3. Repair patched surfaces that are damaged, lifted, discolored, or showing other imperfections due to patching work. If defects are due to condition of substrate, repair

substrate prior to repairing finish.

3.8 PROGRESS CLEANING

- A. Maintain areas free of waste materials, debris, and rubbish. Maintain site in a clean and orderly condition.
- B. Remove debris and rubbish from pipe chases, plenums, attics, crawl spaces, and other closed or remote spaces, prior to enclosing the space.
- C. Broom and vacuum clean interior areas prior to start of surface finishing, and continue cleaning to eliminate dust.
- D. Collect and remove waste materials, debris, and trash/rubbish from site periodically and dispose off-site; do not burn or bury.

3.9 PROTECTION OF INSTALLED WORK

- A. See Section 01 76 10 for temporary protective covering materials.
- B. Protect installed work from damage by construction operations.
- C. Provide special protection where specified in individual specification sections.
- D. Provide temporary and removable protection for installed products. Control activity in immediate work area to prevent damage.
- E. Provide protective coverings at walls, projections, jambs, sills, and soffits of openings.
- F. Protect finished floors, stairs, and other surfaces from traffic, dirt, wear, damage, or movement of heavy objects, by protecting with durable sheet materials.
- G. Protect work from spilled liquids. If work is exposed to spilled liquids, immediately remove protective coverings, dry out work, and replace protective coverings.
- H. Prohibit traffic or storage upon waterproofed or roofed surfaces. If traffic or activity is necessary, obtain recommendations for protection from waterproofing or roofing material manufacturer.
- I. Remove protective coverings when no longer needed; reuse or recycle coverings if possible.

3.10 SYSTEM STARTUP

- A. Coordinate schedule for start-up of various equipment and systems.
- B. Verify that each piece of equipment or system has been checked for proper lubrication, drive rotation, belt tension, control sequence, and for conditions that may cause damage.
- C. Verify tests, meter readings, and specified electrical characteristics agree with those required by the equipment or system manufacturer.
- D. Verify that wiring and support components for equipment are complete and tested.
- E. Execute start-up under supervision of applicable Contractor personnel and manufacturer's representative in accordance with manufacturers' instructions.

- F. When specified in individual specification Sections, require manufacturer to provide authorized representative to be present at site to inspect, check, and approve equipment or system installation prior to start-up, and to supervise placing equipment or system in operation.
- G. Submit a written report that equipment or system has been properly installed and is functioning correctly.

3.11 DEMONSTRATION AND INSTRUCTION

- A. Demonstrate operation and maintenance of products to Owner's personnel two weeks prior to date of Substantial Completion.
- B. Demonstrate start-up, operation, control, adjustment, trouble-shooting, servicing, maintenance, and shutdown of each item of equipment at scheduled time, at equipment location.
- C. For equipment or systems requiring seasonal operation, perform demonstration for other season within six months.
- D. Provide a qualified person who is knowledgeable about the Project to perform demonstration and instruction of Owner's personnel.
- E. Utilize operation and maintenance manuals as basis for instruction. Review contents of manual with Owner's personnel in detail to explain all aspects of operation and maintenance.

3.12 ADJUSTING

- A. Adjust operating products and equipment to ensure smooth and unhindered operation.
- B. Testing, adjusting, and balancing HVAC systems: See Section 23 05 93 - Testing, Adjusting, and Balancing for HVAC.

3.13 FINAL CLEANING

- A. Execute final cleaning prior to final project assessment.
 - 1. Clean areas to be occupied by Owner prior to final completion before Owner occupancy.
- B. Use cleaning materials that are nonhazardous.
- C. Clean interior and exterior glass, surfaces exposed to view; remove temporary labels, stains and foreign substances, polish transparent and glossy surfaces, vacuum carpeted and soft surfaces.
- D. Remove all labels that are not permanent. Do not paint or otherwise cover fire test labels or nameplates on mechanical and electrical equipment.
- E. Clean equipment and fixtures to a sanitary condition with cleaning materials appropriate to the surface and material being cleaned.
- F. Clean filters of operating equipment.
- G. Clean debris from roofs, gutters, downspouts, scuppers, overflow drains, area drains, drainage systems
- H. Clean site; sweep paved areas, rake clean landscaped surfaces.

- I. Remove waste, surplus materials, trash/rubbish, and construction facilities from the site; dispose of in legal manner; do not burn or bury.

3.14 CLOSEOUT PROCEDURES

- A. Make submittals that are required by governing or other authorities.
 - 1. Provide copies to Architect.
- B. Notify Architect when work is considered ready for Architect's Substantial Completion inspection.
- C. Submit written certification containing Contractor's Correction Punch List, that Contract Documents have been reviewed, work has been inspected, and that work is complete in accordance with Contract Documents and ready for Architect's Substantial Completion inspection.
- D. Conduct Substantial Completion inspection and create Final Correction Punch List containing Architect's and Contractor's comprehensive list of items identified to be completed or corrected and submit to Architect.
- E. Correct items of work listed in Final Correction Punch List and comply with requirements for access to Owner-occupied areas.
- F. Notify Architect when work is considered finally complete and ready for Architect's Substantial Completion final inspection.
- G. Complete items of work determined by Architect listed in executed Certificate of Substantial Completion.

3.15 MAINTENANCE

- A. Provide service and maintenance of components indicated in specification sections.
- B. Maintenance Period: As indicated in specification sections or, if not indicated, not less than one year from the Date of Substantial Completion or the length of the specified warranty, whichever is longer.
- C. Examine system components at a frequency consistent with reliable operation. Clean, adjust, and lubricate as required.
- D. Include systematic examination, adjustment, and lubrication of components. Repair or replace parts whenever required. Use parts produced by the manufacturer of the original component.
- E. Maintenance service shall not be assigned or transferred to any agent or subcontractor without prior written consent of the Owner.

END OF SECTION

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**SECTION 01 78 00
CLOSEOUT SUBMITTALS**

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Project record documents.
- B. Operation and maintenance data.
- C. Warranties and bonds.

1.2 RELATED REQUIREMENTS

- A. Section 00 72 00 - General Conditions and 00 73 00 - Supplementary Conditions: Performance bond and labor and material payment bonds, warranty, and correction of work.
- B. Section 01 30 00 - Administrative Requirements: Submittals procedures, shop drawings, product data, and samples.
- C. Section 01 70 00 - Execution and Closeout Requirements: Contract closeout procedures.
- D. Individual Product Sections: Specific requirements for operation and maintenance data.
- E. Individual Product Sections: Warranties required for specific products or Work.

1.3 SUBMITTALS

- A. Project Record Documents: Submit documents to Architect with claim for final Application for Payment.
- B. Operation and Maintenance Data:
 - 1. Submit two copies of preliminary draft or proposed formats and outlines of contents before start of Work. Architect will review draft and return one copy with comments.
 - 2. For equipment, or component parts of equipment put into service during construction and operated by Owner, submit completed documents within ten days after acceptance.
 - 3. Submit one copy of completed documents 15 days prior to final inspection. This copy will be reviewed and returned after final inspection, with Architect comments. Revise content of all document sets as required prior to final submission.
 - 4. Submit two sets of revised final documents in final form within 10 days after final inspection.
- C. Warranties and Bonds:
 - 1. For equipment or component parts of equipment put into service during construction with Owner's permission, submit documents within 10 days after acceptance.
 - 2. Make other submittals within 10 days after Date of Substantial Completion, prior to final Application for Payment.

3. For items of Work for which acceptance is delayed beyond Date of Substantial Completion, submit within 10 days after acceptance, listing the date of acceptance as the beginning of the warranty period.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.1 PROJECT RECORD DOCUMENTS

- A. Maintain on site one set of the following record documents; record actual revisions to the Work:
 1. Drawings.
 2. Specifications.
 3. Addenda.
 4. Change Orders and other modifications to the Contract.
- B. Ensure entries are complete and accurate, enabling future reference by Owner.
- C. Store record documents separate from documents used for construction.
- D. Record information concurrent with construction progress.
- E. Specifications: Legibly mark and record at each product section description of actual products installed, including the following:
 1. Manufacturer's name and product model and number.
 2. Product substitutions or alternates utilized.
 3. Changes made by Addenda and modifications.
- F. Record Drawings: Legibly mark each item to record actual construction including:
 1. Field changes of dimension and detail.
 2. Details not on original Contract drawings.

3.2 OPERATION AND MAINTENANCE DATA

- A. Product Data: Mark each sheet to clearly identify specific products and component parts, and data applicable to installation. Delete inapplicable information.
- B. Drawings: Supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams. Do not use Project Record Documents as maintenance drawings.
- C. Typed Text: As required to supplement product data. Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions.

3.3 ASSEMBLY OF OPERATION AND MAINTENANCE MANUALS

- A. Assemble operation and maintenance data into durable manuals for Owner's personnel use, with data arranged in the same sequence as, and identified by, the specification sections.
- B. Where systems involve more than one specification section, provide separate tabbed divider for each system.
- C. Cover: Identify each binder with typed or printed title OPERATION AND MAINTENANCE INSTRUCTIONS; identify title of Project; identify subject matter of contents.
- D. Project Directory: Title and address of Project; names, addresses, and telephone numbers of Architect, Consultants, Contractor and subcontractors, with names of responsible parties.
- E. Tables of Contents: List every item separated by a divider, using the same identification as on the divider tab; where multiple volumes are required, include all volumes Tables of Contents in each volume, with the current volume clearly identified.
- F. Dividers: Provide tabbed dividers for each separate product and system; identify the contents on the divider tab; immediately following the divider tab include a description of product and major component parts of equipment.

3.4 WARRANTIES AND BONDS

- A. Obtain warranties and bonds, executed in duplicate by responsible Subcontractors, suppliers, and manufacturers, within 10 days after completion of the applicable item of work. Except for items put into use with Owner's permission, leave date of beginning of time of warranty until Date of Substantial completion is determined.
- B. Verify that documents are in proper form, contain full information, and are notarized.
- C. Co-execute submittals when required.
- D. Retain warranties and bonds until time specified for submittal.

END OF SECTION

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SECTION 02 23 10
TREE PROTECTION AND TRIMMING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes general protection and pruning of existing trees and plants that are affected by execution of the Work, whether temporary or permanent construction. ALL ROOT AND CROWN PRUNING SHALL BE PERFORMED BY A CERTIFIED ARBORIST.
- B. Related Sections:
 - 1. Section 01500 "Temporary Facilities and Controls" for temporary site fencing.
 - 2. Section 311000 "Site Clearing" for removing existing trees and shrubs.

1.3 DEFINITIONS

- A. Caliper: Diameter of a trunk measured by a diameter tape or the average of the smallest and largest diameters at 6 inches above the ground for trees up to, and including, 4-inch size; and 12 inches above the ground for trees larger than 4-inch size.
- B. Plant-Protection Zone: Area surrounding individual trees, groups of trees, shrubs, or other vegetation to be protected during construction, and indicated on Drawings.
- C. Tree-Protection Zone: Area surrounding individual trees or groups of trees to be protected during construction, and indicated on Drawings.
- D. Vegetation: Trees, shrubs, groundcovers, grass, and other plants.

1.4 SUBMITTALS

- A. Tree Pruning Schedule: Written schedule detailing scope and extent of pruning of trees to remain that interfere with or are affected by construction.
 - 1. Species and size of tree.
 - 2. Location on site plan. Include unique identifier for each.
 - 3. Reason for pruning.
 - 4. Description of pruning to be performed.
 - 5. Description of maintenance following pruning.
- B. Existing Conditions: Documentation of existing trees and plantings indicated to remain, which establishes preconstruction conditions that might be misconstrued as damage caused by construction activities.
 - 1. Use sufficiently detailed photographs or videotape.
 - 2. Include plans and notations to indicate specific wounds and damage conditions of each tree or other plants designated to remain.

1.5 QUALITY ASSURANCE

- A. Preinstallation Conference: Conduct conference at Project site.
 - 1. Review methods and procedures related to temporary tree and plant protection including, but not limited to, the following:
 - a. Construction schedule. Verify availability of materials, personnel, and equipment needed to make progress and avoid delays.
 - b. Enforcing requirements for protection zones.

- d. Field quality control.

1.6 PROJECT CONDITIONS

- A. The following practices are prohibited within protection zones:
 - 1. Storage of construction materials, debris, or excavated material.
 - 2. Parking vehicles or equipment.
 - 3. Foot traffic.
 - 4. Erection of sheds or structures.
 - 5. Impoundment of water.
 - 6. Excavation or other digging unless otherwise indicated.
 - 7. Attachment of signs to or wrapping materials around trees or plants unless otherwise indicated.
- B. Do not direct vehicle or equipment exhaust toward protection zones.
- C. Prohibit heat sources, flames, ignition sources, and smoking within or near protection zones and organic mulch.
- D. Prohibit disposal of chemical or paint remains within root zone protection areas.
- E. Topsoil: Natural or cultivated top layer of the soil profile or manufactured topsoil; containing organic matter and sand, silt, and clay particles; friable, pervious, and black or a darker shade of brown, gray, or red than underlying subsoil; reasonably free of subsoil, clay lumps, gravel, and other objects more than 1 inch in diameter; and free of weeds, roots, and toxic and other non-soil materials.
 - 1. Obtain topsoil only from well-drained sites where topsoil is 4 inches deep or more; do not obtain from bogs or marshes.
- F. Topsoil: Stockpiled topsoil from project site or imported topsoil complying with ASTM D 5268.
- G. Organic Mulch: Free from deleterious materials and suitable as a top dressing for trees and shrubs, consisting of one of the following:
 - 1. Type: Pine straw.
Color: Natural.
 - 2. Type: Hardwood Mulch
Color: Natural.
- H. Protection-Zone Fencing: Fencing fixed in position and meeting the following requirements.
 - 1. Plastic Protection-Zone Fencing: Plastic construction fencing constructed of high-density extruded and stretched polyethylene fabric with 2-inch maximum opening in pattern and weighing a minimum of 0.4 lb/ft. ; remaining flexible from minus 60 to plus 200 deg F ; inert to most chemicals and acids; minimum tensile yield strength of 2000 psi and ultimate tensile strength of 2680 psi ; secured with plastic bands or galvanized-steel or stainless-steel wire ties; and supported by tubular or T-shape galvanized-steel posts spaced not more than 8 feet apart.
 - a. Height: 4 feet.
 - b. Color: High-visibility orange, nonfading.
 - 2. Gates: Single swing access gates matching material and appearance of fencing, to allow for maintenance activities within protection zones; leaf width 36 inches.

PART 2 - PRODUCTS

N/A

PART 3 - EXECUTION

McNeese President's Residence
Improvements | 1427
19-627-21-01, F.19002606 &
01-107-05B-13, F.01004560 (Supplement)
Site Code: 5-10-004 | State ID : S05519
April 14, 2025

3.1 EXAMINATION

- A. Erosion and Sedimentation Control: Examine the site to verify that temporary erosion- and sedimentation-control measures are in place. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross protection zones.
- B. For the record, prepare written report, endorsed by arborist, listing conditions detrimental to tree and plant protection.

3.2 PREPARATION

- A. Locate and clearly identify trees, shrubs, and other vegetation to remain. Tie a 1-inch blue-vinyl tape around each tree trunk at 54 inches above the ground.
- B. Protect tree root systems from damage caused by runoff or spillage of noxious materials while mixing, placing, or storing construction materials. Protect root systems from ponding, eroding, or excessive wetting caused by dewatering operations.
- C. Tree-Protection Zones: Mulch areas inside tree-protection zones and other areas indicated.
 - 1. Apply 3-inch average thickness of organic mulch. Do not place mulch within 6 inches of tree trunks.

3.3 TREE- AND PLANT-PROTECTION ZONES

- A. Protection-Zone Fencing: Install protection-zone fencing along edges of protection zones before materials or equipment are brought on the site and construction operations begin in a manner that will prevent people and animals from easily entering protected area except by entrance gates. Construct fencing so as not to obstruct safe passage or visibility at vehicle intersections where fencing is located adjacent to pedestrian walkways or in close proximity to street intersections, drives, or other vehicular circulation.
 - 1. Fencing: 6' chain link fence panels or Approved Alternative..
 - 2. Access Gates: Install to allow for entry into tree protection zone for maintenance; adjust to operate smoothly, easily, and quietly, free of binding, warp, excessive deflection, distortion, nonalignment, misplacement, disruption, or malfunction, throughout entire operational range. Confirm that latches and locks engage accurately and securely without forcing or binding.
- B. Protection-Zone Signage: Install protection-zone signage in visibly prominent locations in a manner approved by Landscape Architect. Install one sign spaced approximately every 35 feet on protection-zone fencing, but no fewer than four signs with each facing a different direction.
- C. Maintain protection zones free of weeds and trash.
- D. Repair or replace trees, shrubs, and other vegetation indicated to remain or be relocated that are damaged by construction operations, in a manner approved by Landscape Architect.
- E. Maintain protection-zone fencing and signage in good condition as acceptable to Landscape Architect and remove when construction operations are complete and equipment has been removed from the site.
 - 1. Do not remove protection-zone fencing, even temporarily, to allow deliveries or equipment access through the protection zone.
 - 2. Temporary access is permitted subject to preapproval in writing by arborist if a root buffer effective against soil compaction is constructed as directed by arborist. Maintain root buffer so long as access is permitted.

3.4 EXCAVATION

- A. General: Excavate at edge of protection zones and for trenches indicated within protection zones according to requirements in Section 312000 "Earth Moving."
- B. Trenching near Trees: Where utility trenches are required within protection zones, hand excavate under or around tree roots or tunnel under the roots by drilling, auger boring, or pipe jacking. Do

not cut main lateral tree roots or taproots; cut only smaller roots that interfere with installation of utilities. Cut roots as required for root pruning.

- C. Redirect roots in backfill areas where possible. If encountering large, main lateral roots, expose roots beyond excavation limits as required to bend and redirect them without breaking. If encountered immediately adjacent to location of new construction and redirection is not practical, cut roots approximately 3 inches back from new construction and as required for root pruning.
- D. Do not allow exposed roots to dry out before placing permanent backfill. Provide temporary earth cover or pack with peat moss and wrap with burlap. Water and maintain in a moist condition. Temporarily support and protect roots from damage until they are permanently relocated and covered with soil.

3.5 ROOT PRUNING

- A. All pruning of roots larger than 1/2" dia. within the Protection Zone shall be performed by Southern University Landscaping Services. Contractor shall notify SU and Landscape Architect of roots requiring pruning.
- B. Prune roots that are affected by temporary and permanent construction. Prune roots as follows:
 - 1. Cut roots manually by digging a trench and cutting exposed roots with sharp pruning instruments; do not break, tear, chop, or slant the cuts. Do not use a backhoe or other equipment that rips, tears, or pulls roots.
 - 2. Cut Ends: Coat cut ends of roots more than 1-1/2 inches in diameter with an emulsified asphalt or other coating formulated for use on damaged plant tissues and that is acceptable to arborist.
 - 3. Temporarily support and protect roots from damage until they are permanently redirected and covered with soil.
 - 4. Cover exposed roots with burlap and water regularly.
 - 5. Backfill as soon as possible according to requirements in Section 312000 "Earth Moving."
- C. Root Pruning at Edge of Protection Zone: Prune roots flush with the edge of the protection zone, by cleanly cutting all roots to the depth of the required excavation.
- D. Root Pruning within Protection Zone: Clear and excavate by hand to the depth of the required excavation to minimize damage to root systems. Use narrow-tine spading forks, comb soil to expose roots, and cleanly cut roots as close to excavation as possible.

3.6 CROWN PRUNING

- A. All crown pruning shall be performed by Southern University Landscaping Services. Contractor shall notify SU and Landscape Architect of limbs requiring pruning.
- B. Prune branches that are affected by temporary and permanent construction. Prune branches as follows:
 - 1. Prune trees to remain to compensate for root loss caused by damaging or cutting root system. Provide subsequent maintenance during Contract period as recommended by arborist.
 - 2. Pruning Standards: Prune trees according to ANSI A300 (Part 1) and the following:
 - a. Type of Pruning: Cleaning Thinning Raising Reduction.
 - 3. Cut branches with sharp pruning instruments; do not break or chop.
 - 4. Do not apply pruning paint to wounds, unless otherwise specified for disease or pest control.
- C. Chip removed branches and dispose of off-site.

3.7 REGRADING

- A. Lowering Grade: Where new finish grade is indicated below existing grade around trees, slope grade beyond the protection zone. Maintain existing grades within the protection zone.
- B. Raising Grade: Where new finish grade is indicated above existing grade around trees, slope grade beyond the protection zone. Maintain existing grades within the protection zone.

3.8 FIELD QUALITY CONTROL

- A. Inspections: Engage a qualified arborist to direct plant-protection measures in the vicinity of trees, shrubs, and other vegetation indicated to remain and to prepare inspection reports.

3.9 REPAIR AND REPLACEMENT

- A. General: Repair or replace trees, shrubs, and other vegetation indicated to remain or be relocated that are damaged by construction operations, in a manner approved by Landscape Architect.
 - 1. Submit details of proposed root cutting and tree and shrub repairs.
 - 2. Have arborist perform the root cutting, branch pruning, and damage repair of trees and shrubs.
 - 3. Treat damaged trunks, limbs, and roots according to arborist's written instructions.
 - 4. Perform repairs within 24 hours.
 - 5. Replace vegetation that cannot be repaired and restored to full-growth status, as determined by Landscape Architect.
- B. Trees: Remove and replace trees indicated to remain that are more than 25 percent dead or in an unhealthy condition before the end of the corrections period or are damaged during construction operations that Landscape Architect determines are incapable of restoring to normal growth pattern.
 - 1. Provide new trees of same size and species as those being replaced for each tree that measures 6 inches or smaller in caliper size.
 - 2. Provide three new tree(s) of 6-inch caliper size for each tree being replaced that measures more than 6 inches in caliper size.
 - a. Species: Species selected by Landscape Architect.
 - 3. Plant and maintain new trees as specified in Section 329300 "Plants."
- C. Soil Aeration: Where directed by Landscape Architect, aerate surface soil compacted during construction. Aerate 10 feet beyond drip line and no closer than 36 inches to tree trunk. Drill 2-inch- diameter holes a minimum of 12 inches deep at 24 inches o.c. Backfill holes with an equal mix of augered soil and sand.

3.10 DISPOSAL OF SURPLUS AND WASTE MATERIALS

- A. Disposal: Remove excess excavated material, displaced trees, trash and debris, and legally dispose of them off Owner's property.

END OF SECTION 02 23 10

SECTION 02 30 00

SUBSURFACE INVESTIGATION

PART 1 GENERAL

1.1 SUMMARY

- A. Geotechnical Report: A copy of the geotechnical report which includes an appendix and addendum no. 1., are included after this section.
- B. Information Not Guaranteed: Information on the Drawings and in the Project Manual relating to subsurface conditions and existing utilities and structures is from information available from sources available to the Owner's engineering consultants. Such information is furnished only for the information and convenience of the Contractor, and the accuracy or completeness of this information is not guaranteed.

PART 2 PRODUCTS - NOT APPLICABLE TO THIS SECTION

PART 3 EXECUTION - NOT APPLICABLE TO THIS SECTION

END OF SECTION

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Proposed McNeese President's House Additions

Lake Charles, Louisiana

Report of Subsurface Investigation and Geotechnical Evaluation

Prepared For:
Tipton Associates
Baton Rouge, Louisiana
October 25, 2024



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BATON ROUGE OFFICE

11638 Sun Belt Court
Baton Rouge, LA 70809

Tel: (225) 751-1727
Fax: (225) 752-1467
www.soearth.com

October 25, 2024

TIPTON ASSOCIATES

449 Westmoreland Avenue
Baton Rouge, Louisiana 70806

ATTENTION: Ms. Paula Moran

REFERENCE: Report of Subsurface Investigation and Geotechnical Engineering Evaluation
Proposed McNeese President's House Additions
Lake Charles, Louisiana
SES Project No: B24-142

Dear Ms. Moran:

Southern Earth Sciences, Inc (SES) has completed the subsurface investigation and geotechnical engineering evaluation for the referenced project. This report presents our understanding of the available project information and outlines our soil-related recommendations and comments regarding construction of the proposed additions to the existing structure.

We appreciate this opportunity to be of service. Please do not hesitate to contact us if you have any questions.

Sincerely,

SOUTHERN EARTH SCIENCES, INC.

Leigh Brister, E.I.
Project Manager / Business Development
Registered, Louisiana 33949

LB/KM

Attachments



Kenny Meyn, P.E.
Regional Manager
Registered, Louisiana 24945

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APPENDIX

- Test Location Plan
- CPT Sounding Logs
- Soil Boring Logs

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1.0 PROJECT INFORMATION

Based on our understanding of the provided information, the project will consist of the additions and alterations to the existing President's House on McNeese State University's campus. The proposed project site is located at 4130 Ryan Street in Lake Charles, Louisiana.

No detailed loading, grading, and/or topographic information was available at the writing of this report; however, SES assumes that the maximum column and wall loads will not exceed 40 kips and 2.0 kips per linear foot, respectively. Furthermore, SES assumes minimal structural fill material will be required to achieve design grade for this project.

2.0 SITE DESCRIPTION

At the time of our fieldwork, the project site consisted of an existing two-story residence with surrounding patio, pavement and grass areas. Based on limited historical imagery from Google Earth which dates back to 1998, the site has remained relatively unchanged.

3.0 FIELD INVESTIGATION

The field investigation included a total of 3 test locations at the client determined locations. The test locations were identified in the field by SES personnel using the provided site plan and reference to onsite features. The locations were marked and recorded using a handheld GPS accurate to 25 feet. Specific tests and depths are presented in the table below and a Test Location Plan is attached in the **Appendix**.

TABLE 1: FIELD INVESTIGATION SCOPE

Test	Test Location	Test Type	Test Depth (feet)
CPT/B-1	Proposed Addition Footprint – South Area	CPT, Auger	35, 10
CPT/B-2	Proposed Addition Footprint – North Area	CPT, Auger	41, 10
CPT/B-3	Proposed Addition Footprint – West Area	CPT, Auger	36, 10

The CPT soundings were performed in general accordance with ASTM Specification D-5778. CPT Log sheets graphically showing the cone tip resistance, friction, equivalent SPT N-value, and interpreted soil behavior type at each sounding location are attached in the **Appendix**. Soil behavior types were interpreted from methods recommended by Robertson and Campanella. Correlations between Cone Resistance values and Standard Penetration Testing "N" values were performed according to the methods developed by Robertson, Campanella and Wightman. The soil types and stratigraphy shown on the CPT Log sheets are based upon material parameters measured and evaluated as the cone is advanced.

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The soil samples were obtained using a flight auger. The soil samples were logged and bagged and identified according to project number, test location, and depth then transported to the laboratory for testing. The depths at which samples were obtained are shown on the attached boring log of this report. All reference to depth has been made with respect to the existing ground surface encountered during our field investigation.

4.0 LABORATORY TESTING PROGRAM

A supplemental laboratory testing program was conducted to determine additional pertinent engineering characteristics of the subsurface materials. This program included visual description and classification and determination of the moisture content (ASTM D2216 *Standard Test Method for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass*) on all samples. Furthermore, selected samples were subjected to Atterberg Limit Determinations (ASTM D4318 *Standard Test Methods for Liquid Limit, Plastic Limit and Plasticity Index of Soils*). The results of these tests are found in the accompanying soil boring logs located in the **Appendix**.

5.0 SUBSURFACE CONDITIONS

The following is a general description of subsurface conditions encountered during our site investigation. The descriptions provided below are brief and generalized. Additional details on soil layers and the collected data at each test location can be found on the individual CPT Sounding and Soil Boring Logs attached in the **Appendix**. All reference to depth has been made with respect to the existing ground surface encountered during our field investigation.

Subsurface soils encountered across the project site generally consist of medium to stiff consistency compressible clays and silty clays with varying amounts of loose clayey/sandy silts in the upper 28 feet, underlain by stiff to very stiff clays and silty clays to a depth of about 41 feet, the maximum depth explored. Additional details on the collected data at each test location can be found on the individual CPT Sounding and Soil Boring Logs attached in the **Appendix**.

5.1 Groundwater

Groundwater was encountered at depths ranging from approximately 5.8 feet to 6.9 feet below existing site grades at the time of our field exploration. Groundwater depths or elevations should be verified at the time of construction for cases where groundwater variations are potentially significant for construction. Fluctuation in the groundwater table will occur due to variances in rainfall, elevation, drainage, types of soil encountered and other factors not evident at the time measurements were made. Reference to depth has been made with respect to the existing ground surface encountered at the time of our field investigation. Groundwater levels encountered at each test location at the time of our investigation are shown on the appropriate CPT Sounding and Soil Boring Logs attached in the **Appendix**.

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5.2 Presence of Expansive Soils

Based on the laboratory test results from the soil borings, the subsurface soils encountered within the site are considered to have high swelling potential. Generally, the subsurface soils with swelling potential above the ground water level and within the depths subjected to moisture content changes are expected to undergo volume change behavior and were considered in our potential vertical rise (PVR) estimation. **Potential vertical rise (PVR) values up to 1.3 inches were estimated using an applied load of 100 psf.** The PVR estimates were performed using the TEX 124E method analyzing the upper ten (10) feet of soil.

One (1) inch of PVR is generally accepted as the maximum allowable value for design and construction. However, the Structural Engineer or others should determine if these PVR values are within the acceptable limits. The estimated amount of vertical movement of a foundation or floor slab constructed on swelling clays is referred to as the Potential Vertical Rise (PVR). To reduce the potential for shrinkage and swelling of the site soils, it is important that consideration be given to reducing the potential for moisture changes of the site soils. As a minimum, positive drainage away from the new buildings should be provided. If positive drainage is not provided, water will pond around and/or below the structure and total and differential movements higher than indicated in this report may occur.

6.0 FOUNDATION RECOMMENDATIONS

Our evaluation of foundation conditions has been based on the project information and assumed foundation loadings previously described in this report and subsurface data obtained during the investigation. In evaluating the CPT soundings and auger borings, we have relied on our experience with similar soil conditions and the use of empirical correlations between standard penetration resistances and foundation performance observed in soil conditions similar to those encountered at the subject site.

Soils generally consisted of medium to very stiff clays and silty clays and loose sandy/clayey silts. With proper foundation design and subgrade improvement (i.e., limited undercutting and replacement), the reasonably competent soils encountered in the upper 10 feet will be suitable for support of light structural loadings using a shallow foundation system near existing grade, provided the allowable bearing capacity and estimated settlement is adequate. Furthermore, based on the high shrink/swell potential of the subsurface soils encountered, the use of a stiffened and reinforced BRAB Type III slab is recommended to support the proposed new structure, assuming the recommendations we've provided in this report are correctly interpreted and applied.

In the case that anticipated loading conditions for the proposed structures are too high, and the provided allowable bearing capacity and estimated settlement are not adequate, the structure should be supported by a deep foundation system. Recommendations for deep foundation systems consisting of treated timber piles and drilled shafts have also been provided in the following sections.

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6.1 Site Preparation

Based on our experience with similar site conditions, effective drainage, including ditching and positive grading, should be established across the working areas during the initial stages of site grading, and modified as necessary during construction. Once adequate site drainage is in place, the initial step in site preparation should be the complete removal of topsoil and organic-laden material, stumps and roots, debris, rubble, any existing abandoned foundations or pavement elements, and utilities, extending laterally to at least 5 feet outside of the construction area. Excavated materials should be wasted or stockpiled for use in non-structural areas.

We recommend an initial excavation depth of 1 foot below existing grade. Areas of deeper undercut are anticipated and should be planned for to remove any construction debris and foundations elements from previous development. Any over-excavated areas should be backfilled using well-compacted structural fill material placed in horizontal lifts as described below.

The exposed subgrade in areas to support pavements, structures, or fill embankments should be proof rolled with a loaded dump truck weighing 15 to 20 tons. Proof-rolling should be performed after a suitable period of dry weather to avoid degrading an otherwise acceptable subgrade and to reduce the amount of undercutting/remedial work required. Any areas that deflect excessively under the equipment and do not stabilize with further compaction should be lowered further by excavation until more stable material is reached.

In pile-supported areas, proof-rolling of the exposed subgrade is not necessary; however, it may be beneficial for pile driving operations. The stability of the subgrade may be important for consideration of access of the site by construction equipment. The exposed subgrade should still be visually inspected by a representative of the Geotechnical Engineer.

Excavations made as part of the undercutting or foundation construction should remain open for the least amount of time practical. If soils at the bottom of the excavation are disturbed, saturated, or otherwise become unstable, the excavation should be extended deeper to stable materials. Care should be taken to ensure that any soft or excessively yielding areas are undercut to firmer materials. Any demolished foundation or pavement elements and other debris should be disposed of offsite. Since the lateral and vertical extent may vary, we recommend the excavation and backfilling operation be observed by an experienced soils technician under the direct supervision of the registered project geotechnical engineer of record.

6.2 Structural Fill Recommendations

Fill material should be compacted in 8-inch (maximum) lifts to at least 95 percent of the soil's standard proctor maximum dry density as determined by ASTM D 698. In place density tests should be made at frequent intervals to measure the effectiveness of the compaction operations.

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Samples of candidate fill material should be submitted to SES prior to construction to verify that the fill material is suitable for use as structural fill and to establish compaction moisture-density relationships for use as reference for the field density testing.

Imported structural fill material shall be an inert material (non-expansive soil), free of organics (<5%) with a maximum particle size of 2 inches. Commonly available acceptable fill for this region are pumped river sand, lean clays, or clayey sands having the following material properties:

TABLE 2: STRUCTURAL FILL PARAMETERS

Soil Type	USCS Classification	Acceptance Criteria
Lean Clay	CL	Liquid Limit less than 40, Plasticity Index between 12 and 22
Pumped River Sand	SP or SP-SM	Less than 10% passing the #200 Sieve
Aggregate Base	GP	LADOTD 610 Crushed Limestone or other similarly graded recycled aggregate

6.3 Post Tensioned Slab and Grade Beam Design Parameters

Provided the site is prepared as described in this report, the proposed new additions may be supported on a post-tensioned slab-on-grade system. The following recommendations are based on the Post Tension Institute (PTI) method and apply to the new structure. It is recommended that the grading activities be such that the fill thicknesses be uniform across the plan footprint area of the building and that any fill should extend at least five feet beyond the perimeter of the building.

The grade beams/ribs should bear within at least 18 inches of properly compacted structural fill material or stiff in-situ clay soil, 18 inches below the lowest adjacent finished grade, and can be designed for an allowable bearing pressure of 800 psf.

The soil parameters for the design of a post tension slab are as follows:

1. Differential Soil Movement:

Differential Soil Movement (inches)	Existing Soil Conditions
y_m edge	0.66
y_m center	0.74

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2. Edge Moisture Variation:

Edge Moisture Variation (feet)	Existing Soil Conditions
$e_{m \text{ edge}}$	5.3
$e_{m \text{ center}}$	9.0

3. Sub-Grade Friction Coefficient, $\mu = 1.0$ (if slab is cast on sand)

$\mu = 0.75$ (if slab is cast on polyethylene sheeting)

4. Average Unconfined Compressive Strength, $q_u = 2,975$ psf

5. A Potential Vertical Rise (PVR) values of 1.3 inches was estimated at the project site for an applied pressure of about 100 psf.

These parameters were calculated following the procedures of the PTI Design of Post-Tensioned Slabs-on-Ground, 3rd Edition (2008). Potential vertical rise was calculated following the procedures of Tex-124-E method. Furthermore, they are based on correlations established with the results of the tests performed at the time of the original subsurface investigation. When specific data was not available, the most conservative values were assumed.

It should be realized that the soil differential movements presented above do not account for the influence of vegetation, such as trees and shrubs located near the foundation, which can greatly influence the foundation performance. Also, the construction of post-tensioned slabs requires close attention to detail during construction. Only contractors experienced in post-tensioned slab construction should be used on this project.

Total settlements for continuous footings up to two (2) feet in width are expected to be on the order of about one (1) inch. Settlement was estimated based on total sustained dead loads of 70% of the above recommended net allowable bearing pressure using empirical correlations between Atterberg Limits and compressibility. Please note, these settlement estimates do not account for the addition of any structural fill material. A detailed settlement analysis was beyond the scope of our services. All things being equal, differential settlements are expected to be about 50% of the total settlements. While settlement of this magnitude is generally considered tolerable for structures of the type proposed, the Structural Engineer shall confirm if these magnitudes are within tolerance limits. If not, SES shall be notified in order to provide some remedial measures and/or change the foundation type.

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The bottom of the foundation excavations must be dry, clean and free of loose, soft materials and construction debris prior to placement of steel or concrete. It should be observed by SES's Geotechnical Engineer or his representative prior to steel or concrete placement. Concrete shall be poured as quickly as possible to avoid exposure of the footing materials to moisture changes (wetting or drying). Surface run-off water should be channeled away from the excavation and not be allowed to pond. If for any reason the excavation is required to be open for more than one (1) day, it shall be protected to minimize moisture loss/gain.

6.3.1 Building Floor Slab

It is understood that a post-tensioned slab design will be used to support the building floor slab. Any soft or unstable soils encountered should be removed from the floor slab area prior to fill placement and/or floor slab construction. These soils should be replaced with properly compacted structural fill as described in this report.

In order to assist with drainage and to increase the modulus of subgrade reaction (k value), a four (4) inch thick free-draining granular mat may be used. The soil surface shall be graded to drain away from the building without low spots that can trap water prior to placing the granular drainage layer. Polyethylene sheeting should be placed to act as a vapor retarder where the floor will be in contact with moisture sensitive equipment or products such as tile, wood, carpet, etc., as directed by the design engineer. The decision to locate the vapor retarder in direct contact with the slab or beneath the layer of granular fill should be made by the design engineer after considering the moisture sensitivity of subsequent floor finishes, anticipated project conditions, and the potential effects of slab curling and cracking. The floor slabs should have an adequate number of joints to reduce cracking resulting from differential movement and shrinkage.

For subgrade prepared as recommended and properly compacted fill, a modulus of subgrade reaction (k value) of 110 pounds per cubic inch (pci) may be used in the grade slab design. If a four (4) inch granular layer is used, a modulus of subgrade reaction (k value) of 130 pounds per cubic inch (pci) may be used.

6.3.2 Floor Slab Precautions

The precautions listed below are for informational purposes for the construction of post-tensioned slab-on-grade pads. These details will not reduce the amount of movement but are intended to reduce potential damage should some settlement of the supporting subgrade take place. Some increase in moisture content is inevitable as a result of development and associated landscaping. However, extreme moisture content increases can be largely controlled by proper and responsible site drainage, building maintenance and irrigation practices.

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- Cracking of slab-on-grade concrete is normal and should be expected. Cracking can occur not only as a result of heaving or compression of the supporting soil material, but also as a result of concrete curing stresses. The occurrence of concrete shrinkage cracks and problems associated with concrete curing may be reduced and/or controlled by limiting the slump of the concrete, proper concrete placement, finishing, and curing, and by the placement of crack control joints at frequent intervals, particularly where re-entrant slab corners occur. The American Concrete Institute (ACI) recommends a maximum panel size (in feet) equal to approximately three times the thickness of the slab (in inches) in both directions. For example, joints are recommended at a maximum spacing of twelve (12) feet based on having a four-inch slab. SESI also recommends that the slab be independent of the foundation walls. Using fiber reinforcement in the concrete can also control shrinkage cracking.
- Areas supporting slabs should be properly moisture conditioned and compacted. Backfill in all interior and exterior water and sewer line trenches should be carefully compacted to reduce the shear stress in the concrete extending over these areas.

Exterior slabs should be isolated from the building. These slabs should be reinforced to function as independent units. Movement of these slabs should not be transmitted to the building foundation or superstructure.

7.0 DRIVEN PILE RECOMMENDATIONS

Alternatively, the proposed new structure may be supported on treated timber piles, and all slabs should be structurally supported by piles and pile supported grade beams. Treated timber piles will derive their capacity mainly through skin resistance and some end bearing. The provided capacities were determined using APILE 2015 software. Allowable compression and tension capacities for treated timber pile foundations are provided in the table below with an applied Factor of Safety (FOS) of 2.0 in Compression and 3.0 in Tension which requires field load tests as described further in Section 7.1. Pile lengths provided below are based on the provided/assumed information available at this time, and additional pile sizes/lengths can be provided upon request.

The allowable design capacities provided in the following Table 3 do not account for down drag reduction in pile capacity assuming that final site grading plans will require no more than 0.5-feet of fill above existing grade. If site grades will be raised more than 0.5-feet above existing grade, a reduction in allowable capacity will be necessary to account for drag force or negative side resistance that would act on the piles as a result of fill induced settlement.

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TABLE 3: ESTIMATED CAPACITIES FOR DRIVEN PILES

Pile Type	Size	Pile Length (Feet) ²	Allowable Compression Capacity (Tons) ¹	Allowable Tension Capacity (Tons) ¹
			FOS = 2.0	FOS = 3.0
Class 5 Timber Pile	8-in butt & min 6-in tip	30	7.0	4.5
		35	8.0	5.0

1. Allowable design capacities are dependent on level of field verification of installation methods.

2. Measured from existing grade.

Please note, all piles used to support the proposed structure should be the same length and tip at the same embedment depths in order to reduce potential for differential settlement. Additionally, since adjustments of the pile lengths or installation procedures may be made based on the test pile installation and load test results, we recommend the test pile program and production pile installation be performed under the supervision of the SES Project Geotechnical Engineer of Record.

Pile lengths, sizes and capacities presented are based on soil-pile interaction and do not consider the structural aspects of the pile. Pile penetration depths are measured from the existing ground surface and should be adjusted accordingly to ensure that the correct penetration depth is achieved.

7.1 ASD Design Factors

Table 4 presents the required field load testing methods and associated design factors for Allowable Stress Design (ASD) used to develop the allowable capacities provided in Table 3.

TABLE 4: RECOMMENDED FACTORS OF SAFETY

ASD Factor of Safety	Required Quality Control
2.0	Installation of probe piles and minimum one (1) static load test on each pile type & full-time monitoring of production pile installation
2.0	Installation of 2 test piles monitored with PDA testing at the time of installation and Dynamic Testing w/Signal Matching (PDA + CAPWAP) on a 14- day restrike of the pile(s) & full-time monitoring of production pile installation
3.0	All tension capacities unless a tension static load test is performed

7.2 Driven Pile Installation Considerations

All pile driving operations shall be performed under experienced supervision and with efficiently operating mechanical equipment. The hammer selection is the responsibility of the contractor and

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shall be adequately large enough to reach proposed tip elevations and develop the required capacities but taking into account the potential vibrations resulting from pile driving operations.

Piles in large groups should be driven from the center outward. Any piles which have heaved a quarter of an inch ($\frac{1}{4}$ ") or more during driving of subsequent piles shall be re-driven to their original final resistance or their original embedment if originally driven to full penetration.

In no case shall the contractor be allowed to change pile driving equipment, pile types and or sizes without written approval from SES's Geotechnical Engineer.

7.3 Preliminary Drivability Analysis (Driven Piles)

Once the pile diameter has been selected or narrowed to a couple of options, we recommend that a Preliminary Drivability Analysis be conducted to develop a general idea of minimum pile hammer energy requirements for installation of driven piles on this project. The analysis should be performed using the GRL Wave Equation Analysis Program (WEAP). GRLWEAP is a computer program which simulates motions and forces in a foundation pile when driven by either an impact hammer or vibratory hammer. The program computes the blow count (number of blow/unit length of permanent set) of a pile under one or more assumed ultimate resistance values and other dynamic soil resistance parameters, given a hammer and associated driving system.

Additionally, GRLWEAP computes the internal axial stress in a pile, both tension and compression averaged over the cross-section for a certain pile penetration and associated ultimate capacity values, the energy transferred by the hammer to pile and the velocity and displacements along the pile for certain pile penetration and associated capacity values. A final drivability analysis would be necessary after contract award to evaluate the contractor's proposed hammer configuration.

7.3.1 Vibration Monitoring (Driven Piles)

Infrastructure, underground utilities, and nearby structures can be damaged by vibrations and subsidence caused by vibrations during pile driving. If piles will be driven near existing settlement sensitive buildings or infrastructure or if concrete forming and pouring will commence while pile driving operations continues, monitoring ground vibrations during installation of the foundation system using a seismograph should be considered. We will be available upon request to assist with monitoring vibrations and assessing pile installation technique alterations if needed to help reduce vibrations.

Thresholds of vibration induced cracking are generally site specific and depend on the type and age of the structure, the frequency of ground vibration, and the type of soil supporting the structure. We will be available upon request to assist with monitoring vibrations and assessing pile installation technique alterations if needed to help reduce vibrations.

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7.3.2 Driven Test Pile Program

We recommend installing at least one (1) probe pile in the proposed foundation area. If tension capacity is critical to design, plans should be made to install an additional test pile for Static Tension Load testing as tension testing of a compression test pile that has been tested in compression is not recommended. Driven probe piles may be installed in production pile locations and used as production piles as long as they are not damaged during testing. The number of test piles and locations are to be determined as part of the Final Pile Load Test Program design. SES should be consulted to collaborate with the design team to establish detailed Pile Load Test Program recommendations upon request.

7.3.3 High Strain Dynamic Testing (PDA)

To develop a correlation between dynamic testing data and static load test results and to efficiently evaluate capacity of installed driven piles that will not be statically tested, we recommend installing all test and probe pile using High Strain Dynamic Testing (PDA) in accordance with ASTM D4945 - Standard Test Method for High Strain Dynamic Testing of Deep Foundations. We recommend 24-hour and potentially 7-day re-strike PDA Testing on all Probe/Test Piles. Capacity analysis of the PDA data using the Case Method Pile Wave Analysis Program (CAPWAP) should be performed on all probe piles at end of initial drive and at beginning of both re-strikes. The pile to be static load tested in compression will be selected based on our review of the probe pile installation logs, PDA data and CAPWAP Analysis.

All test piles, equipment and installation procedures should be the same as those to be used during production pile installation. Pile load test results and/or PDA results would be used to verify the placement procedures and that the pile section produces the desired design capacity. The test piles, equipment, and installation procedures should be the same as those planned for use in the foundation. Since adjustments of the pile lengths or installation procedures may be made based on the test pile installation and load test results, we recommend the test pile program and production pile installation be performed under the supervision of the SES Project Geotechnical Engineer of Record.

7.4 Individual Pile Settlement

Settlement of individual timber piles installed to the recommended tip elevation and loaded to the allowable design capacities in the previous Table is expected to be less than one (1) inch due to structural loads. Detailed structural loading information and pile cap layouts were not available at this time. Estimated settlement is based on the assumption that minimal structural fill material will be placed above existing grade and therefore will be no 'down drag' effect on the piles. **Please note, if more than 0.5-feet of fill material is anticipated to achieve design grade, SES must be notified to reevaluate our recommendations.**

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7.5 Group Efficiency

For this project, we recommend installing piles at a minimum center to center spacing of 3 pile diameters. A reduction in capacity due to group effects at this spacing should not be required. We recommend using a group efficiency factor of 1.0. We will be available to confirm once pile type, pile loading, pile tip elevations and pile cap configurations have been established.

7.6 Static Load Testing

Static compression load testing should be conducted to failure or 3 times the design compression load (without down-drag reduction). Reinforcement should be designed to facilitate Static Tension load testing to at least 2 times the design tension load. The reaction frame and pile reinforcement should be designed by a Registered Professional Structural Engineer prior to load testing. Static Lateral Load Testing may be performed on either the compression or tension test pile if critical to the design. SES will be available to discuss the load test program as needed once additional project information is developed.

Static compressive load test procedures should be as described in ASTM Specification D 1143. The test procedure will be to apply units of load and obtain pile deflection readings over a period of time at each load increment until the specified load is reached. The load shall be removed in prescribed units and intervals of time. Static Tension Load Test procedures are described in ASTM Specification D 3689.

All test piles, equipment and installation procedures should be the same as those to be used during production pile installation. Pile load test results would be used to verify the placement procedures and that the pile section produces the desired design capacity. Since adjustments of the pile lengths or installation procedures may be made based on the test pile installation and load test results, we recommend the test pile program and production pile installation be performed under the supervision of the SES Project Geotechnical Engineer of Record.

8.0 DRILLED SHAFT FOUNDATION RECOMMENDATIONS

A drilled shaft foundation system was also evaluated to support the proposed structure, and all slabs should be structurally supported by piles and pile supported grade beams. Analysis was performed based on the CPT soundings and laboratory test data with regard to straight-sided drilled shaft foundations for support of the proposed structures.

Drilled shafts generally derive the majority of their capacity through a combination of side resistance and some end bearing. The provided capacities were determined using SHAFT 2015 software. Allowable compression and tension capacities for straight-sided drilled shafts are provided in the table below with an applied Factor of Safety (FOS) of 2.0 in Compression and 3.0 in Tension which requires field load tests and full-time monitoring as described further in Table 6. Please note, if a static load test is not economical

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for this project, a factor of safety of 3.0 in compression must be applied to the capacities presented in the table below.

Shaft lengths provided below are based on the provided/assumed information available at this time, and additional shaft sizes/lengths can be provided upon request.

TABLE 5: ESTIMATED DRILLED SHAFT AXIAL CAPACITIES

Shaft Embedment Depth (feet) ²	Allowable Compression Capacities (tons) ¹			Allowable Tension Capacities (tons) ¹		
	FOS = 2.0			FOS = 3.0		
	Shaft Diameters (inches)					
	12	18	24	12	18	24
30	13.0	20.0	27.0	8.5	13.0	17.0
35	17.5	26.5	35.5	11.5	17.0	23.0

1. Shaft lengths, sizes and capacities presented are based on soil-pile interaction and do not consider the structural aspects of the shaft.
2. Shaft penetration depths are measured from the existing ground surface and should be adjusted accordingly to ensure that the correct penetration depth is achieved.

8.1 ASD Design Factors

Table 6 presents the required field load testing methods, and associated design factors for Allowable Stress Design (ASD) used to develop the allowable capacities provided in Table 5.

TABLE 6: RECOMMENDED FACTORS OF SAFETY

FOS	Required Quality Control
2.0	One (1) static load test & full-time monitoring of production shaft installation
2.5	No load test & full-time monitoring of production shaft installation
3.0	All tension capacities unless a tension static load test is performed

8.2 Drilled Shaft Considerations

Due to the relatively shallow groundwater level at the project site, the need for casing or drilling slurry to install the proposed shafts below a depth of about five (5) feet may be needed. It is the Contractor's responsibility to ensure the drilled shafts are properly installed to the plan tip elevation and shall determine if casing or drilling slurry will be required to do so prior to installation. Concrete placement should be performed by tremie methods. It may be required to utilize steel casing in order to prevent

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sloughing of soils and excessive water intrusion into the borehole. All aspects of drilled shaft construction, including quality control, should be conducted in accordance with the manual titled Drilled Shafts: Construction Procedures and Design Methods (Pub. No. FHWA-IF-99-025, August 1999). Detailed inspection of shaft construction should be made to verify that the shafts are vertical and founded in the proper bearing stratum and to verify that all loose and soft materials have been removed prior to concrete placement.

The successful completion of drilled pier excavations will depend on the suitability of the drilling equipment together with the skill of the operator. The sequence of operations should be scheduled so that each pier can be drilled, reinforcing steel placed, and the concrete poured in a continuous, rapid, and orderly manner to reduce the time that the excavation is open.

Where water inflow or caving soils are encountered, excavation of shafts and placement of concrete within a very short time frame will frequently aid in proper shaft construction. It is recommended that concrete be readily available on-site prior to beginning any shaft excavation. Installation of drilled shafts below the groundwater level may require slurry techniques to prevent collapse of the borehole and concrete placement should be by tremie. It may be required to utilize steel casing in order to prevent sloughing of soils and excessive water intrusion into the bore hole.

We recommend that SES's Geotechnical Engineer or his representative observe the installation of the shafts to verify that, among other things, 1) subsurface conditions are as anticipated from the boring, 2) the shafts are constructed to the proper diameter, penetration and plumbness, 3) reinforcing is properly placed and centered in the open shaft, and 4) proper concrete placement. These critical items are fundamental to proper performance of shafts in accordance with design recommendations.

8.3 Individual Drilled Shaft Settlement

The estimated settlements of individual shafts properly installed to the recommended design depths and loaded to the allowable design capacities in the previous table are estimated to be less than one (1) inch due to structural loads. Estimated settlement is based on the assumption that minimal structural fill material will be placed above existing grade and therefore will be no 'down drag' effect on the piles. **Please note, if more than 0.5-feet of fill material is anticipated to achieve design grade, SES must be notified to reevaluate our recommendations.**

8.4 Group Efficiency

For this project, we recommend installing shafts at a minimum center to center spacing of three (3) shaft diameters. A reduction in capacity due to group effects should not be required at this spacing and with the shaft cap in firm contact with the soil. If the shaft cap will not be in firm contact with the soil, group effects could result in additional reduction of the shaft capacities and should be evaluated

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accordingly once actual shaft length and layout are known. We recommend using a group efficiency factor of 1.0. We will be available to confirm once shaft type, loading, shaft tip elevations and shaft/pile cap configurations have been established.

8.5 Shaft Load Testing

Prior to the installation of production shafts, it is recommended that shaft capacities be verified by field load tests. If different shaft types and/or of varying sizes should be used, then it is recommended that shaft capacity for each shaft type be verified by a field load test. SES recommends performing at least one (1) static load test situated within the footprint of each proposed structure.

Static compression load testing should be conducted to failure or 3 times the design compression load (without down-drag reduction) in the proposed foundation area. Reinforcement should be designed to facilitate Static Tension load testing to at least 2 times the design tension load. The reaction frame and pile reinforcement should be designed by a Registered Professional Structural Engineer prior to load testing. Static Lateral Load Testing may be performed on either the compression or tension test shaft if critical to the design. We will be available to discuss the load test program as needed once additional project information is developed.

Static compressive load test procedures should be as described in ASTM Specification D 1143. The test procedure will be to apply units of load and obtain pile deflection readings over a period of time at each load increment until the specified load is reached. The load shall be removed in prescribed units and intervals of time. Static Tension Load Test procedures are described in ASTM Specification D 3689.

All test shafts, equipment and installation procedures should be the same as those to be used during production shaft installation. Shaft load test results would be used to verify the placement procedures and that the shaft section produces the desired design capacity. Since adjustments of the shaft lengths or installation procedures may be made based on the test pile installation and load test results, we recommend the test pile program and production pile installation be performed under the supervision of the SES Project Geotechnical Engineer of Record.

9.0 CLOSE PROXIMITY TO EXISTING BUILDINGS

There is a significant potential for differential movement to occur between the existing and new structures. The location and type of existing foundations should be determined so that the proposed excavations and construction do not damage the existing structures. Excavations planned in close proximity to existing structures should be performed in short sections or secured with sheet piling. Due to the close proximity of the new construction to existing buildings significant overlapping stresses can occur between the new and existing foundations. As such, we recommend that the new foundations be placed at a distance of at least three (3) times the footing width from the old foundations.

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In addition, the contractor should determine the actual water levels at the time of construction. If dewatering is required, the contractor should pay close attention to not dewater the site below the bottom of foundation systems of the existing adjacent structures. Dewatering of the site below these foundation systems may result in settlement of the existing structures.

10.0 GENERAL COMMENTS AND LIMITATIONS

While the CPT soundings and auger borings are representative of subsurface conditions at the respective locations and for the respective vertical reaches, local variations characteristic of the subsurface materials of the region are anticipated and may be encountered. The delineation between soil types shown on the logs are approximate and the description represents our interpretation of subsurface conditions at the designated testing location and on the particular date performed.

This report has been prepared in order to aid in the evaluation of this project and to assist the engineers in the structural design. It is intended for use with regard to the specific project discussed herein and any substantial changes in the project, loads, locations, or assumed grades should be brought to our attention so that we may determine how such changes may affect our conclusions and recommendations. We would appreciate the opportunity to review the plans and specifications for construction to ensure that our conclusions and recommendations are interpreted correctly.

Professional judgments on design alternatives and criteria are presented in this report. These are based partly on our evaluations of technical information gathered, partly on our understanding of the characteristics of the project being planned, and partly on our general experience with subsurface conditions in the area. We do not guarantee performance of the project in any respect, only that our engineering work and judgments rendered meet the standard of care of our profession.

As the project geotechnical engineer of record that developed the foundation design recommendations, please be aware that we cannot accept responsibility for the performance of the foundation system if we are not afforded the opportunity to confirm that our recommendations have been followed. Accordingly, we recommend that Southern Earth Sciences, Inc. be retained on this project to perform observation and field-testing services during the construction phase of the foundation system.

This report is exclusively for the use and benefit of the addressee(s) identified on the first page of this report and is not for the use or benefit of, nor may it be relied upon by any other person or entity. The contents of this report may not be quoted in whole or in part or distributed to any person or entity other than the addressee(s) hereof without, in each case, advanced written consent.

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APPENDIX

Test Location Plan

CPT Sounding Logs

Soil Boring Logs



PROPOSED MCNEESE PRESIDENT'S HOUSE ADDITIONS
LAKE CHARLES, LOUISIANA
SES FILE NO.: B24-142



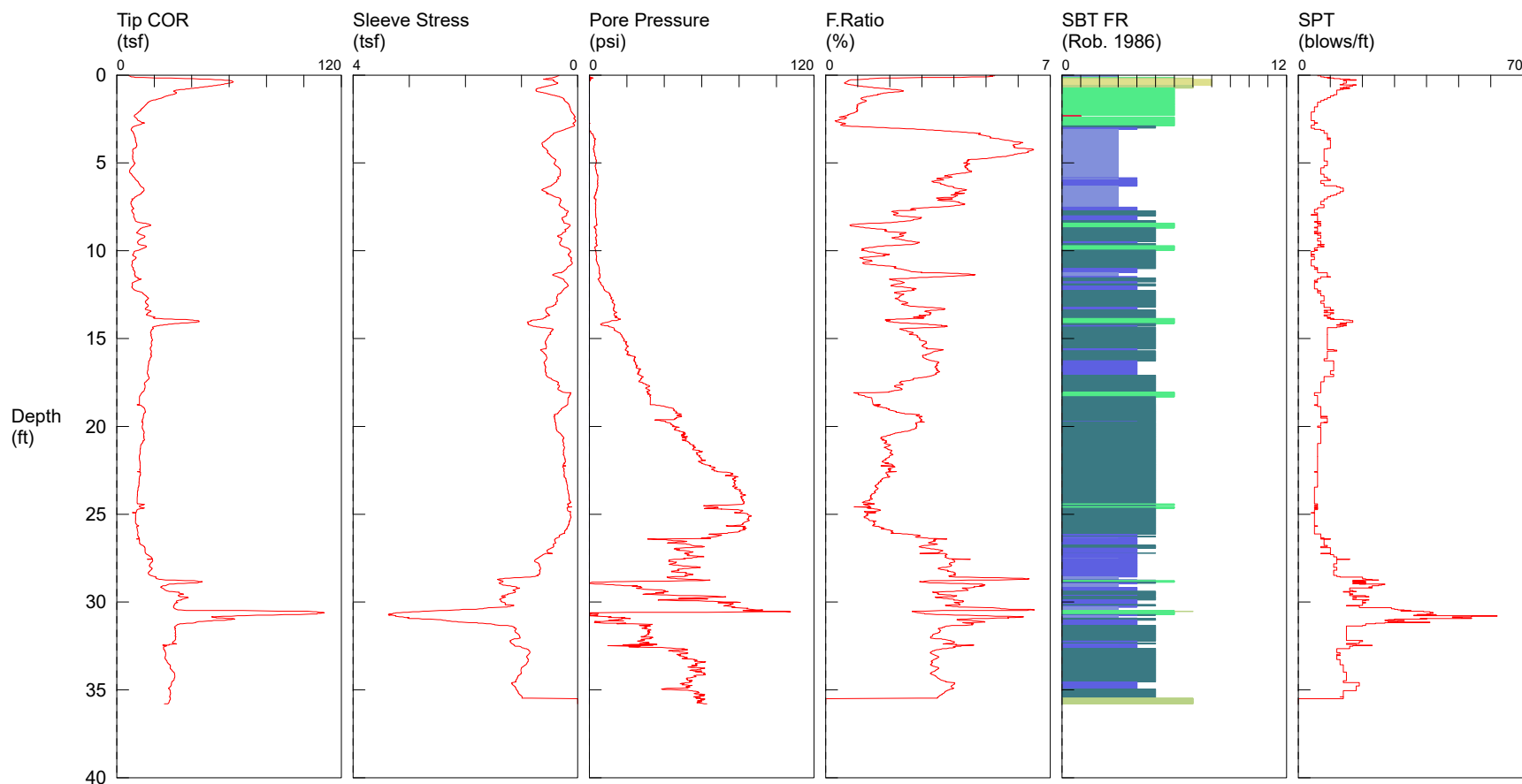
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FIGURE 1
TEST LOCATION PLAN

CPT-1

OPERATOR: JOSH LEE
TOTAL DEPTH: 35.794 ft
CONE ID: DSG1034
GPS (LAT,LON): 30°10'54.17"N, 93°13'9.10"W

TEST DATE: 10/8/2024 10:26:52 AM
LOCATION: MCNEESE PRESIDENT'S HOUSE ADDITIONS
JOB NUMBER: B24-142
WATER LEVEL: 6.5 ft



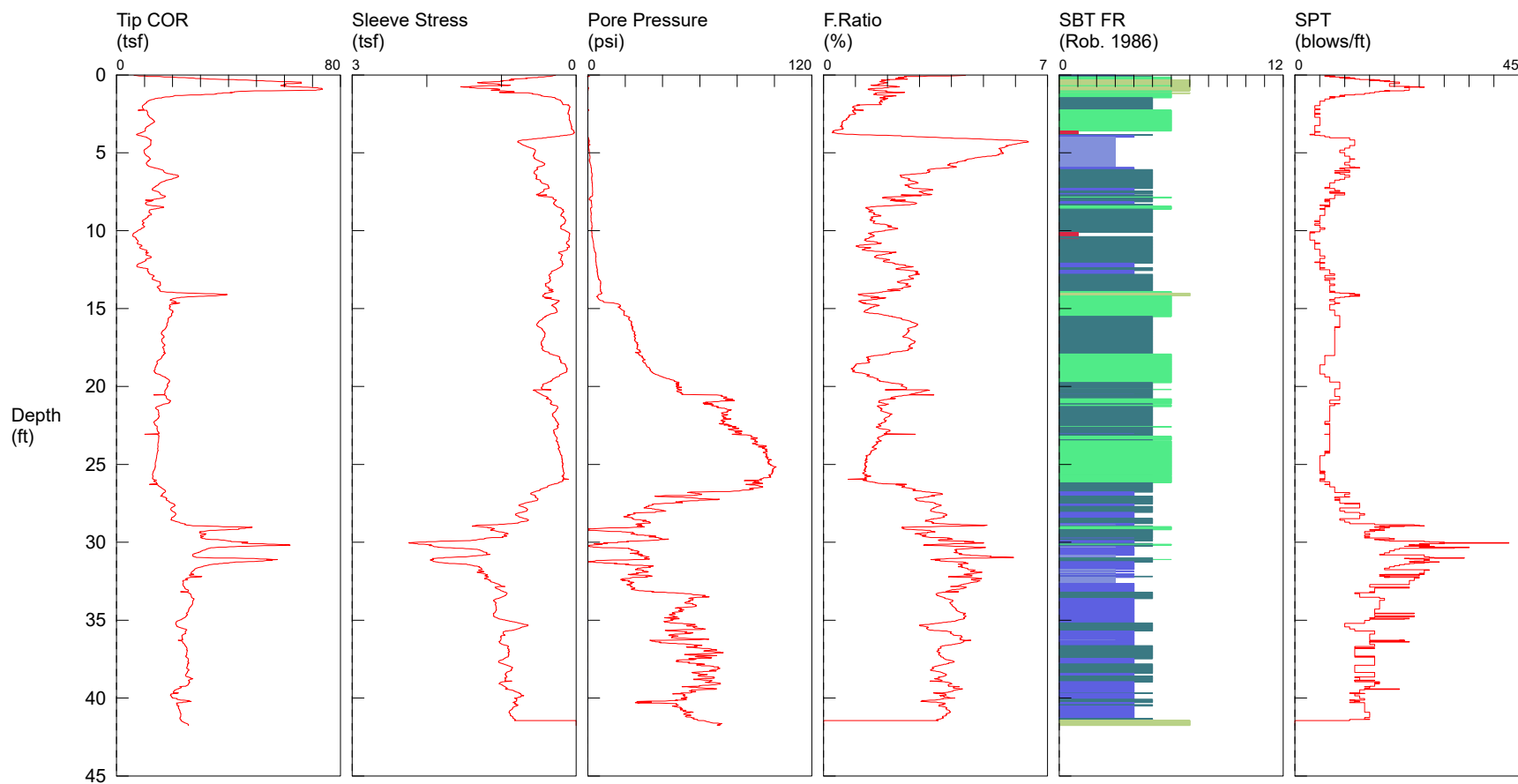
1 Sensitive fine grained	4 Silty clay to clay	7 Silty sand to sandy silt	10 Gravelly sand to sand
2 Organic material	5 Clayey silt to silty clay	8 sand to silty sand	11 Very stiff fine grained **
3 Clays	6 Sandy silt to clayey silt	9 Sand	12 Sand to clayey sand **

*SBT: Robertson 1986; **Overconsolidated or Cemented; *SBT/SPT CORRELATION: UBC-1983

CPT-2

OPERATOR: JOSH LEE
TOTAL DEPTH: 41.765 ft
CONE ID: DSG1034
GPS (LAT,LON): 30°10'54.77"N, 93°13'9.25"W

TEST DATE: 10/8/2024 11:22:34 AM
LOCATION: MCNEESE PRESIDENT'S HOUSE ADDITION
JOB NUMBER: B24-142
WATER LEVEL: 6.9 ft



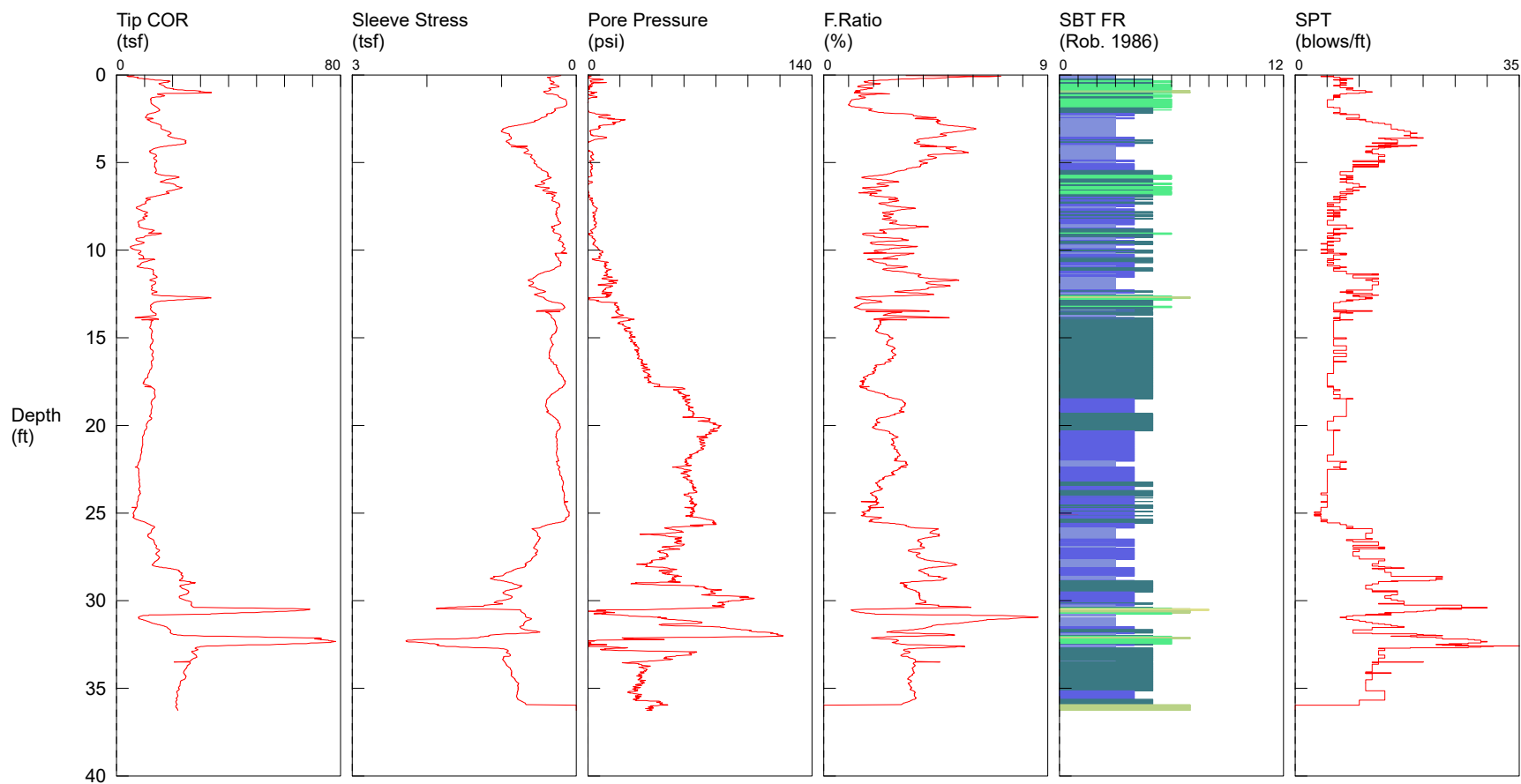
1 Sensitive fine grained	4 Silty clay to clay	7 Silty sand to sandy silt	10 Gravelly sand to sand
2 Organic material	5 Clayey silt to silty clay	8 sand to silty sand	11 Very stiff fine grained **
3 Clays	6 Sandy silt to clayey silt	9 Sand	12 Sand to clayey sand **

*SBT: Robertson 1986; **Overconsolidated or Cemented; *SBT/SPT CORRELATION: UBC-1983

CPT-3

OPERATOR: JOSH LEE
TOTAL DEPTH: 36.253 ft
CONE ID: DSG1034
GPS (LAT,LON): 30°10'54.52"N, 93°13'9.76"W

TEST DATE: 10/8/2024 9:55:22 AM
LOCATION: MCNEESE PRESIDENT'S HOUSE ADDITION
JOB NUMBER: B24-142
WATER LEVEL: 5.8 ft



1 Sensitive fine grained	4 Silty clay to clay	7 Silty sand to sandy silt	10 Gravelly sand to sand
2 Organic material	5 Clayey silt to silty clay	8 sand to silty sand	11 Very stiff fine grained **
3 Clays	6 Sandy silt to clayey silt	9 Sand	12 Sand to clayey sand **
- *SBT: Robertson 1986; **Overconsolidated or Cemented; *SBT/SPT CORRELATION: UBC-1983

BORING LOG

BORING NO.: B-1

PROJECT: MCNEESE PRESIDENT'S HOUSE ADDITIONS

PROJECT LOCATION: LAKE CHARLES, LA

BORING LOCATION: 30°10'54.17"N, 93°13'9.10"W

BORING ELEVATION: EXISTING GRADE

GEOL/ENGR: KM

METHOD: FLIGHT AUGER

PROJECT NO.: B24-142

DATE DRILLED: 10/08/24

DATE COMPLETED: 10/08/24

DEPTH TO WATER LEVEL: 6.5 ft

WATER LEVEL DATE: 10/08/24

LOGGED BY: JL

DRILLER: SES

DEPTH (FEET)	SAMPLE	Moisture Content (%)	LL	PI	SYMBOL	MATERIAL CLASSIFICATION
1		17	41	23		Brown LEAN CLAY (CL)
2						
3		18				
4						
5						
6		25	52	32		Tan FAT CLAY (CH)
7						
8						
9		27				
10						Bottom at 10 Feet
11						
12						
13						
14						
15						

COMMENTS:
☒ AUGER


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BORING LOG

BORING NO.: B-2

PROJECT: MCNEESE PRESIDENT'S HOUSE ADDITIONS

PROJECT LOCATION: LAKE CHARLES, LA

BORING LOCATION: 30°10'54.77"N, 93°13'9.25"W

BORING ELEVATION: EXISTING GRADE

GEOL/ENGR: KM

METHOD: FLIGHT AUGER

PROJECT NO.: B24-142

DATE DRILLED: 10/08/24

DATE COMPLETED: 10/08/24

DEPTH TO WATER LEVEL: 6.9 ft

WATER LEVEL DATE: 10/08/24

LOGGED BY: JL

DRILLER: SES

DEPTH (FEET)	SAMPLE	Moisture Content (%)	LL	PI	SYMBOL	MATERIAL CLASSIFICATION
1		17				Brown LEAN CLAY (CL)
2						
3						
4		20	45	26		
5						Tan FAT CLAY (CH)
6		25				
7						
8						
9		29	56	35		
10						Bottom at 10 Feet
11						
12						
13						
14						
15						

COMMENTS:
☒ AUGER


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BORING LOG

BORING NO.: B-3

PROJECT: MCNEESE PRESIDENT'S HOUSE ADDITIONS

PROJECT LOCATION: LAKE CHARLES, LA

BORING LOCATION: 30°10'54.52"N, 93°13'9.76"W

BORING ELEVATION: EXISTING GRADE

GEOL/ENGR: KM

METHOD: FLIGHT AUGER

PROJECT NO.: B24-142

DATE DRILLED: 10/08/24

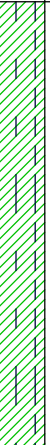
DATE COMPLETED: 10/08/24

DEPTH TO WATER LEVEL: 5.8 ft

WATER LEVEL DATE: 10/08/24

LOGGED BY: JL

DRILLER: SES

DEPTH (FEET)	SAMPLE	Moisture Content (%)	LL	PI	SYMBOL	MATERIAL CLASSIFICATION
1		16	40	24		Brown LEAN CLAY (CL)
2						
3						
4		20				
5						
6		26				Tan FAT CLAY (CH)
7						
8						
9		27	56	34		
10						Bottom at 10 Feet
11						
12						
13						
14						
15						

COMMENTS:
☒ AUGER


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CONSTRUCTION MATERIALS TESTING

Full Range of Services and Unparalleled Response

Southern Earth Sciences, Inc. laboratories are certified by AASHTO, AMRL, CMEC and the U.S. Army Corps of Engineers to perform soil, concrete, asphalt and materials testing. Our professional inspectors and technicians continually participate in proficiency testing programs to ensure internal quality control.

FIELD TESTING AND INSPECTION

In addition to our laboratory testing facilities, SESI maintains a fully outfitted mobile field laboratory available for on-site testing. This allows our OSHA safety certified technicians to perform both call-out services on small projects or full-time quality control testing and inspection on major projects. The on-site testing lab offers a full range of services.

Services

- Dipstick technology for flatness testing of concrete slabs
- Soil testing—compaction, pile load testing, pile and caisson inspection, plate load bearing tests
- Asphaltic concrete testing—core density and thickness, evaluation of aggregates, mix designs, plant and field control
- Portland cement concrete—batch plant and field control, core drilling, molding, curing and testing cylinders
- Slump testing, air content and unit weight
- Pipe and block inspection
- Soundness and abrasion of aggregates
- Bridge inspection
- Pile integrity testing
- Pile dynamic analysis (PDA)
- Vibration monitoring
- Rebar location/depth of cover
- Post tensioning inspection
- Welding and steel framing inspections



LABORATORY TESTING OF MATERIALS

Strategically located laboratories make testing of soils, concrete, asphalt and metals quick and convenient. Branch managers supervise all lab operations in accordance with ASTM Specifications E-329 and E-699. All equipment is calibrated annually to ensure accurate data. SESI technicians are certified by appropriate accrediting agencies on a routine basis.

Services

- Consolidation testing
- Flexible wall permeability testing
- Triaxial testing
- Soil classification testing
- Concrete strength testing
- Steel strength testing



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SECTION 02 41 00

DEMOLITION

PART 1 GENERAL

1.1 SUMMARY

- A. Provide demolition activities.

1.2 SUBMITTALS

- A. Schedule: Submit for approval selective demolition schedule, including schedule and methods for capping utilities to be abandoned and maintaining existing utility service.

1.3 QUALITY ASSURANCE

- A. Codes and Regulations: Comply with governing codes and regulations. Use experienced workers.

1.4 PROJECT CONDITIONS

- A. Occupancy: Areas of work will not be occupied during demolition.
- B. Existing Conditions: No responsibility for buildings and structures to be demolished will be assumed by the Owner.

PART 2 PRODUCTS

2.1 DEMOLITION APPLICATIONS

A. Selective Site Demolition:

1. Application: Demolition of designated building structures.
2. Application: Demolition of designated improvements including paving, curbing, site walls, and utility structures.
3. Application: Demolition of below-grade foundations and site improvements to depth to avoid conflict with new construction or site work.
4. Application: Removal of hollow items or items which could collapse.
5. Application: Salvage of designated items.
6. Application: Protection of site work and adjacent structures.
7. Application: Disconnection, capping, and removal of utilities.
8. Application: Pollution control during building demolition, including noise control.
9. Application: Removal and legal disposal of materials.
10. Protection: Designated site improvements and adjacent construction.
11. Salvage: Designated items.
12. Utilities: Interruption, capping or removal as applicable.
13. Hazardous Materials: See Enclosed Asbestos-Containing Materials Report Following this Section with areas of concern identified.

B. Selective Building Demolition:

1. Application: Selective demolition of interior partitions, systems, and building components

- designated to be removed.
2. Application: Selective demolition of exterior facade, structures, and components designated to be removed.
 3. Application: Protection of portions of building adjacent to or affected by selective demolition.
 4. Application: Removal of abandoned utilities and wiring systems.
 5. Application: Notification to Owner of schedule of shut-off of utilities which serve occupied spaces.
 6. Application: Pollution control during selective demolition, including noise control.
 7. Application: Removal and legal disposal of materials.
 8. Protection: Designated site improvements and adjacent construction.
 9. Salvage: Designated items.
 10. Utilities: Interruption, capping or removal as applicable.
 11. Hazardous Materials: Removed as a part of this contract. See architectural drawings and related specification sections for scope of work.

PART 3 EXECUTION

3.1 SELECTIVE DEMOLITION

- A. Demolition Operations: Do not damage building elements and improvements indicated to remain. Items of salvage value, not included on schedule of salvage items to be returned to Owner, shall be removed from structure. Storage or sale of items at project site is prohibited.
- B. Utilities: Locate, identify, disconnect, and seal or cap off utilities in buildings to be demolished.
- C. Shoring and Bracing: Provide and maintain interior and exterior shoring and bracing.
- D. Occupied Spaces: Do not close or obstruct streets, walks, drives or other occupied or used spaces or facilities without the written permission of the Owner and the authorities having jurisdiction. Do not interrupt utilities serving occupied or used facilities without the written permission of the Owner and authorities having jurisdiction. If necessary, provide temporary utilities.
- E. Operations: Cease operations if public safety or remaining structures are endangered. Perform temporary corrective measures until operations can be continued properly.
- F. Security: Provide adequate protection against accidental trespassing. Secure project after work hours.
- G. Restoration: Restore finishes of patched areas.

3.2 SCHEDULE

- A. Items for Protection During Demolition and Construction: (The following are samples only)
 1. Designated site improvements, trees, and plantings.
 2. Adjacent construction.
- B. Items to be Salvaged for Reinstallation:
 1. There are no items on the existing site or in the existing building to be salvaged for reinstallation into the new project.

C. Items to be Salvaged for Delivery to Owner:

1. There are no items on the existing site or in the existing building to be salvaged for delivery to the Owner. All items will be removed by the Owner prior to the Contractor starting the project.

D. Utilities Requiring Interruption, Capping, or Removal:

1. Refer to drawings and other specification sections regarding required utility related work.

END OF SECTION

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SECTION 03 10 00

CONCRETE FORMWORK AND FORM ACCESSORIES

PART 1 - GENERAL

1.01 DESCRIPTION

This section covers design, construction, and treatment of formwork to confine and shape concrete to the required dimensions.

1.02 REFERENCE STANDARDS

ACI 117
ACI 301
ACI 318
ACI 347
ASTM C31
ASTM C39
ASTM D994
ASTM D1751
ASTM D1752
FS-SS-S-00210

1.03 SUBMITTALS

- A. Formwork Release Agent: Submit data on the Formwork release agent proposed for use with each form surface to be used for acceptance unless otherwise specified in the Contract Documents.
- B. Shop Drawings: When required by Contract Documents, submit shop drawings for Formwork.
- C. Reshoring: When reshoring is permitted or required, submit for acceptance the plan of reshoring procedures and operations in advance.
- D. Control Joints: If control joints other than those indicated on Contract Documents are desired, submit request for acceptance.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Form-facing material shall be plywood, tempered concrete-form-grade hardboard, metal, plastic, paper or other acceptable material capable of producing the desired finish. Form-facing material shall produce a smooth, uniform texture on the concrete. Do not use form-facing material with raised grain, torn surfaces, worn edges, patches, dents, or other defects that will impair the texture of concrete surfaces.

- B. Formwork Accessories: Use commercially manufactured accessories for formwork accessories that are partially or wholly embedded in concrete, including ties and hangers. Do not use non-fabricated wire form ties. Where indicated in the Contract Documents, use form ties with integral water barrier plates in walls.
- C. Formwork Release Agents: Use commercially manufactured form release agents that will prevent formwork absorption of moisture, prevent bond with concrete, and not stain the concrete surfaces.
- D. Expansion Joint Filler: Pre-molded expansion joint filler shall conform to ASTM D994, ASTM D 1751, or ASTM D 1752.
- E. Other Embedded Items: Sleeves, inserts, anchors, and other embedded items shall be of the material and design indicated in the Contract Documents.
- F. Water Stops: Water stop materials shall meet requirements of FS SS-S-00210 and shall have a cross sectional area of approximately on (1) square inch.
- G. Foam Board: Lightweight inert compressible materials with a maximum density of 1.5 #/cu. ft. Foam board shall cover the full width of the member above.
- H. Cardboard Form Boxes: Form boxes are double wall corrugated fiber boards, laminated with water resistant adhesives and impregnated with waterproofing agents. Assembled units shall be capable of safely supporting a sustained 350 #/sq. Ft. for a minimum of 36 hours after concrete has been placed. Provide all accessories to prevent concrete intrusion into the form boxes. Assemble per manufacturer's recommendations. Product shall be equal to SlabVoid as manufactured by Sure Void.

2.02 PERFORMANCE AND DESIGN REQUIREMENTS

- A. Design and engineering of formwork shall be the responsibility of the Contractor. When required by the Contract Documents, design of formwork and preparation of formwork drawings shall be under the supervision of a professional engineer registered in the state where the work will be done.
- B. Design formwork for construction loads, lateral pressure, and requirements of the applicable building code. Design formwork to withstand the pressure resulting from placement and vibration of concrete and to maintain specified tolerances.
- C. Do not use earth cuts as forms for vertical or sloping surfaces unless required or permitted by Contract Documents. Foundation grade beams are permitted to be earth formed.
- D. Maximum deflection of facing materials reflected on concrete surfaces exposed to view shall be 1/240 of the span between structural members of the formwork except for architectural concrete.
- E. Locate and detail formed joints to the following requirements:
 - 1. Locate and form construction joints that least impair strength of the structure, and submit information for acceptance of proposed location and treatment of

construction joints that are not indicated on the project drawings. In general, locate construction joints near the middle of the spans of slabs, beams, and girders. When a beam intersects a girder at this point, the joint in the girder shall be offset a distance equal to or greater than twice the width of the beam. Locate joints in walls and columns at the underside of floors, slabs, beams, or girders and at the tops of footings or floor slabs. Make joints perpendicular to the main reinforcement.

2. Provide keyways as indicated on Contract Documents. Where longitudinal keyways are indicated on the Contract Documents, make them a minimum of 1 ½ in. deep joints in walls and between walls and slabs or footings.
 3. Provide control joints where indicated on the Contract Documents. The location of control joints other than those indicated on the Contract Documents shall be submitted for acceptance.
- F. For smooth form finish, arrangement of the facing material shall be orderly and symmetrical, with the number of seams kept to a practical minimum. Support facing material with studs or other backing capable of preventing excessive deflection within the tolerances specified.

2.03 FABRICATION AND MANUFACTURE

- A. Formwork shall be tight to prevent loss of mortar from concrete. Provide watertight formwork when architectural concrete is specified.
- B. Place 3/4 in. minimum chamfer strips in the corners of formwork to produce beveled edges on permanently exposed surfaces unless otherwise specified. Do not bevel re-entrant corners or edges of formed joints of concrete unless specified in the Contract Documents.
- C. Provide temporary openings at the base of column and wall formwork and at other points where necessary to facilitate cleaning and inspection. Clean and inspect immediately before concrete is placed.
- D. Fabricate form ties so ends or end fasteners can be removed with minimum spalling at the faces of concrete.

After the ends or end fasteners of form ties have been removed, terminate the embedded portion of ties not less than 2 diameters, or twice the minimum cross-section dimension of the ties, from the formed concrete surface. In no case shall this distance be less than 3/4 inch.

- E. Locate water stops in joints where indicated on Contract Documents. Use pieces of pre-molded water stop with a maximum practicable length to hold the number of end joints to a minimum. Make joints in water stops in accordance with the manufacturer's recommendations. Ensure that joints develop effective water tightness equal to the continuous water stop material, permanently develop not less than 50 percent of the mechanical strength of the parent section, and permanently retain flexibility.

PART 3 - EXECUTION

3.01 CONSTRUCTION AND ERECTION OF FORMWORK

- A. At construction joints, lap contact surface of the form sheathing for flush surfaces exposed to view over the hardened concrete in the previous placement by not more than 1 inch. Ensure formwork is held firmly against hardened concrete to prevent offsets or loss of mortar at construction joints and to maintain a true surface.
- B. Unless specified in Contract Documents, construct formwork so concrete surfaces conform to tolerance limits of ACI 117. The class of surface for offset between adjacent pieces of formwork facing material shall be Class C in accordance with ACI 117, unless otherwise specified.
- C. Provide positive means of adjustment (wedges or jacks) of shores and struts. Do not make adjustments in the formwork after concrete has taken its initial set. Brace formwork securely against lateral deflection and lateral instability.
- D. To maintain specified tolerances, camber formwork to compensate for anticipated deflections in formwork prior to hardening of concrete. Set formwork and intermediate screed strips for slabs accurately to produce designated elevations and contours of the finished surface prior to removal of formwork. Ensure that edge forms and screed strips are sufficiently strong to support vibrating screeds or roller pipe screeds when the finish specified requires the use of such equipment.
- E. When formwork is cambered, set screeds to a like camber to maintain required concrete thickness.
- F. Fasten form wedges in place after final adjustment of forms and prior to concrete placement.
- G. Anchor formwork to shores, supporting surfaces, or members to prevent upward or lateral movement of the formwork system during concrete placement.
- H. Construct formwork for wall openings to facilitate removal and to counteract swelling of wood formwork.
- I. Provide runways for moving equipment and support runways directly on the formwork or structural member without resting on the reinforcing steel.
- J. Place sleeves, inserts, anchors, and embedded items required for adjoining work or for support of adjoining work prior to concrete placement.
- K. Position and support expansion joint material, water stops, and other embedded items to prevent displacement. Fill voids in sleeves, inserts, and anchor slots temporarily with readily removable material to prevent entry of concrete into voids.
- L. Clean surfaces of formwork and embedded materials of mortar, grout, and foreign material before concrete is placed.
- M. Cover surfaces of formwork with acceptable formwork release agent. Apply form release agent before placing reinforcing steel and concrete. A field-applied formwork release agent or sealer of an acceptable type or an acceptable factory-applied non-absorptive liner may be used. Do not allow formwork release agent to puddle in the forms. Do not allow

formwork release agent to contact reinforcing steel or hardened concrete against which fresh concrete is to be placed.

3.02 REMOVAL OF FORMWORK

- A. When finishing is required, remove forms as soon as removal operations will not damage concrete.
- B. Remove top forms on sloping surfaces of concrete as soon as removal will not allow concrete to sag. Perform needed repairs or treatment required at once and follow immediately with specified curing.
- C. Loosen wood formwork for wall openings when this can be accomplished without causing damage to concrete.
- D. Do not allow removal of formwork for columns, walls, sides of beams, and other parts not supporting the weight of the concrete to damage the concrete. Perform needed repair and treatment required on vertical surfaces at once and follow immediately with specified curing.
- E. Unless otherwise specified, leave formwork and shoring in place to support the weight of concrete in beams, slabs, and in place structural members until concrete has reached the specified compressive strength, f'_c , or for no less than 14 days. If a lower compressive strength is proposed for removal for formwork and shoring, submit detail plans for review and acceptance, unless otherwise specified. When shores and other vertical supports are arranged to allow the form facing material to be removed without loosening or disturbing the shores and supports, the facing material may be removed after cumulative curing at not less than 50° F for 24 hours after placing concrete, provided the concrete is sufficiently hard to not be damaged by form removal, and provided curing operations are maintained.
- F. Construct formwork to permit easy removal.

3.03 RESHORING

- A. When reshoring is permitted or required, submit for acceptance a plan of reshoring procedures and operations prior to their use.
- B. While reshoring is under way, do not permit any construction load on new construction.
- C. During reshoring, do not allow concrete in beam, slab, column, or any structural member to be loaded with combined dead and construction loads in excess of the loads permitted by Architect/Engineer for the concrete compressive strength at the time of reshoring.
- D. Place reshores in sequence with stripping operations.
- E. Tighten reshores to carry the required loads without over-stressing the concrete members. Leave reshores in place until tests indicate that the concrete compressive strength has attained the minimum value specified.
- F. For floors supporting shores under newly placed concrete, leave in place the original supporting shores or reshore. The shoring or reshoring system and the supporting slabs

shall have capabilities sufficient to resist the anticipated loads. Reshores shall be located directly under a shore position.

- G. In multi-story buildings, extend reshoring over a sufficient number of stories (two stories minimum) to distribute the weight of newly placed concrete, forms, and construction live loads.

3.04 STRENGTH OF CONCRETE REQUIRED FOR REMOVAL OF FORMWORK

When removal of formwork or reshoring is based on concrete reaching a specified compressive strength, concrete will be presumed to have reached this strength when test cylinders, field cured along with the concrete they represent, have reached the compressive strength specified for removal of formwork or reshoring. Mold cylinders in accordance with ASTM C 31, and cure them under the same conditions for moisture and temperature as used for the concrete they represent. Test cylinders in accordance with ASTM C 39.

3.05 FIELD QUALITY CONTROL

- A. Establish and maintain controls and bench marks in an undisturbed condition until final completion and acceptance of the project.
- B. Variations from plumb and designated building lines shall not exceed the tolerances specified in ACI 117.

END OF SECTION 03 10 00

SECTION 03 10 01
CONCRETE FORMWORK FOR LANDSCAPE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Formwork for cast-in-place concrete footings
 - 2. furnishing and installing shoring, bracing, anchorage and all necessary accessories. Openings in the formwork for other work shall be provided. All stripping activities shall be included under this section.
- B. Related Requirements
 - 1. Section 032000 - Concrete Reinforcement.
 - 2. Section 033000 - Cast-In-Place Concrete.

1.3 REFERENCES

- A. ACI 347-78 - Recommended Practice for Concrete Formwork.
- B. ACI 301-84 - Specifications for Structural Concrete for Building (Revised 1988).
- C. PS-1 - Construction and Industrial Plywood.
- D. ACI 318-95/318R-95 - Building Code Requirements for Reinforced Concrete.

1.4 DESIGN REQUIREMENTS

- A. CONTRACTOR shall be responsible for the design, engineering and construction of formwork, shoring and bracing to conform to design and code requirements; resultant concrete to conform to required shape, line and dimension. Design and construction of formwork shall take into account live loads, dead loads, weight of moving equipment operating on formwork, concrete mix, height of concrete drop, vibrator frequency, temperature, foundation pressures, stresses, lateral stability, and other factors pertinent to the safety of personnel and structures. CONTRACTOR shall provide shores, struts, and trussed supports as necessary.

1.5 QUALITY ASSURANCE

- A. Work shall be performed in accordance with the standards referenced in Part 1.3 of this specification.

1.6 REGULATORY REQUIREMENTS

- A. Conform to applicable codes for design, fabrication, erection and removal of formwork.

1.7 COORDINATION

- A. Coordinate this section with other sections of the Work which require attachment of components to formwork. If formwork is placed after reinforcement, resulting in insufficient concrete cover over reinforcement, replace formwork or reset reinforcing to provide minimum specified concrete cover.

PART 2 - PRODUCTS

2.1 FORM MATERIALS

- A. Forms for exposed vertical faces less than 30" in height: Form-facing panels that will provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize joints
 - 1. Coated plywood consisting of a plywood panel core that is pre-coated with a smooth phenolic film or smooth fiberglass surface on one side.
 - a. Coated plywood forms may be reused as long as no surface damage is present. If surface damage is present, including cuts, chips, or any other inconsistency compromising the contiguous smooth surface, the form shall be discarded and replaced.
- B. Forms for exposed vertical faces greater than 30" in height:
 - 1. Preformed Steel Forms: Minimum 16-gauge (1.5 mm) matched, tight fitting, stiffened to support weight of concrete without deflection detrimental to tolerances and appearance of finished surfaces.
 - 2. Glass Fiber Fabric Reinforced Plastic Forms: Matched, tight fitting, stiffened to support weight of concrete without deflection detrimental to tolerances and appearance of finished concrete surfaces.
- C. Forms for paving, sidewalks, and other horizontal concrete applications
 - 1. See Section 321313 – Concrete Paving.

2.2 FORMWORK ACCESSORIES

- A. Form Ties (for exposed vertical faces greater than 30" in height):
 - 1. Metal form ties shall be removable or snap-off type, galvanized metal, fixed or adjustable length cone type with waterproof washer (for water bearing structure or basement), shall be used to hold forms in place. Such ties shall have provision to permit ease of removal of the metal as hereinafter specified. The use of wire form ties will not be permitted. All metal appliances used inside of the forms to hold them in correct alignment shall be removed to a depth of at least 1/2-inch from the surface of the concrete and shall be so constructed that metal may be removed without undue injury to the surface from chipping or spalling. Such devices, when removed, shall leave a smooth opening in the concrete surface not larger than 7/8-inch in diameter. Burning off of rods, bolts, or ties will not be permitted. Metal ties shall be held in place by devices attached to wales. Each device shall be capable of developing the strength of the tie. Metal and wooden spreaders which are separate from the forms shall be wired to the top of form and shall be entirely removed as the concrete is being placed. The use of metal form ties of a type that are encased in paper or other material to allow the removal of complete tie, leaving a hole through the concrete structure, will not be permitted in the construction of basement or water bearing walls. After the tie rods are broken back or removed, the holes shall be thoroughly cleaned to remove all grease and loose particles; then the mortar (non-shrink cement-sand mortar, as dry as practicable) shall be carefully placed into the holes in small quantities. After the holes are completely filled, all excess mortar shall be struck off flush and the surface finished in such a manner as to render the filled hole as inconspicuous as possible. If these patches appear to be darker than the other surface of the concrete, white cement shall be used in the mortar as required.
 - 2. "Supertie" fiberglass form tie system as manufactured by RJD Industries, Inc., 26945 Cabot Road, Suite 107, Leguna Hill, California, 800/344-4753. Provide spreader rod, ties, gripper and all necessary accessories and installation devices. Provide gray color rod. Install Supertie in accordance with supplier's instructions. After removal of forms, grind Supertie flush to wall.
- B. Form Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.
- C. Corners: Chamfered, rigid plastic or wood strip type; 3/4-inch by 3/4-inch size; maximum possible lengths. Accurately formed to produce uniformly straight lines and tight edge joints.
- D. Nails, Spikes, Lag bolts, Through bolts, Anchorages: Sized as required, of sufficient strength and character to maintain formwork in place while placing concrete.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify lines, levels and centers before proceeding with formwork. Ensure that dimensions agree with Plans.

3.2 EARTH FORMS

- A. Earth forms shall not be used without specific, written approval from ENGINEER. Hand trim sides and bottom of earth forms. Remove loose soil prior to placing concrete.

3.3 ERECTION - FORMWORK

- A. Erect formwork, shoring and bracing to achieve design requirements, in accordance with the requirements of ACI 301.
- B. Provide bracing to ensure stability of formwork. Shore or strengthen formwork subject to overstressing by construction loads.
- C. Arrange and assemble formwork to permit dismantling and stripping. Do not damage concrete during stripping. Permit removal of remaining principal shores.
- D. Align joints and make watertight. Keep form joints to a minimum.
- E. Obtain approval from ENGINEER before framing openings in structural members which are not indicated on Plans.
- F. Provide chamfer strips on external corners of beams, joists, columns, elevated slabs and walls.

3.4 APPLICATION - FORM RELEASE AGENT

- A. Apply form release agent on formwork in accordance with manufacturer's recommendations.
- B. Apply prior to placement of reinforcing steel, anchoring devices, and embedded items.
- C. Do not apply form release agent where concrete surfaces will receive special finishes or applied coverings which are effected by agent. Soak inside surfaces of untreated forms with clean water. Keep surfaces coated prior to placement of concrete.

3.5 INSERTS AND EMBEDDED PARTS

- A. Provide form openings where required for items to be embedded in or passing through concrete work. Locate and set in place items which will be cast directly into concrete.

3.6 FORM CLEANING

- A. Clean and remove foreign matter within forms as erection proceeds.
- B. Clean formed cavities of debris prior to placing concrete.
- C. Flush with water or use compressed air to remove remaining foreign matter. Ensure that water and debris drain to exterior through clean-out ports.
- D. During cold weather, remove ice and snow from within forms. Do not use de-icing salts or water to clean out forms, unless formwork and concrete construction proceed within heated enclosure. Use compressed air or other means to remove foreign matter.

3.7 FORMWORK TOLERANCES

- A. Construct formwork so as to maintain tolerances required by ACI 347, Chapter 3.3, except as otherwise noted.

3.8 FIELD QUALITY CONTROL

- A. Inspect erected formwork, shoring, and bracing to ensure that work is in accordance with formwork design, and that supports, fastenings, wedges, ties, and items are secure. Do not reuse split, frayed, delaminated or otherwise damaged formwork.

3.9 FORM REMOVAL

- A. The time for removal of forms shall comply with ACI 318. If curing temperatures are below 50° F (15° C), the time for removal shall be increased by fifty percent (50%). In no case shall forms or bracing be removed until concrete has gained sufficient strength to carry its own weight and imposed loads.
- B. Loosen forms carefully. Do not wedge pry bars, hammers, or tools against finish concrete surfaces scheduled for exposure to view.
- C. Store removed forms in manner that surfaces to be in contact with fresh concrete will not be damaged. Discard damaged forms.

END OF SECTION 03 10 00

SECTION 03 20 00

CONCRETE REINFORCEMENT AND SUPPORTS

PART 1 - GENERAL

1.01 DESCRIPTION

This section covers materials, fabrication, placement and tolerances of reinforcement and reinforcement accessories.

1.02 REFERENCE STANDARDS

- A. ACI STANDARDS
ACI-117
- B. ASTM STANDARDS
ASTM A185
ASTM A615

1.03 SUBMITTALS, DATA AND DRAWINGS

Unless otherwise required by Contract Documents, submit the following data and drawings for review and acceptance before fabrication and execution.

- A. Placing Drawings: Submit placing drawings showing fabrication dimensions and locations for placement of reinforcement and reinforcement supports.
- B. Splices: Submit a list and request to use splices not indicated in Contract Documents.
- C. Mechanical Connections: Submit request for the use of mechanical connections not shown on the Project Drawings.
- D. Field Bending: Submit requests and procedure to field bend or straighten reinforcement partially embedded in concrete.

1.04 MATERIALS DELIVERY, STORAGE, AND HANDLING

Prevent bending, coating with earth, oil, or other material, or otherwise damaging the reinforcement.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Reinforcing Bars: Bars used as reinforcement shall be deformed except spirals and welded wire fabric, which may be plain. Reinforcement shall be ASTM A615 Grade 60.

- B. Welded Wire Fabric: ASTM A 185, with welded intersections spaced not farther apart than 12 inches in the direction of principal reinforcement.
- C. Wire Reinforcement Supports: Unless otherwise specified or permitted, use wire reinforcement supports complying with Class 1, maximum protection, or Class 2, moderate protection as indicated in Chapter 3 - Bar Supports of the CRSI Manual of Standard Practice.

2.02 FABRICATION

Bend all reinforcement cold unless heating is permitted. Fabricate reinforcement in accordance with fabricating tolerances of ACI 117.

PART 3 - EXECUTION

3.01 PREPARATION

When concrete is placed, all reinforcement shall be free of materials deleterious to bond. Reinforcement with rust, mill scale, or a combination of both will be considered satisfactory provided the minimum nominal dimensions, nominal weight, and the minimum average height of deformations of a hand-wire-brushed test specimen are not less than the applicable ASTM specification requirements.

3.02 PLACEMENT

- A. Tolerances: Place, support, and fasten reinforcement as shown on the Project Drawings. Do not exceed the placing tolerances specified in ACI 117 before concrete is placed. Placing tolerances shall not reduce cover requirements except as specified in ACI 117.
- B. Reinforcement Relocation: When necessary to move reinforcement beyond the specified placing tolerances to avoid interference with other reinforcement, conduits, or embedded items, submit the resulting arrangement of reinforcement for acceptance.
- C. Concrete Cover: Minimum concrete cover for reinforcement, except for extremely corrosive atmosphere, other severe exposures, or fire protection, shall be as follows:
 - 1. Concrete cast against and permanently exposed to earth – 3 inches
 - 2. Concrete exposed to earth or weather:
 - No. 6 through No. 18 bars – 2 inches
 - No. 5 bars and smaller – 1-1/2 inches
 - 3. Concrete not exposed to weather or in contact with ground:
 - a. Slabs, walls, and joists (not exposed to weather):
 - No. 14 and No. 18 bars – 1-1/2 inches
 - No. 11 bars and smaller – 3/4 inches
 - b. Beams and columns (not exposed to weather):

Primary reinforcement, ties, stirrups, spirals – 1-1/2 inches

4. Tolerances on minimum concrete cover shall meet the requirements of ACI 117.
- D. Reinforcement supports: Unless otherwise permitted:
1. Place reinforcement supported from the ground or mud mat on precast concrete reinforcement supports.
 2. Place reinforcement supported from formwork on reinforcement supports made of concrete, metal, or plastic.
- E. Welded wire fabric: For slabs on grade, extend welded wire fabric to within 2 in. of the concrete edge. Lap edges and ends of fabric sheets a minimum of one mesh spacing. Welded wire fabric may extend through contraction joints only where permitted. Support welded wire fabric during placing of concrete to assure required positioning in the slab. Do not place welded wire fabric on grade and subsequently raise into position in concrete.
- F. Column dowels: Furnish and use templates for placement of column dowels unless otherwise permitted.
- G. Make splices as indicated on the Project Drawings unless otherwise permitted. Mechanical connections for reinforcement not shown on the Project Drawings may be used when accepted.
- H. Field bending or straightening: When permitted, bend or straighten reinforcement partially embedded in concrete in accordance with the following procedures.
- Reinforcing bar sizes No. 3 through No. 5 may be bent cold the first time provided reinforcing bar temperature is above 32 F.
- I. Minimum inside bend diameters shall be 6 bar diameters for #3 through #8 bars, 8 bar diameters for #9 through #11 bars, and 10 bar diameters for #14 and #18 bars. In addition, beginning of the bend shall not be closer to the concrete surface than the minimum diameter of bend.
- J. Field cutting of reinforcement: Reinforcement shall not be cut in the field except when specifically permitted.
- K. Reinforcement through expansion joint: Do not continue reinforcement or other embedded metal items bonded to concrete through expansion joints. Dowels bonded on only one side of a joint and waterstops may extend through the joint.

END OF SECTION 032000

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SECTION 03 20 01
CONCRETE REINFORCEMENT FOR LANDSCAPE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes the following items shown in the Landscape Drawings:
 - 1. Concrete Footings
- B. Related Requirements:
 - 1. Section 031000 "Concrete Formwork"
 - 2. Section 033101 "Cast-in-Place Concrete"

1.3 REFERENCES

- A. ACI 301-84 - Structural Concrete for Buildings (Revised 1988).
- B. ACI 318-95/318R-95 - Building Code Requirements For Reinforced Concrete.
- C. ACI 315 - Manual of Standard Practice for Detailing Reinforced Concrete Structures.
- D. ANSI/ASTM A82 - Cold Drawn Steel Wire for Concrete Reinforcement.
- E. ANSI/ASTM A185 - Welded Steel Wire Fabric for Concrete Reinforcement.
- F. SP-66-88 - ACI Detailing Manual.
- G. ANSI/ASTM A496 - Deformed Steel Wire Fabric for Concrete Reinforcement.
- H. ANSI/ASTM A497 - Welded Deformed Steel Wire Fabric for Concrete Reinforcement.
- I. ANSI/AWS D1.4 - Structural Welding Code for Reinforcing Steel.
- J. ANSI/AWS D12.1 - Reinforcing Steel Welding Code.
- K. ASTM A615 - Deformed and Plain Billet Steel Bars for Concrete Reinforcement.
- L. CRSI - Concrete Reinforcing Steel Institute Manual of Practice.
- M. CRSI 63 - Recommended Practice For Placing Reinforcing Bars.
- N. CRSI 65 -Recommended Practice For Placing Bar Supports, Specifications and Nomenclature

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.

1.5 INFORMATIONAL SUBMITTALS

- A. Submittals shall meet the requirements of Section 013400, Contractor's Submittals.
- B. Record Data: Indicate bar sizes, spacings, locations, and quantities of reinforcing steel, bending and cutting schedules, supporting and spacing devices, and joint and splice locations.
- C. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- D. Comply with ACI 315, Chapters 1 through 8.
- E. Manufacturer's specifications and installation instructions for all proprietary products, including sleeves for welded splices..

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01-107-05B-13, F.01004560 (Supplement)
Site Code: 5-10-004 | State ID : S05519
April 14, 2025

1.6 QUALITY ASSURANCE

- A. Perform work in accordance with referenced standards. Submit certified copies of mill test report of reinforcement materials analysis.

1.7 COORDINATION

- A. Coordinate work with other trades, placement of formwork, formed openings and other work.

PART 2 - PRODUCTS

2.1 REINFORCEMENT

- A. Reinforcing Bars: Deformed, new billet steel conforming to ASTM A615, Grade 60 for nonweldable bars and ASTM A706, Grade 60 for weldable bars. Grade 60 shall be used for concrete paving.
- B. Welded Wire Fabric: ASTM A185 for smooth wire and ASTM A457 for deformed wire.

2.2 ACCESSORY MATERIALS

- A. Tie Wire: Minimum 16-gauge annealed type.
- B. Supports for Reinforcement: Conform to CRSI 63.
- C. Chairs, Bolsters, Bar Supports, Spacers: Sized and shaped for strength and support of reinforcement during concrete placement conditions including load bearing pad on bottom to prevent settling or vapor barrier puncture.
- D. Special Chairs, Bolsters, Bar Supports, Spacers Adjacent to Weather Exposed Concrete Surfaces: Plastic coated steel or stainless steel type, size and shape as required.
- E. Splices
 - 1. Mechanical Connections:
 - a. Compression: Gateway Building Products "G-Loc" or approved equivalent.
 - b. Tension: Lenton Anchor or approved equivalent. Connection device shall develop 125 percent of yield strength of bar.
 - 2. Welded Splices: "Cadweld," "Thermoweld" or approved equivalent. Size device to develop 125 percent of yield strength of bar.
 - 3. Lap Splices: See structural drawings.

2.3 FABRICATION

- A. Fabricate concrete reinforcing in accordance with CRSI Manual of Practice. Locate reinforcing splices not indicated on Plans at point of minimum stress. Review location of splices with ENGINEER.

PART 3 - EXECUTION

3.1 PLACEMENT

- A. Place, support and secure reinforcement against displacement by means of accepted spacers, chairs or hangers. Do not deviate from required position.
- B. Do not displace or damage vapor barrier.
- C. Accommodate placement of formed openings.
- D. Conform to AC1 318 code for concrete cover over reinforcement. Concrete surfaces in contact with liquids shall have 2-inch cover.
- E. Clean reinforcement to remove loose rust, mill scale, oil, earth, ice, and other materials which might reduce or destroy bond with concrete.

3.2 FIELD QUALITY CONTROL

- A. Concrete shall not be placed until reinforcing steel is inspected by OWNER's Representative. All concrete placed in violation of this provision will be rejected. The CONTRACTOR shall give OWNER's Representative 48 hours notice prior to completion of reinforcement placement.

END OF SECTION 03 20 01

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SECTION 033000 - CAST-IN-PLACE CONCRETE

PART 1 - GENERAL REQUIREMENTS

1.01 DESCRIPTION - STRUCTURAL CAST-IN-PLACE CONCRETE

1.02 REFERENCE STANDARDS AND CITED PUBLICATIONS

A. American Concrete Institute (ACI) standards:

ACI 301 Standard Specification for Structural Concrete

ACI 117 Specifications for Tolerances for Concrete Construction and Materials

B. American Society for Testing & Materials (ASTM) standards:

A 185 Specification for Steel Welded Wire Fabric, Plain for Concrete Reinforcement

A 615 Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement

C 31 Method of Making and Curing Concrete Test Specimens in the Field

C 33 Specification for Concrete Aggregates

C 39 Test Method of Compressive Strength of Cylindrical Concrete Specimens

C 42 Methods of Obtaining and Testing Drilled Cores and Sawed Beams of Concrete

C 94 Specification for Ready-Mixed Concrete

C 138 Test Method for Unit Weight, Yield, and Air Content (Gravimetric) of Concrete

C 143 Test Method for Slump of Portland Cement Concrete

C 150 Specification for Portland Cement Concrete

C 171 Specification for Sheet Materials for Curing Concrete

C 172 Method of Sampling Freshly Mixed Concrete

C 173 Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method

C 192 Method of Making and Curing Concrete Test Specimens in the Laboratory

C 231 Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method

C 260 Specification for Air-Entraining Admixtures for Concrete

C 309 Specification for Liquid Membrane-Forming Compounds for Curing Concrete

C 494	Specification for Chemical Admixtures for Concrete
C 595	Specification for Blending Hydraulic Cements
C 597	Test Method for Pulse Velocity Through Concrete
C 805	Test Method for Rebound Number of Hardened Concrete
C 989	Specification for Ground Granulated Blast-Furnace Slag for Use in Concrete and Mortars
C 1017	Specification for Chemical Admixtures for Use in Producing Flowing Concrete
C 1064	Test Methods for Temperature of Freshly Mixed Portland Cement Concrete
C 1077	Practice for Laboratories Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Laboratory Evaluation
AASHTO T260	Sampling and Testing for Total Chloride Ion in Concrete and Concrete Materials

1.03 SUBMITTALS

- A. General - Submittals required in this specification shall be submitted for review and acceptance.
- B. Product Data - Submit (5) sets of manufacturer's product data with application and installation instructions for proprietary materials and items, admixtures, patching compounds, curing compounds, and others as requested by Architect.
- C. Testing and Inspection Reports - Testing agencies shall report results of concrete and concrete materials tests and inspections performed during the course of the work to the Owner, Architect/Engineer, Contractor, and the Concrete Supplier. Strength test reports shall include location in the work where the batch represented by test was deposited and the batch ticket number. Final reports shall be provided within seven days of test completion.

1.04 QUALITY ASSURANCE

- A. General - Concrete materials and operations shall be tested and inspected by the Testing Agency as work progresses. Failure to detect defective work or material will not prevent rejection later when a defect is discovered, nor shall it obligate Architect/Engineer for final acceptance.
- B. The Owner shall engage and pay for the services of an Independent Testing Agency to perform inspections and tests of the concrete materials. In the event of a test failure, the Contractor shall pay for retesting. The Contractor shall also select a testing lab and pay for development of the concrete mix design. The Independent Testing Agency shall promptly submit written reports of each test and inspection made to the Owner, Architect, Engineer, Contractor, and to such other parties the Owner may specify.
- C. Testing Agencies - Agencies that perform testing services on development of the concrete mixes shall meet the requirements of ASTM C 1077. Testing agencies performing the tests shall be acceptable to Architect/Engineer prior to performing any work.

1. Submit data on qualifications of proposed testing agency to be used in development of the mix design for acceptance. Use of testing services will not relieve the Contractor of the responsibility to furnish materials and construction in full compliance with the Contract Documents.
2. Duties and Responsibilities: Unless otherwise specified in the Contract Documents, the Contractor shall assume the following duties and responsibilities:
 - a. Qualify proposed materials and establish mixture proportions.
 - b. Submit quality control program of the concrete supplier and provide copies of all test reports performed in the development of the concrete mix.
 - c. Submit data and test documentation on materials and mixture proportions.
 - d. Make available, without cost, random samples of production concrete as needed to perform required testing by the Independent Testing Agency.
 - e. Furnish any necessary labor to assist the Independent Testing Agency in obtaining and handling samples at the project site or at the source of the materials.
 - f. Advise the Independent Testing Agency sufficiently in advance of operations to allow for completion of quality tests and for assignment of personnel.
 - g. Advise the Independent Testing Agency sufficiently in advance of any cancellation of required testing operations. The Contractor shall be responsible to the Independent Testing Agency for charges due to failure to notify if requirements for testing are cancelled.
 - h. Provide and maintain for the sole use of the Independent Testing Agency adequate facilities for safe storage and proper curing of concrete test specimens on the job site for initial curing as required by ASTM C 31.

E. Testing Services - The Independent Testing Agency shall perform the following testing services:

1. Obtain composite samples in accordance with ASTM C 172. Each sample shall be obtained from a different batch of concrete on a random basis, avoiding any selection of the test batch other than by a number selected at random before commencement of concrete placement. Obtain at least one composite sample for each 50 yd³, or fraction thereof, of each design mixture of concrete placed in any one day. When the total quantity of concrete with a given design mixture is less than 25 yd³, the strength tests may be waived by Architect/Engineer, if in his judgment, adequate evidence of satisfactory strength is provided.
2. Conduct strength tests of concrete during construction in accordance with the following procedures:
 - a. Mold and cure four cylinders from each sample in accordance with ASTM C 31. Record any deviations from the ASTM requirements in the test report.
 - b. Test cylinders in accordance with ASTM C 39. Test one specimen at 7 days for information, two specimens at 28 days for acceptance, and hold one specimen to be tested as directed by Architect/Engineer. The compressive strength test results for acceptance shall be the average of the compressive strengths from the two specimens tested at 28 days.
3. Determine slump of each composite sample and whenever consistency of concrete appears to vary, using

4. Determine temperature of each composite sample in accordance with ASTM C 1064.
5. Air content tests will be made on samples from the first three batches in the placement and until three consecutive batches have air contents within the range specified at which time one test will be performed for each 100 cubic yards or fraction thereof of each design mixture of concrete placed in any one day. This test frequency will be maintained until a batch is not within the range specified, at which time testing of each batch will be resumed until three consecutive batches have air contents within the range specified. Additional tests may be performed as necessary for control. These air content tests may be taken on composite samples or on samples from the batch at any time after discharge of two cubic feet of concrete.
6. When it appears that material furnished or work performed by Contractor fails to conform to Contract Documents, testing agency will immediately report such deficiency to the Architect/Engineer, Contractor, and concrete supplier.
7. Independent Testing Agency and its representatives are not authorized to revoke, alter, relax, enlarge, or release any requirement of the Contract Documents, or to accept any portion of the work.
8. Independent Testing Agency will report all test and inspection results to the Owner, Architect, Engineer, Contractor, concrete supplier and to such other parties the owner may specify within seven days after tests and inspections are performed.

F. Additional Testing and Inspection Services

1. The Independent Testing Agency shall perform the following testing services when necessary, at the Contractor's expense:
 - a. Additional testing and inspection required because of changes in materials or mixture proportions requested by the Contractor.
 - b. Additional testing of materials or concrete occasioned by failure to meet specification requirements.
2. When material furnished or work performed by the Contractor fails to conform to the Contract Documents the Independent Testing Agency will perform the following testing services when required by Architect/Engineer at the Contractor's expense:
 - a. Inspect concrete batching, mixing, and delivery operations.
 - b. Other testing or inspection services as required by Architect/Engineer.

G. Tests on Hardened Concrete in Place

1. General: Tests on hardened concrete will be performed by the testing agency when such tests are needed. Testing shall be at Contractor's expense when tests are performed to verify the strength of the structure when required by this specification. Owner will pay costs if tests are at his request and not required by this specification.
2. Nondestructive Tests: Use of the rebound hammer in accordance with ASTM C 805, pulse velocity methods in accordance with ASTM C 597, or other nondestructive devices may be permitted by the Architect/Engineer in evaluating the uniformity and relative concrete strength in place, or for selecting areas to be cored.

- a. When required by the Architect/Engineer, cores shall be obtained and tested in accordance with ASTM C 42.
- b. At least three representative cores shall be taken from each member or area of concrete in place that is considered potentially deficient. The location of cores is to be determined by the Architect/Engineer. If, before testing, cores show evidence of having been damaged subsequent to or during removal from the structure, replacement cores shall be taken.
- c. Fill core holes with low slump concrete or grout of a strength equal to or greater than the original concrete.

H. Evaluation of Concrete Strength Tests

1. Standard molded and cured strength specimens: Test results from standard molded and cured test cylinders shall be evaluated separately for each specified concrete design mixture. Evaluation will be valid only if tests have been conducted in accordance with procedures specified. For evaluation, each specified design mixture shall be represented by at least five tests.
2. Nondestructive tests: Test results will be evaluated by the Architect/Engineer and will be valid only if tests have been conducted by properly calibrated equipment in accordance with recognized standard procedures.
3. Core tests: Core tests will be evaluated by the Architect/Engineer and will be valid only if tests have been conducted in accordance with specified procedures.

I. Acceptance of Concrete Strength

1. Standard molded and cured strength specimens: The strength level of concrete will be considered satisfactory when the averages of all sets of three consecutive compressive strength test results equal or exceed the specified compressive strength f_c' and no individual strength test result falls below the specified compressive strength f_c' by more than 500 psi.
2. Nondestructive tests: Nondestructive tests shall not be used as the sole basis for accepting or rejecting concrete, but may be used when permitted to evaluate concrete where standard molded and cured cylinders have yielded results not meeting the criteria in Paragraph 1.
3. Core tests: Strength level of concrete in the area represented by core tests will be considered adequate when the average compressive strength of the cores are equal to at least 85 percent of specified compressive strength f_c' , and if no single core is less than 75 percent of the specified compressive strength, f_c' .

J. Field Acceptance of Concrete

1. Air content: Concrete not within the limits of the air-entrainment specified shall not be used in the work.
2. Slump: Concrete not within the slump limits specified at the point of placement shall not be used in the work.
3. Temperature: Concrete not within temperature limits specified shall not be used in the work.

1.05 ACCEPTANCE OF STRUCTURE

A. General - Completed concrete work shall conform to applicable requirements of this Specification.

1. Concrete work that fails to meet one or more requirements of the Contract Documents but subsequently is repaired to bring the concrete into compliance may be accepted.
2. Concrete work that fails to meet one or more requirements of the Contract Documents and cannot be brought into compliance will be rejected.
3. Repair rejected concrete work by removing and replacing or by reinforcing with additional construction required by the Architect/Engineer.
4. Submit for acceptance the proposed repair methods, materials, and modifications needed to assure that concrete work will meet requirements of Contract Documents.
5. Document repair work to bring concrete work into compliance with Contract Documents and submit the documentation to Architect/Engineer for acceptance.
6. Contractor shall pay all costs to bring concrete work into compliance with requirements of the specification.
7. Concrete members cast in the wrong location will be rejected.

B. Dimensional Tolerances

1. Formed surfaces resulting in concrete outlines smaller than permitted by the tolerances of ACI 117, may be considered deficient in strength and subject to the provisions of Paragraph D, Strength of Structure.
2. Formed surfaces resulting in concrete outlines larger than permitted by ACI 117 may be rejected. Excess materials will be subject to removal when required by the Architect/Engineer.
3. Inaccurately formed concrete surfaces that exceed ACI 117 tolerances may be rejected.
4. Concrete with tolerances and defects exceeding the specified limitations may be rejected.

C. Appearance

1. Concrete exposed to view with defects that adversely affect the appearance of the specified finish will be rejected.
2. Concrete not exposed to view may be rejected for nonconforming appearance.

D. Strength of Structure

1. Criteria for determining potential strength deficiency: Strength will be considered deficient and concrete work will be rejected when the work fails to comply with requirements which control the strength of the structure including, but not limited to, the following conditions:
 - a. Concrete strength failing to comply with requirements of the Contract Documents.

- b. Reinforcing steel size, quantity, strength, position, or arrangement at variance with the requirements of the Contract Documents.
 - c. Concrete elements which differ from the required dimensions or location.
 - d. Curing not in accordance with Contract Documents.
 - e. Inadequate protection of concrete from extreme temperature and other environmental conditions during early stages of hardening and strength development.
 - f. Mechanical injury, construction fires, accidents, or premature removal of formwork resulting in deficient strength.
2. Action required when strength is potentially deficient: When strength of the structure is considered potentially deficient, corrective actions may be required by Architect/Engineer.

E. Durability

1. Criteria for determining potential durability deficiency: Durability of concrete work will be considered deficient and the concrete work will be rejected when it fails to comply with the requirements which control durability of the structure including, but not limited to, the following conditions:
- a. Strength failing to comply with that specified.
 - b. Materials for concrete not conforming to the specifications for Cements, Aggregated, Water, and Admixtures, including air entrainment.
 - c. Concrete not conforming to the air-entrainment requirements in Contract Documents.
 - d. Curing not in accordance with Contract Documents.
 - e. Inadequate protection of concrete from temperature and other environmental conditions during early stages of hardening and strength development.
2. Action required when durability is potentially deficient: When durability of the structure is considered to be deficient, the following actions will be taken by the Architect/Engineer:
- a. Require that samples of the ingredient materials used in the concrete be obtained and tested.
 - b. Require that samples of hardened concrete be obtained from the structure by coring, sawing, or other acceptable means.
 - c. Require a laboratory evaluation of concrete and concrete materials to assess the ability of concrete to resist weathering action, chemical attack, abrasion, or other deterioration.
 - d. Concrete rejected for lack of durability shall be repaired or replaced as directed by Architect/Engineer.

1.06 PROTECTION OF IN-PLACE CONCRETE

- A. Loading and support of concrete - Do not allow construction loads to exceed the superimposed load which the structural member, with necessary supplemental support, is capable of carrying safely and without

- B. Protection from mechanical injury - During the curing period, protect concrete from damaging mechanical disturbances including load stresses, shock and harmful vibration. Protect concrete surfaces from damage by construction traffic, equipment, materials, rain or running water, and other adverse weather conditions.

PART 2 - CONCRETE MIXTURES

2.01 DESCRIPTION

Requirements for materials, proportioning, production, and delivery of concrete.

2.02 SUBMITTALS

- A. Mixture proportions - Submit concrete mixture proportions by weight.
- B. Concrete materials - Submit the following information for concrete materials:
 - 1. For cementitious material: types, classes.
 - 2. For aggregates: types, pit or quarry locations, producers' names, gradations, specific gravities.
 - 3. For admixtures: types, brand names, producers.
 - 4. For water and ice: source of supply.
- C. Mixture proportion adjustments - Submit any adjustments to mixture proportions or changes in materials, along with supporting documentation, made during the course of the work.
- D. Floor concrete - Submit evaluations and test results verifying adequacy of concrete to be placed in floors when cementing content is less than 5 sacks/yd. for 3,000 psi concrete and 6 sacks/yd. for 4,000 psi concrete.
- E. Time of discharge - When it is desired to exceed time for discharge of concrete required by ASTM C 94, submit a request along with a description of the precautions to be taken.

2.03 PRODUCTS

- A. Materials
 - 1. Cementitious material - Cementitious material shall consist of Portland cement conforming to ASTM C 150. Unless otherwise specified, cementitious material shall conform to ASTM C 150 Type I or Type II without the addition of cementitious or pozzolanic mineral admixtures. Cementitious material used in concrete shall be of the same brand and type, and from the same plant of manufacture as the cementitious material used in the concrete represented by the submitted field test data or used in the trial mixtures. Cementitious material containing fly ash shall not be permitted.
 - 2. Aggregates - Aggregates shall conform to ASTM C 33 unless otherwise specified. When a single size or a combination of two or more sizes of coarse aggregates are used, the final gradation shall conform to the grading requirements of ASTM C 33 unless otherwise specified or permitted.
 - 3. Water and ice - Mixing water for concrete and water used to make ice shall meet the requirements

4. Admixtures - When required or permitted, admixtures shall meet the requirements of the following:
 - a. Air entraining admixtures - ASTM C 260.
 - b. Chemical admixtures - ASTM C 494.
 - c. Chemical admixtures for use in producing flowing concrete - ASTM C 1017
5. Change of materials - When brand, type, size, or source of cementitious materials, aggregates, water, ice, or admixtures are proposed to be changed, new data or evidence which indicates that the change will not adversely affect the relevant properties of the concrete shall be submitted for acceptance prior to use in concrete.

B. Performance and Design Requirements.

1. Cementitious material content - The cementitious material content shall be adequate for concrete to satisfy the specified requirements for strength, water-cementitious material ratio and finishing ability. For concrete used in floors, cement content shall not be less than the following (unless documentation is submitted satisfying Sub Paragraph 2.02 D):

Nominal maximum size of aggregate, in.	Minimum cement content, lb/yd ³
1 ½	470*
1	520
¾	540
⅜	610

*Minimum cement content shall be 520 lb/yd³ if concrete will be exposed to freezing and thawing in the presence of de-icing chemicals.

2. Slump - Slump shall not exceed the specified slump. Concrete shall have, at the point of delivery, a slump of:
 - a. Ramps and sloping surfaces - 3" maximum
 - b. Reinforced foundations - 1" minimum to 3" maximum
 - c. Other concrete - 2" minimum to 4" maximum
 - d. Determine the slump by ASTM C 143. Slump tolerances shall meet the requirements of ACI 117. When use of a plasticizing admixture conforming to ASTM C 1017 or when a Type F or G high range water reducing admixture conforming to ASTM C 494 is permitted to increase the slump of concrete, concrete shall have a slump of 2 to 4 inches before the admixture is added and a maximum slump of 6 inches at the point of delivery after the admixture is added, unless otherwise specified.
3. Size of coarse aggregate - Except when otherwise specified or permitted, nominal maximum size of coarse aggregate shall not exceed three-fourths of the minimum clear spacing between reinforcing bars, one-fifth of the narrowest dimension between sides of forms, or one-third of the thickness of slabs or toppings.

4. Air content - See plans for air-entrainment requirements. Unless otherwise specified, air content for exterior exposed concrete at the point of delivery shall conform to the requirements of ACI - 301, Table 4.2.2.4 for mild exposure. For specified compressive strengths above 5,000 psi, the total air contents indicated in Table 4.2.2.4 may be reduced by 1 percent.
5. Chloride ion concentration - Unless otherwise specified, maximum water soluble chloride ion concentrations in hardened concrete at ages from 28 to 42 days contributed from the ingredients including water, aggregates, cementitious materials, and admixtures shall not exceed .30% by weight of cement. When testing is performed to determine water soluble chloride ion content, test procedures shall conform to AASHTO T 260.
6. Concrete temperature - When the average of the highest and lowest temperature during the period from midnight to midnight is expected to drop below 40° F for more than three successive days, concrete shall be delivered to meet the following minimum temperature immediately after placement:
 - 55° F for sections less than 12 in. in the least dimension
 - 50° F for sections 12 in. in to 36 in. in the least dimension
 - 45° F for sections 36 in. to 72 in. in the least dimension
 - 40° F for sections greater than 72 in. in the least dimension

The temperature of concrete as placed shall not exceed these values by more than 20° F. These minimum requirements may be terminated when temperatures above 50° F occur during more than half of any 24 hour duration. Unless otherwise specified or permitted, the temperature of concrete as delivered shall not exceed 90° F.

7. Strength - The compressive strength is to be as specified on the drawings. Unless otherwise specified, strength requirements shall be based on the 28-day compressive strength determined on 6 x 12 inch cylindrical specimens made and tested in accordance with ASTM C 31 and C 39 respectively.
8. Water-cementitious material ratio - The water-cement or water-cementitious material ratio of the concrete for each portion of the work shall not exceed .50 for 3,000 psi concrete and .48 for higher strength concrete.
9. Proportioning - Proportion concrete to conform to Paragraph C - Performance and design requirements, to provide workability and consistency so concrete can be worked readily into forms and around reinforcement without segregation or bleeding, and to provide the compressive strength specified.

2.04 EXECUTION

- A. Measuring, batching, and mixing - Production facilities shall produce concrete of the specified quality and conforming to the requirements of this Specification. Unless otherwise specified, measure, batch and mix concrete materials and concrete in conformance with ASTM C 94.
- B. Delivery - Deliver concrete which will possess the specified characteristics in the freshly mixed state at the point of placing. Transport and deliver concrete in equipment conforming to the requirements of ASTM C 94.
 1. Slump adjustment - When concrete arrives at the point of delivery with a slump below that which will result in the specified slump at the point of placement and is unsuitable for placing at that slump, the slump may be adjusted to the required value by adding water up to the amount allowed in Paragraph C.1.1.1. Additions shall be made in small portions unless otherwise specified by the Architect/Engineer. Addition

of water shall be in accordance with ASTM C 94. Do not exceed the specified water-cementitious material ratio or slump. Do not add water to concrete delivered in equipment not acceptable for mixing. After plasticizing or high-range water-reducing admixtures are added to the concrete at the site to achieve flowable concrete, do not add water to the concrete. Measure slump and air content of air-entrained concrete, after slump adjustment, to verify compliance with specified requirements.

2. Time of discharge - Time for completion of discharge shall be as specified by ASTM C 94, unless otherwise permitted. When discharge is permitted after more than 90 minutes have elapsed since batching or after the drum has revolved 300 revolutions, verify that air content of air-entrained concrete, slump, and temperature of concrete are as specified.

PART 3 - HANDLING, PLACING, AND CONSTRUCTING

3.01 EXECUTION

A. Preparation

1. Do not place concrete until data on materials and mixture proportions are accepted.
2. Before placing concrete in forms, complete the following:
 - a. Comply with formwork requirements specified.
 - b. Remove dirt, water, and other foreign material from surfaces, including reinforcement and embedded items, against which concrete will be placed.
 - c. Comply with reinforcing steel placement requirements specified.
 - d. Position and secure in place expansion joint material, anchors, and other embedded items.
 - e. Obtain acceptance of finished preparation.
3. Before placing a concrete slab on grade, clean foreign material from the subgrade and complete the following:
 - a. In-place density of subgrade soils shall be uniform throughout the area and at least the minimum required by Contract Documents.
 - b. Subgrade shall be free from frost or ice.
 - c. Subgrade shall be moist with no free water and no muddy or soft spots.
4. When high ambient temperatures necessitate protection of concrete immediately after placing or finishing, make provisions in advance of concrete placement for windbreaks, shading, fogging, sprinkling, ponding, or wet covering.
5. During ambient temperature conditions described in Section 2.03, Paragraph B, Subparagraph 6 - concrete temperature, make provisions in advance of concrete placement to maintain the temperature of the concrete as specified. Use heating, covering, or other means adequate to maintain required temperature without overheating or drying of concrete due to concentration of

heat. Do not use combustion heaters unless precautions are taken to prevent exposure of the concrete to exhaust gases containing carbon dioxide.

B. Placement of concrete.

1. Wet weather - Do not begin to place concrete while rain, sleet, or snow is falling. Do not allow rain water to increase mixing water or to damage the surface of the concrete.
2. Cold weather - Concrete temperatures and ambient temperatures shall meet minimum temperature requirements of Section 2.03, Paragraph B, Subparagraph 6 - Concrete temperature.
3. Hot weather - The temperature of concrete as placed shall not exceed 90° F unless otherwise permitted. Loss of slump, flash set, or cold joints due to temperature of concrete as placed will not be acceptable. When temperature of concrete exceeds 90° F, obtain acceptance, when required, of proposed precautionary measures. When temperature of steel reinforcement, embedments, or forms is greater than 120° F, fog steel reinforcement, embedments, and forms with water immediately prior to placing concrete.
4. Conveying - Convey concrete from mixer to the place of final deposit rapidly by methods which prevent segregation or loss of ingredients and will assure the required quality of concrete. Do not use aluminum pipes or chutes.
5. Depositing - Deposit concrete continuously in one layer or in layers to have fresh concrete deposited on in-place concrete that is still plastic. Do not deposit fresh concrete on concrete that has hardened sufficiently to cause formation of seams or planes of weakness within the section, unless construction joint requirements are met. Do not use concrete that has surface dried, partially hardened, or contains foreign material. Do not subject concrete to any procedure that will cause segregation. Deposit concrete as near as practicable to the final position to avoid segregation.
6. Consolidating - Consolidate concrete by vibration. Concrete shall be thoroughly worked around reinforcement and embedded items and into corners of forms, eliminating all air or stone pockets which may cause honey-combing, pitting, or planes of weakness. Use internal vibrators of the largest size and power that can properly be used in the work as described in ACI - 301, Table 5.3.2.5. Workers shall be experienced in use of the vibrators. Do not use vibrators to move concrete within the forms.
7. Construction joints and other bonded joints - Locate construction joints as indicated on the Project Drawings or as accepted by the Architect/Engineer.

C. Finishing formed surfaces - After removal of forms, give each formed surface one or more of the finishes as specified by the Architect/Engineer. Finishes are to be in accordance with ACI-301, Section 5.3.3.

D. Finishing unformed surfaces - Place concrete at a rate that allows spreading, straight edging, and darbying or bullfloating before bleed water appears. Strike smooth the top of walls, buttresses, horizontal offsets, and other similar unformed surfaces and float them to a texture consistent with finish of adjacent formed surface. Finish slab surfaces as specified by the Architect/Engineer. Finishes are to be in accordance with ACI-301. Tolerance requirements are to be as specified in the Construction Documents and meet the requirements of ACI-117.

E. Sawed control joints - Where saw cut joints are required or permitted, start cutting as soon as concrete has hardened sufficiently to prevent dislodgement of aggregates. Saw a continuous slot to a depth of one-fourth an inch. Complete sawing within 12 hours after placement.

F. Curing and protection.

1. General - Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures, and mechanical injury. Protect concrete during the curing period such that the concrete temperature does not fall below the requirements of Section 2.03, Paragraph B, Sub-Paragraph 6 - concrete temperature. Cure concrete in accordance with ACI-301, 5.3.6.2 or 5.3.6.3 for 7 days after placement.
2. Formed concrete surfaces - Keep absorbent wood forms wet until they are removed. After form removal, cure concrete by one of the methods in Sub-Paragraph 3 - Unformed Concrete Surfaces.
3. Unformed concrete surfaces - After placing and finishing, use one or more of the following methods to preserve moisture in concrete:
 - a. Ponding, continuous fogging or continuous sprinkling.
 - b. Application of mats or fabric kept continuously wet.
 - c. Continuous application of steam (under 150° F).
 - d. Application of sheet materials conforming to ASTM C 171.
 - e. Application of a curing compound conforming to ASTM C 309. Apply the compound in accordance with manufacturer's recommendation after water sheen has disappeared from the concrete surface and after finishing operations. The rate of application shall not exceed 200 ft²/gal. For rough surfaces, apply in two applications at right angles to each other, not to exceed 200 ft²/gal. for each coat. Do not use curing compound on any surface where concrete or other material will be bonded unless the curing compound will not prevent bond or unless measures are to be taken to completely remove the curing compound from areas to receive bonded applications.

G. Repair of surface defects.

General - Repair tie holes and surface defects immediately after form removal. Where the concrete surface will be textured by sandblasting or bush-hammering, repair surface defects before texturing. Repairs are to meet the requirement of ACI-301, Section 5.3.7.

END OF SECTION 033000

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SECTION 03 31 01
CAST IN PLACE CONCRETE FOR LANDSCAPE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Cast-in-Place Concrete Footings
 - 2. Cast-in-Place Concrete Fountain
- B. Related Sections:
 - 1. Section 031000 "Concrete Formwork"
 - 2. Section 032000 "Concrete Reinforcement"

1.3 DEFINITIONS

- A. Cementitious Materials: Portland cement. None of the following are allowed in any concrete for this project: blended hydraulic cement, fly ash and other pozzolans, ground granulated blast-furnace slag, and silica fume.

1.4 REFERENCES

- A. ACI 301-84 - Structural Concrete for Buildings (Revised 1988).
- B. ACI 302 - Guide for Concrete Floor and Slab Construction.
- C. ACI 304 - Recommended Practice for Measuring, Mixing, Transporting and Placing Concrete.
- D. ACI 305R - Hot Weather Concreting.
- E. ACI 306R - Cold Weather Concreting.
- F. ACI 308 - Standard Practice for Curing Concrete.
- G. ACI 318-95/318-95R - Building Code Requirements for Reinforced Concrete.
- H. ANSI/ASTM D1752 - Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction.
- I. ASTM C33-86 - Concrete Aggregates.
- J. ASTM C94-86 - Ready-Mixed Concrete.
- K. ASTM C595-21 – Blended Hydraulic Cement.
- L. ASTM C260-86 - Air Entraining Admixtures for Concrete.
- M. ASTM C494 - Chemical Admixtures for Concrete.

1.5 ACTION SUBMITTALS

- A. Submit under provisions of Section 013300.
- B. Product Data: Provide data on joint devices, coatings, attachment accessories, curing compounds, admixtures, mix designs, tests performed to establish mix designs, and physical capacity of mixing plant and trucking facilities.

- C. Installer qualifications
- D. Manufacturer's Installation Instructions: Indicate installation procedures and interface required with adjacent work

1.6 PROJECT RECORD DOCUMENTS

- A. Submit under the provisions of the GENERAL CONDITIONS. Accurately record actual locations of embedded utilities and components which are concealed from view.
- B. CONTRACTOR shall furnish delivery tickets with each load of concrete delivered indicating amount or weights of each component in the load, the cubic yards in the load, the amount of water which may be added in the field without exceeding the specifications, the time batched, and truck number. Ticket shall be printed and legible.

1.7 QUALITY ASSURANCE

- A. All work shall be performed in accordance with the standards referenced in Part 1.4. Cement and aggregate shall be obtained from the same source for all work.
- B. Installer Qualifications: A qualified installer who employs qualified personnel on the Project, Flatwork Technicians with at least three (3) years of experience, Finishers with at least three (3) years of experience, and a Supervisor with at least ten (10) years of experience in concrete finishing and flatwork.
- C. Manufacturer's Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C94/C94M requirements for production facilities and equipment.
- D. Preinstallation Conference: Conduct conference at Project site with the general contractor, the subcontractor placing the concrete, specialty concrete finish contractor (if different than concrete subcontractor), and the site superintendent.
 - 1. Review methods and procedures related to concrete placement, including but not limited to, the following:
 - a. Finished product expectations
 - b. Formwork construction, shoring, and removal
 - c. Expansion joint and control joint layout and construction
 - d. Concrete mixture design.
 - e. Steel reinforcement installation.
 - f. Quality control of concrete materials and concrete paving construction practices.
 - g. Weather related adjustments
 - 2. Require representatives of each entity directly concerned with concrete paving to attend, including the following:
- E. Mock-up
 - 1. Contractor shall construct an on-site mock-up for each element covered under this specification section. The mock-up shall be constructed in the same manner and with the same materials as those to be used for the final elements in order to demonstrate the aesthetic and build quality standards. The accepted mock-up shall become the standard for the entire job and shall remain undisturbed on site until the completion of this scope of work.
 - a. Wall and step mock-ups shall demonstrate the exposed vertical finish, edge treatment, and top surface finish.
 - b. Mock-ups do not have to include the substrate or footing.
 - c. Mock-ups shall be constructed on a movable platform (pallet or similar) so that it may be moved around the site if required.
- F. Concrete Testing Service: Owner shall engage (and pay for) a qualified independent testing agency to perform material evaluation tests.
- G. Materials and installed work may require testing and retesting, as directed by the Landscape Architect, at anytime during progress work. Contractor shall allow free access to material

stockpiles and facilities. Tests, including retesting of rejected materials for installed work, shall be done at the Contractor's expense.

- H. For all concrete placement events, all steel reinforcement, other embedded items, and formwork shall be set and finalized a minimum of three (3) hours prior to the time of initial concrete placement to allow time for proper observation / inspection by the design team and the testing agency, as well as time for the resolution of any discrepancies. For any concrete placement events occurring before 10am, all items noted above shall be finalized by 4pm on the afternoon prior.

1.8 COORDINATION

- A. Coordinate the placement of joint devices with erection of concrete formwork and placement of form accessories.
 - a. Contractor's superintendent.
 - b. Independent testing agency responsible for concrete design mixtures.
 - c. Concrete paving subcontractor.

1.9 PROJECT CONDITIONS

- A. Traffic Control: Maintain access for vehicular and pedestrian traffic as required for other construction activities.

PART 2 - PRODUCTS

2.1 CONCRETE MATERIALS

- A. Cementitious Material: Use the following cementitious materials, of same type, brand, and source throughout Project:
 - 1. Blended Hydraulic Cement: ASTM C 595, light gray, Type I/II.
- B. Fine and Coarse Aggregates: ASTM C33.
 - 1. Do not use aggregates containing soluble salts or other substances such as iron sulfides, pyrite, marcasite, ochre, or other materials that can cause stains on exposed concrete surfaces.
 - 2. Fine Aggregate: Clean, sharp, natural sand free from loam, clay, lumps or other deleterious substances. Dune sand, bank run sand and manufactured sand are not acceptable.
 - 3. Coarse Aggregate: Clean, uncoated, processed aggregate containing no clay, mud, loam, or foreign matter, as follows:
 - a. Crushed stone, processed from natural rock or stone in primarily brown and tan colors.
 - b. Wash gravel, either natural or crushed. Use of slag and pit or bank run gravel is not permitted.
 - c. Coarse Aggregate Size: Size to be ASTM C33, Nos. 57 or 67, except that No. 467 may be used for footings, foundation mats and walls 16 inches or greater in thickness.
- C. Water: Clean and not detrimental to concrete.

2.2 ADMIXTURES

- A. Air Entrainment: ASTM C260; MB-VR manufactured by Master Builders Company or approved equivalent.
- B. Chemical: ASTM C494, Type A - Water Reducing Pozzoloth manufactured by Master Builders Company or approved equivalent.
- C. Set-Control Admixtures: ASTM C494, as follows:
 - 1. Type B, Retarding.
 - 2. Type C, Accelerating.
 - 3. Type D, Water-reducing and Retarding.

4. Type E, Water-reducing and Accelerating.
5. Type F, Water-reducing, High Range.

2.3 ACCESSORIES

- A. Bonding Agent: Sika-Dur Hi-Mod manufactured by Sika Chemical Corporation or approved equivalent.
- B. Non-Shrink Grout: Submit product for approval under provisions of Section 013300.
- C. Reinforcing doweling system for existing concrete shall conform to Section 032001 and shall be installed per the manufacturer's instructions.

2.4 EXPANSION JOINTS

- A. Provide a semi-rigid, closed-cell polypropylene foam, preformed joint filler that meets the following physical property requirements and fully complies with ASTM D8139.

1. Compression Strength	30-60 psi	per ASTM D 545 or AASHTO T 42
2. Compression Recovery	> 80%	per ASTM D 545 or AASHTO T 42
3. Extrusion	< 0.1 in.	per ASTM D 545 or AASHTO T 42
4. Density	>3.5 lbs./cu.ft.	per ASTM D 545 or AASHTO T 42
5. Water Absorption	< 1.0%	per ASTM D 545 or AASHTO T 42
6. Heat Resistance °F	392°F ± 5°F	per ASTM D 5249
7. Freeze Thaw Resistance	No change	per ASTM C 666 (300 cycles)
8. UV Weathering	No change	per ASTM D 4329 (1000 hrs., Cycle A)
9. Thickness	3/8" Min.	
10. Width	6" Min.	
- B. Manufacturers
 1. Nomaco, WR Meadows, or Approved Equal

2.5 CONCRETE MIX

- A. Provide concrete with the following mix design limitations where Class "A" concrete is specified (or where no Class is specified) to result in concrete placed in the field of minimum compressive strength of 4000 psi at 28 days based on test cylinders which are taken during concrete placement.

<u>Unit</u>	<u>Measurement</u>
Minimum Compressive Strength (7 day)	3000 psi
Minimum Compressive Strength (28 day)	4000psi
Coarse Aggregate	ASTM C33, No. 57
Fine Aggregate	ASTM C33
Water/Cement Ratio (maximum)	0.44 by weight
Air Entrainment	5 percent (+/- 2%)
Slump - Plus or minus 1 inch	4 inches
Minimum Cement Content	564 pounds per cy

- B. The concrete mix design listed above for the various classes shall be proportioned to produce 28 days concrete compression strength above the specified 28 days concrete compression strength when cylinder test is made from concrete mixed and moisture cured in the laboratory as follows:

<u>Specified 28 days strength</u>	<u>Laboratory 28 days test cylinder</u>
fc = 3000 psi and under	fc + 1000 psi
fc = 4000 to 5000 psi	fc + 1200 psi

Adjustment in the limitation listed in mix design shall be made to produce the required strength of laboratory made and cured cylinder.

- C. Use accelerating admixtures in cold weather only when approved by LANDSCAPE ARCHITECT. Use of admixtures will not relax cold weather placement requirements.
- D. Do not use calcium chloride in concrete or in any admixture.
- E. Use set retarding admixtures during hot weather only when approved by LANDSCAPE ARCHITECT.
- F. Use air entraining agent in all concrete mix except for interior slabs subject to abrasion or unless otherwise shown.
- G. Maximum chloride ion content for corrosion protection shall meet Table 4.4.1 listed in ACI 318/318R (1995). Testing for chloride ion content shall conform to AASHTO T260.

2.6 COATINGS

- A. Penetrating Sealer: Transparent, non-yellowing, water- or solvent-based coating
 - 1. Composition: Silane-siloxane mixture
 - 2. Manufacturers:
 - a. Clemons Concrete Coatings
 - b. Concrete Sealers USA
 - c. TK Products Construction Coatings
 - d. WR Meadows
 - 3. Apply to exposed surfaces of retaining walls and steps per manufacturer's installation instructions.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify site conditions prior to construction.
- B. Verify requirements for concrete cover over reinforcement.
- C. Verify that anchors, seats, plates, reinforcement and other items to be cast into concrete are accurately placed, positioned securely, and will not cause hardship in placing concrete.

3.2 PREPARATION

- A. Prepare previously placed concrete by cleaning with steel brush and applying bonding agent in accordance with manufacturer's instructions.
- B. In locations where new concrete is to be doweled to existing work, drill holes in existing concrete, insert steel dowels and pack solid with epoxy adhesive, unless capsule anchors or other form of fastening is shown on Plans.

3.3 FORMWORK

- A. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.
- B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.
- C. Limit concrete surface irregularities, designated by ACI 117 and ACI 347R as abrupt or gradual, as follows:
 - 1. Class A, 1/8 inch for smooth-formed finished surfaces.

2. Class B & C, 1/2 inch for rough-formed finished surfaces.
- D. Construct forms tight enough to prevent loss of concrete mortar.
- E. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical.
 1. Install keyways, reglets, recesses, and the like, for easy removal.
 2. Do not use rust-stained steel form-facing material.
- F. Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and slopes in finished concrete surfaces. Provide and secure units to support screed strips; use strike-off templates or compacting-type screeds.
- G. Provide temporary openings for cleanouts and inspection ports where interior area of formwork is inaccessible. Close openings with panels tightly fitted to forms and securely braced to prevent loss of concrete mortar. Locate temporary openings in forms at inconspicuous locations.
- H. Chamfer exterior corners and edges of permanently exposed concrete, unless otherwise indicated.
- I. Form openings, chases, offsets, sinkages, keyways, reglets, blocking, screeds, and bulkheads required in the Work. Determine sizes and locations from trades providing such items.
- J. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.
- K. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.
- L. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.

3.4 REMOVING AND REUSING FORMS

- A. General: Formwork for sides of beams, walls, columns, and similar parts of the Work that does not support weight of concrete may be removed after cumulatively curing at not less than 50 deg F for 24 hours after placing concrete, if concrete is hard enough to not be damaged by form-removal operations and curing and protection operations are maintained.
 1. Remove forms only if shores have been arranged to permit removal of forms without loosening or disturbing shores.
- B. Clean and repair surfaces of forms to be reused in the Work. Split, frayed, delaminated, or otherwise damaged form-facing material will not be acceptable for exposed surfaces. Apply new form-release agent.
- C. When forms are reused, clean surfaces, remove fins and laitance, and tighten to close joints. Align and secure joints to avoid offsets. Do not use patched forms for exposed concrete surfaces unless approved by Architect.

3.2 JOINTS

- A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.
- B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.
 1. Place joints perpendicular to main reinforcement. Do not continue reinforcement through sides of strip placements of floors and slabs (unless noted otherwise on drawings).
 2. Form joints as indicated on drawings. Do not use metal keyways
 3. Space vertical joints in walls as indicated. Locate joints beside piers integral with walls, near corners, and in concealed locations where possible.
 4. Use a bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces, where indicated on drawings.

5. Use epoxy-bonding adhesive at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces, where indicated on drawings.
 6. Construction joints shall not be placed in any slab areas with floor coverings prone to cracking, unless written approval is provided the Architect. When construction joints are allowed in slab areas with floor coverings prone to cracking, the contractor shall assure that joints are properly considered in floor covering installation as required to prevent reflective cracking.
- C. Doweled Joints (as indicated on drawings): Install dowel bars and support assemblies at joints where indicated.

3.3 WATERSTOPS

- A. Flexible Waterstops: Install in construction joints and at other joints indicated to form a continuous diaphragm. Install in longest lengths practicable. Support and protect exposed waterstops during progress of the Work. Field fabricate joints in waterstops according to manufacturer's written instructions.
- B. Self-Expanding Strip Waterstops: Install in construction joints and at other locations indicated, according to manufacturer's written instructions, adhesive bonding, mechanically fastening, and firmly pressing into place. Install in longest lengths practicable.
 1. Place at locations indicated on plans.
 2. Place at concrete construction joints below site grade in order to avoid water intrusion into interior space.
 - a. Place at wall to slab (or mat foundation) joints below site grade.
 - b. Place at wall to wall joints below site grade.

3.5 PLACING CONCRETE

- A. Place concrete in accordance with ACI 304.
- B. Notify OWNER's representative 48 hours prior to completion of reinforcement placement.
- C. Prior to placing concrete, ensure that reinforcement, inserts, embedded parts, formed joint fillers, joint devices and water stops are not disturbed during concrete placement.
- D. Install joint fillers, primer and sealant in accordance with manufacturer's instructions.
- E. Separate slabs on grade from vertical surfaces with 3/4-inch thick joint filler where shown on the Plans.
- F. Extend joint filler from bottom of slab to within 1/4 inch of the finished slab surface. Conform to Section 079200 for finish joint sealer requirements.
- G. Before test sampling and placing concrete, water may be added at Project site, subject to limitations of ACI 301 and in accordance with ASTM C94.
 1. Determine initial slump prior to any water addition at Project site and before any significant concrete discharge.
 2. Measure and record water added on Project site and resulting slump.
 3. The amount of water added shall not exceed the amount allowed in the approved design mixture.
 4. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.
 5. Do not exceed specified W/C ratio or slump per approved design mixture.
 6. Do not add water to concrete delivered in equipment not acceptable for mixing.
 7. Do not add water if more than 0.25 cubic yards of concrete has already been discharged from the mixer.
 8. All water added shall be under the pressure and direction of flow required to achieve uniformity in concrete. Immediately after addition of water, the drum or blades of the truck mixer or agitator shall be turned an additional 30 revolutions or more if necessary, at mixing speed, until uniformity of concrete is achieved.
- H. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete will be placed on concrete that has hardened enough to cause seams or planes of

weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.

1. Deposit concrete in horizontal layers of depth to not exceed formwork design pressures and in a manner to avoid inclined construction joints.
 2. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.
 3. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mixture constituents to segregate.
- I. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.
1. Consolidate concrete during placement operations so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
 2. Maintain reinforcement in position on chairs during concrete placement.
 3. Screed slab surfaces with a straightedge and strike off to correct elevations.
 4. Slope surfaces uniformly to drains where required.
 5. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleedwater appears on the surface. Do not further disturb slab surfaces before starting finishing operations.
- J. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.
1. When average high and low temperature is expected to fall below 40 deg F for three successive days, maintain delivered concrete mixture temperature within the temperature range required by ACI 301.
 2. Do not place concrete when temperature is 36 deg F or below or if temperature is expected to reach 36 deg F (or below) within 12 hours of the anticipated time for completing a concrete pour.
 3. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
 4. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.
- K. Hot-Weather Placement: Comply with ACI 301, ACI 305R, and as follows:
1. Maintain concrete temperature below 90 deg F at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
 2. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.
- L. Ensure reinforcement, inserts, waterstops, embedded parts, and formed construction joint devices will not be disturbed during concrete placement.
1. Maintain records of concrete placement. Record date, location, quantity, air temperature, and test samples taken.
- M. Place concrete continuously between predetermined expansion, control, and construction joints.
- N. Do not interrupt successive placement; do not permit cold joints to occur.
- O. Screed floors and slabs on grade level to required level, maintaining surface flatness of maximum 1/4-inch in 10 ft.

3.6 FINISHING FORMED SURFACES

- A. Concrete Finish Schedule
1. Retaining Walls

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Cast-in-Place Concrete for Landscape

- a. Exposed Top: Smooth Trowel
 - b. Exposed Vertical Face: Smooth-Formed
 - c. Non-Exposed Vertical Face: Rough-Formed
- 2. Steps
 - a. Exposed Top: Light Broom
 - b. Exposed Vertical Faces: Smooth-Formed
- 3. Curbs
 - a. Exposed Top: Medium Broom
 - b. Exposed Vertical Faces: Medium Broom
- B. Smooth-Formed Finish: (For formed vertical concrete surfaces exposed to view) As-cast concrete texture imparted by the specified form-facing material noted in Section 031000, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defects. Remove fins and other projections that exceed specified limits on formed-surface irregularities.
 - 1. Apply to concrete surfaces exposed to public view
 - 2. Apply to concrete surfaces specified to receive a rubbed finish, or to be covered with a coating or covering material applied directly to concrete.
- C. Rough-Formed Finish: (For formed vertical concrete surfaces not exposed to view) As-cast concrete texture imparted by form-facing material with tie holes and defects repaired and patched. Remove fins and other projections that exceed specified limits on formed-surface irregularities.
 - 1. Apply to concrete surfaces not exposed to public view.
- D. Rubbed Finishes: Where concrete surfaces are noted to receive a rubbed finish, consult with Landscape Architect to determine the type of rubbed finish prior to pouring of concrete. Apply one of the following to smooth-formed finished as-cast concrete as indicated or directed by Landscape Architect:
 - 1. Smooth-Rubbed Finish: Not later than one day after form removal, moisten concrete surfaces and rub with carborundum brick or another abrasive until producing a uniform color and texture. Do not apply cement grout other than that created by the rubbing process.
 - 2. Grout-Cleaned Finish: Wet concrete surfaces and apply grout of a consistency of thick paint to coat surfaces and fill small holes. Mix one part portland cement to one and one-half parts fine sand with a 1:1 mixture of bonding admixture and water. Add white portland cement in amounts determined by trial patches so color of dry grout will match adjacent surfaces. Scrub grout into voids and remove excess grout. When grout whitens, rub surface with clean burlap and keep surface damp by fog spray for at least 36 hours.
 - 3. Cork-Floated Finish: Wet concrete surfaces and apply a stiff grout. Mix one part portland cement and one part fine sand with a 1:1 mixture of bonding agent and water. Add white portland cement in amounts determined by trial patches so color of dry grout will match adjacent surfaces. Compress grout into voids by grinding surface. In a swirling motion, finish surface with a cork float.
- E. Float Finish: Consolidate surface with power-driven floats or by hand floating if area is small or inaccessible to power driven floats. Restraighten, cut down high spots, and fill low spots. Repeat float passes and restraightening until surface is left with a uniform, smooth, granular texture.
 - 1. Apply float finish to surfaces indicated, to receive trowel finish and to be covered with fluid-applied or sheet waterproofing, built-up or membrane roofing, or sand-bed terrazzo.
- F. Smooth Trowel Finish: After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance. Grind smooth any surface defects that would telegraph through applied coatings.
- G. Broom Finish: Provide a light broom finish on all exposed surfaces on curbs when not noted to receive a specific finish listed above. Draw a soft-bristle broom across float-finished concrete surface perpendicular to line of traffic to provide a uniform, fine-line texture.

- H. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces, unless otherwise indicated.

3.4 CONCRETE PROTECTING AND CURING

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 301 for hot-weather protection during curing.
- B. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.
- C. Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces. If forms remain during curing period, moist cure after loosening forms. If removing forms before end of curing period, continue curing for the remainder of the curing period.
- D. Unformed Surfaces: Begin curing immediately after finishing concrete. Cure unformed surfaces, including floors and slabs, concrete floor toppings, and other surfaces.
- E. Cure concrete according to ACI 308.1, by one or a combination of the following methods:
 - 1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:
 - a. Water.
 - b. Continuous water-fog spray.
 - c. Absorptive cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with 12-inch lap over adjacent absorptive covers.
 - 2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period using cover material and waterproof tape.
 - a. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive floor coverings.
 - b. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive penetrating liquid floor treatments.
 - c. Cure concrete surfaces to receive floor coverings with either a moisture-retaining cover or a curing compound that the manufacturer certifies will not interfere with bonding of floor covering used on Project.
 - 3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.
 - a. After curing period has elapsed, remove curing compound without damaging concrete surfaces by method recommended by curing compound manufacturer unless manufacturer certifies curing compound will not interfere with bonding of floor covering used on Project.

3.5 JOINT FILLING

- A. Prepare, clean, and install joint filler according to manufacturer's written instructions.
 - 1. Defer joint filling until concrete has aged at least one month(s). Do not fill joints until construction traffic has permanently ceased.
- B. Remove dirt, debris, saw cuttings, curing compounds, and sealers from joints; leave contact faces of joint clean and dry.

- C. Install semirigid joint filler full depth in saw-cut joints and at least 2 inches deep in formed joints, unless noted otherwise in documents. Overfill joint and trim joint filler flush with top of joint after hardening.

3.6 CONCRETE SURFACE REPAIRS

- A. Defective Concrete: Repair and patch defective areas when approved by Landscape Architect. Remove and replace concrete that cannot be repaired and patched to Landscape Architect's approval.
- B. Patching Mortar: Mix dry-pack patching mortar, consisting of one part portland cement to two and one-half parts fine aggregate passing a No. 16 sieve, using only enough water for handling and placing.
- C. Repairing Formed Surfaces: Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycombs, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning.
 - 1. Immediately after form removal, cut out honeycombs, rock pockets, and voids more than 1/2 inch in any dimension in solid concrete, but not less than 1 inch in depth. Make edges of cuts perpendicular to concrete surface. Clean, dampen with water, and brush-coat holes and voids with bonding agent. Fill and compact with patching mortar before bonding agent has dried. Fill form-tie voids with patching mortar or cone plugs secured in place with bonding agent.
 - 2. Repair defects on surfaces exposed to view by blending white portland cement and standard portland cement so that, when dry, patching mortar will match surrounding color. Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching. Compact mortar in place and strike off slightly higher than surrounding surface.
 - 3. Repair defects on concealed formed surfaces that affect concrete's durability and structural performance as determined by Landscape Architect.
- D. Repairing Unformed Surfaces: Test unformed surfaces, such as floors and slabs, for finish and verify surface tolerances specified for each surface. Correct low and high areas. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.
 - 1. Repair finished surfaces containing defects. Surface defects include spalls, popouts, honeycombs, rock pockets, crazing and cracks in excess of 0.01 inch wide or that penetrate to reinforcement or completely through unreinforced sections regardless of width, and other objectionable conditions.
 - 2. After concrete has cured at least 14 days, correct high areas by grinding.
 - 3. Correct localized low areas during or immediately after completing surface finishing operations by cutting out low areas and replacing with patching mortar. Finish repaired areas to blend into adjacent concrete.
 - 4. Correct other low areas scheduled to receive floor coverings with a repair underlayment. Prepare, mix, and apply repair underlayment and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface. Feather edges to match adjacent floor elevations.
 - 5. Correct other low areas scheduled to remain exposed with a repair topping. Cut out low areas to ensure a minimum repair topping depth of 1/4 inch to match adjacent floor elevations. Prepare, mix, and apply repair topping and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.
 - 6. Repair defective areas, except random cracks and single holes 1 inch or less in diameter, by cutting out and replacing with fresh concrete. Remove defective areas with clean, square cuts and expose steel reinforcement with at least a 3/4-inch clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding agent. Mix patching concrete of same materials and mixture as original concrete except without coarse aggregate. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.
 - 7. Repair random cracks and single holes 1 inch or less in diameter with patching mortar. Groove top of cracks and cut out holes to sound concrete and clean off dust, dirt, and

loose particles. Dampen cleaned concrete surfaces and apply bonding agent. Place patching mortar before bonding agent has dried. Compact patching mortar and finish to match adjacent concrete. Keep patched area continuously moist for at least 72 hours.

- E. Perform structural repairs of concrete, subject to Landscape Architect's approval, using epoxy adhesive and patching mortar.
- F. Repair materials and installation not specified above may be used, subject to Architect's approval.

3.7 FIELD QUALITY CONTROL

- A. Field inspection and testing will be performed in accordance with ACI 301 and under the provisions of the General Conditions.
- B. CONTRACTOR shall provide free access to the Work and cooperate with the appointed testing firm.
- C. Submit proposed mix design of each class of concrete to inspection and testing firm for review prior to commencement of Work.
- D. Tests of cement and aggregates may be performed to ensure conformance with specified requirements.
- E. Four concrete test cylinders will be taken for every 75 or less cubic yards of each class of concrete placed.
 - 1. When multiple trucks are used in a given day, evenly distribute the test cylinders between the number of trucks being used for that day.
- F. One additional test cylinder will be taken during cold weather concreting, cured on job site under same conditions as concrete it represents.
- G. One slump test will be taken for each set of test cylinders taken.
- H. One air content test for each load of concrete at point of discharge or when indication of change requires.
- I. Concrete Tests: Testing of composite samples of fresh concrete obtained according to ASTM C 172 shall be performed according to the following requirements:
 - 1. Testing Frequency: Obtain one composite sample for each day's pour of each concrete mixture exceeding 5 cu. yd., but less than 25 cu. yd., plus one set for each additional 50 cu. yd. or fraction thereof.
 - a. When frequency of testing will provide fewer than five compressive-strength tests for each concrete mixture, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.
 - 2. Slump: ASTM C 143/C 143M; one test at point of discharge for each composite sample, but not less than one test for each day's pour of each concrete mixture. Perform additional tests when concrete consistency appears to change or is questionable.
 - a. Determine initial slump prior to any water addition to concrete at Project site and before any significant concrete discharge.
 - b. Measure and record water added to concrete on Project site and resulting slump.
 - c. Record amount of water indicated on batch ticket allowed to be added.
 - 3. Air Content: ASTM C 231, pressure method, for normal-weight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
 - 4. Concrete Temperature: ASTM C 1064/C 1064M; one test hourly when air temperature is 40 deg F and below and when 80 deg F and above, and one test for each composite sample.
 - 5. Unit Weight: ASTM C 567, fresh unit weight of structural lightweight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
 - 6. Compression Test Specimens: ASTM C 31/C 31M.
 - a. Cast and laboratory cure five standard cylinder specimens for each composite sample.

- b. Testing Agency shall be responsible for providing curing container for composite samples on Site as required for initial curing period and verifying that standard-cured composite samples are cured in accordance with ASTM C31/C31M. Testing Agency shall document method of initial curing.
 - c. The Contractor shall provide secured space, electrical power, and access for initial curing of test specimens.
- 7. Compressive-Strength Tests: ASTM C 39/C 39M.
 - a. Test one specimen at 7 days, three specimens at 28 days, and hold one specimen for testing at 56 days, if necessary.
 - b. A compressive-strength test shall be the average compressive strength from a set of three specimens obtained from same composite sample and tested at age indicated.
- 8. Strength of each concrete mixture will be satisfactory if every average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi.
- 9. Test results shall be reported in writing to Architect, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work (illustrated via highlighting of elements on structural plans), design compressive strength at 28 days, concrete mixture proportions and materials, concrete unit weight, compressive breaking strength, and type of break for both 7- and 28-day tests. Deviations from the requirements of the Contract Documents shall be clearly identified and described on the reports.
- 10. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but will not be used as sole basis for approval or rejection of concrete.
- 11. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42/C 42M or by other methods as directed by Architect.
- 12. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
- 13. Correct deficiencies in the Work that test reports and inspections indicate does not comply with the Contract Documents.

3.8 SCHEDULE - CONCRETE TYPES

- A. Class "A" concrete shall be steel reinforced and shall include the following:
 - 1. Walls
 - 2. Slabs.
 - 3. Street paving.
 - 4. Girders.
 - 5. Columns.
 - 6. Drilled piers.
 - 7. Thrust blocks.
 - 8. Footings
- B. Class "B" concrete shall be placed without forms or with simple forms, with little or no reinforcing, and shall include the following:
 - 1. Equipment bases.
 - 2. Standard pipe supports (except thrust blocks).
 - 3. Fence post footings.
 - 4. Manhole bases.
 - 5. Pipe encasements.
- C. Class "C" concrete shall be placed with or without forms and shall be unreinforced. It is intended for use in the following applications:

1. Concrete fill.
2. Working slab.

3.9 MODIFICATION AND REPAIR TO EXISTING CONCRETE

A. Cut, repair, reuse, demolish, excavate or otherwise modify parts of the existing structures or appurtenances, as indicated on the Contract Drawings, specified, or necessary to permit completion of the work. Finishes, joints, reinforcements, sealants, etc. are specified under respective sections of Specification. All work shall conform with other requirements of this Section and to detail Drawings.

B. Mix proportions of materials used in the modifications and repair to existing concrete as indicated on the Drawings shall be:

1. When new material other than non-shrink grout is shown to be connected to existing concrete, add the following cement mixtures depending on the depths called for or shown on the Drawings:

- a. Less than or equal to 2 inches in depth.

<u>Material</u>	<u>Volume</u>
Cement	1.0
Sand	2.0
Water	5 gals/200 lbs. cement

- b. Greater than 2 inches to 12 inches in depth.

<u>Material</u>	<u>Volume</u>
Cement	1.0
Pea Gravel	2.5
Sand	2.0
Water	5 gals/200 lbs. cement

- c. Greater than 12 inches in depth.

<u>Material</u>	<u>Volume</u>
Concrete as specified under 2.1	2.0
MATERIALS in this section	

2. Epoxy Bonding Agent

- a. Epoxy bonding agent shall be a two component epoxy adhesive specifically formulated for bonding old concrete to new (plastic) concrete. Component A shall be an epoxy resin and Component B shall be epoxy hardener. The epoxy bonding agent shall be "Sikastix 370, Sikdadur Hi-Mod", by Sika Corporation, Lindhurst, New Jersey; "Pro Bond 821 or 822" by Protex Industries, Denver, Colorado; "Concresive 1170" by Adhesive Engineering Company, San Carlos, California; or equal.
- b. The mixing ratio shall be as recommended by the manufacturer for the ambient temperature when placed. Furnish manufacturer's specific instruction for specific job application and obtain LANDSCAPE ARCHITECT's review prior to purchase.
- c. Epoxy bonding agent shall conform to ASTM C-881 and corresponding tests for bond strength and shrinkage as specified in ASTM C-882, C-883, and C-884.
- d. The properties of the cured material shall meet the following:
 - 1) Compressive Strength (ASTMD-695)
 - 48hour - 1000 psi
 - 28day - 7000 psi
 - 2) Tensile Strength (ASTM D-638)
 - 7 day - 4000 psi
 - 3) Bond Strength (ASTM C-882 or C-884) - 1500 psi

- e. Approval requirements - The CONTRACTOR must furnish notarized certification that the material proposed for use meets all of the above requirements and that the material has been previously used successfully for the purpose described.
- 3. Epoxy Protectant - Sikagard 62 by Sika Chemical Corporation, Lindhurst, New Jersey, or equal.
- C. Demolition of Existing Concrete shown to be removed on the Drawings shall be done by Sawcutting at limits of concrete as indicated on the Drawings. The CONTRACTOR shall be responsible for removing concrete in such a manner that surrounding concrete or existing reinforcing to be left in place and existing in place equipment is not damaged.
- D. Connection to Existing Concrete
 - 1. Roughen surface of existing concrete to be connected to new materials by sandblasting, chipping, or scarifying. Thoroughly clean area of concrete to receive new materials of loose particles and dust or other contaminating objects.
 - 2. Existing reinforcing to be left in place as shown on the Drawings shall be wire brushed to remove rust or concrete on the bar. The existing reinforcing shall be cut, bent, lapped, or welded to new reinforcing as shown on the Drawings and provided with a minimum of 1 inch of cover all around and at ends of the bar. The reinforcing shall be thoroughly cleaned of loose particles and dust before incorporating in new materials.
 - 3. After existing concrete surface has been roughened and cleaned as specified above, apply epoxy bonding agent at connection surface. The field preparation and application of the epoxy bonding agent shall conform strictly with the manufacturer's recommendations. Immediately pour new cement mixture or non-shrink grout as detailed on the Drawings.

END OF SECTION 03 31 01

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SECTION 05 12 23

STRUCTURAL STEEL FOR BUILDINGS

PART 1 - GENERAL

1.01 DESCRIPTION

- A. All work under this Section shall be performed entirely under one sub-contract, the scope of which shall include the production of shop drawings, the fabrication of all steel members and the erection of all structural and miscellaneous steel members.
- B. Work is to include all structural steel framing members, support members, with required bracing welds, fasteners, base plates, bearing plates, anchor bolts, and miscellaneous structural steel items.

1.02 APPLICABLE STANDARDS

- A. American Institute of Steel Construction
 - 1. AISC Manual of Steel Construction, 13th Edition
 - 2. AISC Code of Standard Practice for Steel Buildings and Bridges, latest edition.
- B. American Society for Testing and Materials:
 - 1. ASTM A 992 for structural steel wide flange shapes
 - 2. ASTM A 36 for miscellaneous structural steel plates and shapes
 - 3. ASTM A572 for structural steel where specified on plans
 - 4. ASTM A-233 Class E70XX series electrodes for manual arc welding and Grade SAW-1 submerged arc processed shall be used.
 - 5. ASTM A307 for unfinished bolts
 - 6. ASTM A325 for high strength bolts
 - 7. ASTM C827 for non-shrink and non-metallic grout
 - 8. ASTM C191 for non-shrink and non-metallic grout
 - 9. ASTM A500, Grade B hollow structural shapes
 - 10. ASTM A501 steel pipe

1.03 QUALITY ASSURANCE

- A. The Owner shall retain the services of a testing laboratory of recognized standing to do the specified inspection and furnish to the Architect, in triplicate, reports of all

inspections with complete summary of results. The Contractor shall coordinate all work required of the testing laboratory.

- B. The testing laboratory shall visually inspect all field welds and all bolted connections for compliance with the details shown on the Plans and the requirements of the AISC.
- C. The Owner reserves the right to employ an independent testing laboratory to gamma ray or magna-flux all welds. Any welds found to be inadequate shall be removed and replaced by the Contractor at no additional cost to the Owner.
- D. Welds shall be made according to requirements of the American Welding Society. Welders shall be certified for this project as qualified structural welders according to the requirements of the American Welding Society by an independent testing laboratory approved by the Architect. Copies of the certificates for each field welder shall be furnished to the Architect.
- E. Mill certificates for all structural steel are to be available to the Architect for his review.

1.04 SUBMITTALS

- A. The fabricator shall furnish and submit five (5) copies of shop drawings showing all details necessary for erection and fabrication of his work to the Architect for his approval. Reproductions of the contract structural drawings for erection plans and details will not be permitted without the approval of the Engineer. Detailing shall be performed by experienced detailers. Erection plans, erection details, and detailing shall be clear and easily readable. One copy will be returned marked for corrections or as approved. Copies of approved drawings shall be furnished the job as needed. If it is apparent to the Architect or Structural Engineer that the Contractor has not thoroughly checked the shop drawings prior to submittal, the Contractor will be notified to resubmit a set that has been properly checked, and the previous submittal will be abandoned. Only complete sets of shop drawings will be reviewed unless an agreement to check partial submittals is obtained prior to the first submittal. Do not fabricate any material until approval of the Architect has been obtained.

1.05 PRODUCT HANDLING

- A. Store above ground on suitable supports and keep free of foreign material and corrosion as far as practicable.

1.06 JOB CONDITIONS

- A. All dimensions requiring verification from the work as installed shall be verified from the shop drawings of such work or from the building by the Contractor. Contractor to verify dimensions in field and field conditions. Indicate on shop drawings this has been done.
- B. All work under this Division of the specification shall be installed at the proper time and as rapidly as the progress of the adjacent and connecting work will permit. All

brackets, anchors, bolts, inserts, straps, and all other items to be installed in masonry or concrete shall be built in as the masonry or concrete is constructed.

- C. Verify existing structural members are permanently braced and supported before installation of new structural members. Note that all structural steel is not self-supporting as defined by the Code of Standard Practice. The cold-formed steel framing and shear walls are required for stability.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Structural Steel shall be new sections that conform to the current Specifications of ASTM A992, ASTM A36, ASTM A500 or ASTM A572 as specified on the plans.
- B. High strength bolts shall conform to ASTM Specification A325- N.
- C. Welds shall be E70XX Series electrodes for manual arc welding and grade SAW-1 for submerged arc process.
- D. All bolts not indicated otherwise on plans are 3/4". All connections not noted otherwise on plans shall be framed connections.
- E. Grout for base plates shall be precision, premixed, non-shrink and non-metallic in conformance with ASTM C827. Grout shall be easily workable as well as being made flowable with an initial setting time of not less than 45 minutes and shall meet the requirements of ASTM C191. Grout shall have a 14 day compressive strength of 6000 psi when mixed to its flowable state.
- F. Primer:
 - 1. Paint shall be Tnemec No. 99, Rust Oleum No. 960, or Indurall Indurust Primer No. H-1319. Surface Preparation shall be in accordance with manufacturer's instructions.
 - 2. Where sprayed on fire-proofing is specified the paint shall be suitable for its adhesion.
- G. Galvanizing:

Provide a zinc coating for all exterior steel exposed to the weather and those items shown or specified to be galvanized on the drawings as follows:

 - 1. ASTM A 153 for galvanizing iron and steel hardware.
 - 2. ASTM A 123 for galvanizing rolled, pressed and forged steel shapes, plates, bars and strip 1/8" thick and heavier.
 - 3. ASTM A 386 for galvanizing assembled steel products.
 - 4. ASTM A 446, Grade 90 for sheet steel

PART 3 - EXECUTION

3.01 FABRICATION

- A. All workmanship shall be equal to the best practice in modern structural shops. As a minimum required all structural steel work shall conform to the specifications of "American Institute of Steel Construction" (AISC).
- B. Shop connections shall be welded. Field connections shall be bolted unless welded connections are indicated on plans. Welded connections shall be detailed consistent with requirements of the American Welding Society. Bolted connections shall be proportioned as shown in AISC Manual, using three-fourths inch (3/4") unless shown otherwise on plans.
- C. Shop and field welders shall have been recently certified as qualified structural welder according to requirements of the American Welding Society.
- D. Any splices not shown on the drawings shall be indicated clearly on the shop drawings and shall be made only with the approval of the architect and/or engineer.
- E. The general contractor is to verify the sizes and locations of all required floor and roof openings, equipment supports, etc. with the various subcontractors. Any conditions which require revisions or additions to the structural framing are to be brought to the attention of the architect and structural engineer prior to any construction. Any cost for the required structural changes will be borne by the general contractor.
- F. Unless otherwise detailed on the Plans, the fabricator shall design the frames for floor openings for the appropriate live and dead loads plus the weight of any mechanical or electrical equipment, ducts, pipes, etc.
- G. If a member size has been inadvertently omitted from the Plans, the fabricator shall contact the Structural Engineer for the required size prior to submittal of his bid proposal.
- H. Erection marks shall be painted on all structural members.
- I. Provide all necessary erection clips, angles, seats, etc., to properly erect structural steel.
- J. Welding shall be in accordance with the requirements of the American Welding Society with all possible welding performed in the shop.
- K. Provide one shop coat of paint to all structural members, connectors, angles, etc., except those members required to be galvanized. Thickness shall be at least 2.0 - 3.0 mil dry film. All steel shall be cleaned in accordance with SSPC-SP3 so as to remove all loose mill scale, rust, weld slag, etc., prior to painting.
- L. Fabricator shall obtain written approval from the manufacturer or applicator of any specified sprayed-on fire-proofing material that the paint to be used for the shop

coat is suitable for the adhesion of the sprayed-on material and a copy of same shall be submitted to the Architect.

- M. The contractor shall make measurements in the field to verify or supplement dimensions shown on the drawings, and he shall be responsible for proper measurements and fit of all items.
- N. Over masonry openings for windows, doors, ducts, grilles, louvers, recesses in masonry walls, and where indicated or required, provide structural steel angles, channels, and shapes to properly support adjacent work. Where loose lintel angles occur in pairs, they shall have bolts and separators.
- O. For those items required to be galvanized, apply a high zinc dust content paint for re-galvanizing welds in galvanized steel, complying with the Military Specification MIL-P-21035 (Ships).

3.02 ERECTION

- A. Provide false work, temporary bracing, and all tools, machinery and appliances, necessary for the expeditious handling of the work. False work and temporary bracing shall be properly designed and substantially constructed and maintained for the loads which will come upon it and shall remain in place until all permanent bracing is in place. The structural steel for this project is not self-supporting. The erector is responsible to ensure the structural steel is adequately braced and shored until all steel joist framing, metal decking and concrete masonry unit walls are installed that provide lateral or vertical stability for the structural steel.
- B. Bolts shall be installed using a hardened washer under the turned element and shall be tightened as per the requirements of the AISC.
- C. Steel furnished shall be true and free of twists, bends, and open joints between components parts. Material shall be thoroughly straightened in the shop before being laid out or worked in any way.
- D. Each piece or member shall be properly identified by a mark and direction of setting. Contractor shall check each piece for conformity to plans and dimensions to maintain proper location, alignment and level.
- F. All members shall be set plumb and true to exact level, or slope if required, and checked by instrument. Grout base plates solidly with approved non-shrinking grout. Set bearing plates in mortar consisting of Portland Cement and sand.
- G. After erection, nuts, bolt heads, and burs or abraded spot shall be spot painted with above mentioned paint.

END OF SECTION 051223

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SECTION 06 10 00
ROUGH CARPENTRY

PART 1 – GENERAL

1.01 SUMMARY

- A. Provide wood, nails, bolts, screws, framing anchors and other items and perform rough carpentry for the construction shown on the Drawings, as specified herein and as needed for complete and proper installation.

1.02 QUALITY ASSURANCE

- A. Use adequate number of skilled workmen who are thoroughly trained and experienced in the necessary crafts who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this section.
- B. Codes and standards:
 - 1. In addition to complying with all pertinent codes and regulations of agencies having jurisdiction, comply with:
 - a. Western Wood Products Association "Product Use Manual";
 - b. American Plywood Association "Plywood Specification and Grade Guide."

1.03 DELIVERY STORAGE AND HANDLING

- A. Protection:
 - 1. Deliver the materials to the job site and store, in a safe area, out of view of the way of traffic, and shored up off the ground surface.
 - 2. Identify framing lumber as to grades, and store each grade separately from other grades.
 - 3. Protect materials with adequate waterproof outer wrapping.
 - 4. Use extreme care in off loading of lumber to prevent damage, splitting and breaking of materials.

PART 2 – PRODUCTS

2.01 LUMBER MATERIALS

- A. Use lumber, S4S, S-Dry unless otherwise indicated, grade marked complying with the following requirements:
 - 1. Girder Framing: No. 2, Southern Pine
 - 2. Joist Framing: No 2, Southern Pine

3. Rafter Framing: No. 2, Southern Pine
4. Studding: "Stud" or No. 3 Structural Light Framing grade, any species graded under WWP, WCLIB, SPIB or NLGA rules.
5. Non-structural light framing: Standard grade or better. No utility grade.
6. Concealed boards: Standard grade, any species graded under WWP rules or No. 3 grade southern pine graded under SPIB rules.
7. Sill boards: Pressure treated.
8. Structural light framing: No. 2 or better.
9. Lumber for misc. uses: Unless otherwise indicated, use standard grade lumber for support of other work including bucks, nailer, blocking, furring, grounds, stripping and similar members.

2.02 SHEATHING MATERIALS

- A. Plywood sheathing: Use APA rated, PS-1 or APA PRP-108
- B. Particleboard: Exterior type 2-M, ANSI A208.1
- C. Hardboard: ANSI/AHA A135.6
- D. Subflooring: APA rated plywood sheathing, exterior, thickness as noted on drawings.
- E. Roof sheathing: APA rated plywood, exterior, thickness as noted on drawings.
- F. Underlayment:
 1. Shingle Roof Underlayment: Dupont Roof Liner, Everbilt, GAF Feltbuster, Certaineed Roof Runner or approved equal.
 2. Ice & Water Shield Underlayment: Grace Vycor Ice and Watershield by Certaineed, Stormguard Polypropylene Underlayment by GAF, Weatherlock Mat by Owens Corning or approved equal.

2.03 MANUFACTURED LUMBER

- A. Glued Laminated Beams: Use visually graded southern pine 24F-V5

2.05 ACCESSORIES

- A. Fasteners: Galvanized steel for exterior, high humidity, and treated wood locations. Plain finish elsewhere.
- B. Joist hangers: Galvanized steel, sized to suit framing.
- C. Anchors:

1. Hollow Masonry: Toggle bolt.
 2. Solid Masonry or Concrete: Expansion shield lag bolt.
 3. Steel: Bolt or ballistic fastener.
- D. Sill gasket on top of foundation wall: Glass fiber strip, width equal to plate dimension.
 - E. Sill flashing: Galvanized steel or aluminum.
 - F. Subfloor glue: APA AFG-01, solvent base, waterproof.
 - G. Moisture Barrier: Tyvek for Brick, Perma Pro or approved equal.
 - H. Termite Shield: Galvanized sheet steel or aluminum.

2.06 WOOD TREATMENT

- A. Fire retardant: AWPA Standard U1, Use Category UCFB.
- B. Wood preservative, pressure treatment: AWPA Standard U1 with the specific Use Category determined based on the exposure as noted on the drawings.
- C. Wood preservative, surface application: Type and color as specified by Architect.

2.07 OTHER MATERIALS

- A. Provide other materials not specifically described but required for complete and proper installation as selected by the Contractor subject to approval of the Architect.

PART 3 – EXECUTION

3.01 SURFACE CONDITIONS

- A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.

3.02 WORKMANSHIP

- A. Install rough carpentry work to comply with the 2021 International Building Code.
- B. Produce joints which are tight, true and well nailed, with members assembled in accordance with the Drawings and with all applicable codes and regulations.

3.03 FRAMING

- A. Do not shim any framing component.
- B. Frame double joist headers at floor and ceiling openings. Frame rigidly into joists. Frame double joists under wall studding.

- C. Curb all roof openings except where curbs are provided. Construct curbs of single members per side.
- D. Install blocking as required to support items of finish and to cut off draft openings, both vertical and horizontal, between ceiling and floor areas.
- E. On framing members to receive a finished surface, align the finish substrate to vary not more than 1/8 inch from the plane of surfaces of adjacent furring and framing members.

3.04 INSTALLATION OF PLYWOOD SHEATHING

- A. Placement: Place plywood with the face grain perpendicular to supports and continuously over at least two supports. Center joints accurately over supports.
- B. Protect plywood from moisture by use of waterproof covering until the plywood has been covered by the next component.
- C. Place building paper between underlayment and subflooring.
- D. Place building paper over wall sheathing, weather lap joints and end laps, staple in place.

END OF SECTION 061000

SECTION 06 10 63

EXTERIOR ROUGH CARPENTRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Wood Fence & Gate

1.3 DEFINITIONS

- A. Boards: Lumber of less than 2 inches nominal in thickness and 2 inches nominal or greater in width.
- B. Dimension Lumber: Lumber of 2 inches nominal or greater but less than 5 inches nominal in least dimension.
- C. Timber: Lumber of 5 inches nominal or greater in least dimension.
- D. Lumber grading agencies, and the abbreviations used to reference them, include the following:
 - 1. NeLMA: Northeastern Lumber Manufacturers' Association.
 - 2. NLGA: National Lumber Grades Authority.
 - 3. RIS: Redwood Inspection Service.
 - 4. SPIB: The Southern Pine Inspection Bureau.
 - 5. WCLIB: West Coast Lumber Inspection Bureau.
 - 6. WWP: Western Wood Products Association.

1.4 ACTION SUBMITTALS

- A. Product Data: For preservative-treated wood products. Include chemical treatment manufacturer's written instructions for handling, storing, installing, and finishing treated material.

1.5 INFORMATIONAL SUBMITTALS

- A. Certificates of Inspection: Issued by lumber grading agency for exposed wood products not marked with grade stamp.
- B. Evaluation Reports: For preservative-treated wood products, from ICC-ES.

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1.6 QUALITY ASSURANCE

- A. Lumber Manufacturer Qualifications: A qualified manufacturer that is certified for chain of custody by an FSC-accredited certification body.
- B. Lumber Vendor Qualifications: A vendor that is certified for chain of custody by an FSC-accredited certification body.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Store materials under cover and protected from weather and contact with damp or wet surfaces. Stack lumber flat with spacers between each bundle to provide air circulation. Provide for air circulation around stacks and under coverings.

PART 2 - PRODUCTS

2.1 LUMBER, GENERAL

- A. Comply with DOC PS 20 and with grading rules of lumber grading agencies certified by ALSC's Board of Review as applicable. If no grading agency is indicated, comply with the applicable rules of any rules-writing agency certified by ALSC's Board of Review.
 - 1. Factory mark each item with grade stamp of grading agency.
 - 2. For items that are exposed to view in the completed Work, mark grade stamp on end of each piece omit grade stamp and provide certificates of grade compliance issued by grading agency.
 - 3. Where nominal sizes are indicated, provide actual sizes required by DOC PS 20 for moisture content specified. Where actual sizes are indicated, they are minimum dressed sizes for dry wood products.
 - 4. Provide dressed lumber, S4S, unless otherwise indicated.
- B. Certified Wood: Boards and dimension lumber shall be certified as "FSC Pure" according to FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship," and to FSC STD-40-004, "FSC Standard for Chain of Custody Certification."
- C. Maximum Moisture Content:
 - 1. Boards: 15 percent.
 - 2. Dimension Lumber: 15 percent
 - 3. Timber: 19 percent

2.2 DIMENSIONAL LUMBER FRAMING

- A. Hand select wood for freedom from characteristics, on exposed surfaces and edges, that would impair finish appearance, including decay, honeycomb, knot holes, shake, splits, torn grain, and wane.
- B. Dimension Lumber or Timber: Construction or No. 2 grade and any of the following species:
 - 1. Species: Treated Southern Yellow Pine, Black Locust, or Gingerwood.

2.3 PRESERVATIVE TREATMENT

- A. Pressure treat boards and dimension lumber with waterborne preservative according to AWPA U1; Use Category UC3b for exterior construction not in contact with the ground, and Use Category UC4a for items in contact with the ground.
- B. Preservative Chemicals: Acceptable to authorities having jurisdiction.
 - 1. Do not use chemicals containing arsenic or chromium
- C. Use process that includes water-repellent treatment.
- D. After treatment, redry dimension lumber to 15 percent maximum moisture content and timbers to 19 percent maximum moisture content.
- E. Mark treated wood with treatment quality mark of an inspection agency approved by ALSC's Board of Review.
- F. Application: Treat items indicated on Drawings.

2.4 FASTENERS

- A. General: Provide fasteners of size and type indicated, acceptable to authorities having jurisdiction, and that comply with requirements specified in this article for material and manufacture. Provide nails or screws, in sufficient length, to penetrate not less than 1-1/2 inches into wood substrate.
 - 1. Use stainless steel unless otherwise indicated.
- B. Nails: ASTM F 1667.
- C. Power-Driven Fasteners: ICC-ES AC70.
- D. Wood Screws and Lag Screws: ASME B18.2.1, ASME B18.6.1, or ICC-ES AC233.
- E. Stainless-Steel Bolts: ASTM F 593, Alloy Group 1 or 2 (ASTM F 738M, Grade A1 or Grade A4); with ASTM F 594, Alloy Group 1 or 2 (ASTM F 836M, Grade A1 or Grade A4) hex nuts and, where indicated, flat washers.
- F. Postinstalled Anchors: Stainless-steel, anchors with capability to sustain, without failure, a load equal to 6 times the load imposed when installed in unit masonry assemblies and equal to 4 times the load imposed when installed in concrete as determined by testing according to ASTM E 488 conducted by a qualified independent testing and inspecting agency.
 - 1. Stainless-steel bolts and nuts complying with ASTM F 593 and ASTM F 594, Alloy Group 1 or 2 (ASTM F 738M and ASTM F 836M, Grade A1 or Grade A4).

2.5 METAL ACCESSORIES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following
 - 1. Cleveland Steel Specialty Co.
 - 2. KC Metals Products, Inc.
 - 3. Phoenix Metal Products, Inc.

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- B. Galvanized-Steel Sheet: Hot-dip, zinc-coated steel sheet complying with ASTM A 653/A 653M, G185 coating designation.
- C. Stainless-Steel Sheet: ASTM A 666, Type 316.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Set work to required levels and lines, with members plumb, true to line, cut, and fitted. Fit work to other construction; scribe and cope as needed for accurate fit.
- B. Framing Standard: Comply with AF&PA WCD1 unless otherwise indicated.
- C. Install metal framing anchors to comply with manufacturer's written instructions.
- D. Do not splice structural members between supports unless otherwise indicated.
- E. Provide blocking and framing as indicated and as required to support facing materials, fixtures, specialty items, and trim.
- F. Sort and select lumber so that natural characteristics do not interfere with installation or with fastening other materials to lumber. Do not use materials with defects that interfere with function of members or pieces that are too small to use with minimum number of joints or optimum joint arrangement.
- G. Apply copper naphthenate field treatment to comply with AWWPA M4, to cut surfaces of preservative-treated lumber.
- H. Securely attach exterior rough carpentry work to substrate by anchoring and fastening as indicated, complying with the following:
 - 1. ICC-ES AC70 for power-driven fasteners.
 - 2. "Fastening Schedule" in ICC's International Building Code.
 - 3. "Fastener Schedule for Structural Members" and "Alternate Attachments" in ICC's International Residential Code for One- and Two-Family Dwellings.
- I. Use common wire nails unless otherwise indicated. Select fasteners of size that do not fully penetrate members where opposite side is exposed to view. Make tight connections between members. Install fasteners without splitting wood; do not countersink nail heads unless otherwise indicated.

END OF SECTION 061063

SECTION 06 20 13

EXTERIOR FINISH CARPENTRY

PART 1 GENERAL

1.1 SUMMARY

- A. Provide exterior finish carpentry.

1.2 SUBMITTALS

- A. Product Data: Submit manufacturer's product data and installation instructions for each material and product used.
- B. Shop Drawings: Submit shop drawings indicating material characteristics, details of construction, connections, and relationship with adjacent construction.
- C. Samples: Submit two representative samples of each material specified indicating visual characteristics and finish. Include range samples if variation of finish is anticipated.

1.3 QUALITY ASSURANCE

- A. Comply with governing codes and regulations. Provide products of acceptable manufacturers which have been in satisfactory use in similar service for three years. Use experienced installers. Deliver, handle, and store materials in accordance with manufacturer's instructions.
- B. Preservative Treatment: Nonpressure method, exterior type, AWPA N1.
- C. Mock-Ups: Provide mock-up as required to demonstrate quality of workmanship of each type of finish carpentry.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Exterior Standing and Running Trim and Rails:
 - 1. Manufacturers: AZEK Corporation, James Hardie, Westlake Royal Building Products, TruExterior; or approved equal.
 - 2. Type: Lap Siding – Thicker Artisan type style as shown in drawings.
 - 3. Type: Trim - Hardie Board as called out and sized in drawings.
 - 4. Type: Crown Mould - Azek or Wood as called out and sized in drawings.
 - 5. Type: Soffit Panel – Hardie Soffit, non-vented and sized in drawings.
 - 6. Surface - Smooth.
 - 7. Species for Opaque Finish: Clear Spanish Cedar.
 - 8. Finish: Pre-primed & Opaque.
- B. Exterior Wood Door Frames:
 - 1. Species for Opaque Finish: Clear Spanish Cedar.
 - 2. Finish: Opaque.
- C. Exterior Shutters: Refer to Sht. A1/A220.

1. Manufacturers: Hardware Solutions, Houma, Louisiana or approved equal.
2. Species for Opaque Finish: Accoya wood.
3. Hardware: SPS.
4. Finish: Opaque.

D. Exterior Composite Columns:

1. Manufacturers: HB&G & Turncraft or approved equal.
2. Type: Polyester Resin Stone Composite. Refer to drawings for size.
3. Surface: Smooth.

E. Exterior Pre-Engineered Wood Post:

1. Manufacturers: Cox Industries, Prime Columns Engineered Wood Products, Inc. or approved equal.
2. Species: No. 1 grade syp, treated pre-engineered wood post. Refer to drawings for size.
3. Finish: Pre-primed only.
4. Accessories: Refer to drawings for post base.

F. Exterior Fasteners:

1. Nails: Stainless steel, aluminum or hot-dip galvanized siding nails.
2. Screws and Anchors: Noncorrosive, type required for secure anchorage.
3. As required by manufacturers of selected material.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Provide work to sizes, shapes, and profiles indicated. Install work to comply with quality standards referenced. Back prime work and install plumb, level and straight with tight joints; scribe work to fit.
- B. Install materials and systems in accordance with manufacturer's instructions and approved submittals. Install materials and systems in proper relation with adjacent construction. Use non-corrosive fasteners for exterior work. Coordinate with work of other sections.
- C. Comply with manufacturer's requirements for cutting, handling, fastening and working treated materials.
- D. Repair minor damage, clean and protect.

END OF SECTION

SECTION 06 40 23

INTERIOR ARCHITECTURAL WOODWORK

PART 1 GENERAL

1.1 SUMMARY

- A. Provide interior finish carpentry.

1.2 SUBMITTALS

- A. Product Data: Submit manufacturer's product data and installation instructions for each material and product used.
- B. Shop Drawings: Submit shop drawings indicating material characteristics, details of construction, connections, and relationship with adjacent construction.
- C. Samples: Submit two representative samples of each material specified indicating visual characteristics and finish. Include range samples if variation of finish is anticipated.

1.3 QUALITY ASSURANCE

- A. Comply with governing codes and regulations. Provide products of acceptable manufacturers which have been in satisfactory use in similar service for three years. Use experienced installers. Deliver, handle, and store materials in accordance with manufacturer's instructions.
- B. Standards: Architectural Woodwork Institute (AWI) "Architectural Woodwork Quality Standards."
- C. Standards: Woodwork Institute (WI) "Manual of Millwork."
- D. Preservative Treatment: Nonpressure method, exterior type, AWPA N1.
- E. Fire-Retardant Treatment:
 - 1. Lumber: AWPA C20, non-corrosive type.
 - 2. Plywood: AWPA C27, non-corrosive type.
 - 3. Particleboard: ASTM E 84, flame spread 20 or less.
- F. Wood Products: Comply with the following:
 - 1. Hardboard: AHA A135.4.
 - 2. Medium-Density Fiberboard: ANSI A208.2, Grade MD-Exterior Glue.
 - 3. Particleboard: ANSI A208.1, Grade M-2-Exterior Glue.
 - 4. Softwood Plywood: DOC PS 1, Medium Density Overlay.
 - 5. Hardwood Plywood and Face Veneers: HPVA HP-1.
- G. Sustainable Design:
 - 1. Recycled content wood fiber.
 - 2. FSC Certified Lumber.
 - 3. Low-emitting materials, adhesives.
 - 4. Low-emitting materials, field-applied paints and coatings.
 - 5. Low-emitting materials, no added urea-formaldehyde.

- H. Mock-Ups: Provide mock-up as required to demonstrate quality of workmanship of each type of finish carpentry.

PART 2 PRODUCTS

2.1 MATERIALS

A. Interior Standing and Running Trim and Rails:

1. Species for Opaque Finish: Poplar, Maple or Birch.
2. Grade: Clear.
3. Site Finish: Opaque finish.

B. Interior Wood Casework:

1. Species for Opaque Finish: Poplar, Maple or Birch.
2. Grade: Clear.
3. Face Style: Shaker panel with bead doors and flush faced beaded drawers.
4. Frame Fabrication: Face frame.
5. Site Finish: Opaque finish.
6. Door: Inset type door and drawers.
7. Interior surfaces of cabinetry to be pre-finished two sided, except for cabinet backs.

C. Interior Casework Hardware and Auxiliary Materials:

1. Manufacturers: Accuride International, Inc.; Blum, Inc.; Grass America, Inc.; Hafele America Co.; Knappe & Vogt Mfg. Co.; or approved equal.
2. Hardware Standard: ANSI/BHMA A156.9.
3. Hardware Finish and Base Metal: Satin chromium plated brass or bronze to match existing.
4. Hinges – “Blum”, 75m 5680 half cranked hinge with 9mm plate or equal.
5. Drawer Glides – “Fulterer”, FR6500 full extension glides or approved equal.

D. Interior Wood Paneling and Wainscots:

1. Grade: Clear.
2. Grade: Poplar, Maple or Birch.
3. Panel: MDF. Refer to drawings for thickness.
4. Style: Flat panel with trim.
5. Site Finish: Opaque finish.

E. Interior Frames and Jambs:

1. Species for Opaque Finish: Poplar, Maple or Birch.
2. Grade: Clear.
3. Site Finish: Opaque finish.

F. Interior Shelving and Closet Specialties:

1. Shelving: Plywood with hardwood edgeband.
2. Closet Rods: Chrome plated steel.

G. Interior Auxiliary Materials:

1. Screws: FS FF-S-111.
2. Nails: FS FF-N-105

3. Anchors: Type required for secure anchorage.
4. Adhesives: Low VOC types.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Provide work to sizes, shapes, and profiles indicated. Install work to comply with quality standards referenced. Back prime work and install plumb, level and straight with tight joints; scribe work to fit.
- B. Quality Standard: Install woodwork to comply with [AWI Section 1700] [WI Manual of Millwork] for the same grade specified for type of woodwork involved.
- C. Install materials and systems in accordance with manufacturer's instructions and approved submittals. Install materials and systems in proper relation with adjacent construction. Use non-corrosive fasteners for exterior work. Coordinate with work of other sections.
- D. Comply with manufacturer's requirements for cutting, handling, fastening and working treated materials.
- E. Repair minor damage, clean and protect.

END OF SECTION

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**SECTION 07 01 50.19
PREPARATION FOR RE-ROOFING**

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Replacement of existing roofing system in preparation for new roofing system in designated areas as indicated on drawings.
- B. Removal of existing flashing and counterflashings.
- C. Temporary roofing protection.
- D. Work will be required to comply with State of Louisiana Roofing requirements.

1.2 RELATED REQUIREMENTS

- A. Section 07 31 13- Fiberglass Reinforced Asphalt Shingles
- B. Section 07 41 13- Metal Roof Panels
- C. Section 07 62 00 - Sheet Metal Flashing and Trim: Replacement of flashing and counterflashings.
- D. Section 07 71 00- Roof Specialities
- E. Section 07 71 23- Manufactureed Gutters and Downspouts
- F. Section 07 72 00- Roof Accessories

1.3 PRICE AND PAYMENT PROCEDURES

1.4 REFERENCE STANDARDS

- A. ASTM C208 - Standard Specification for Cellulosic Fiber Insulating Board; 2022.
- B. ASTM D2178/D2178M - Standard Specification for Asphalt Glass Felt Used in Roofing and Waterproofing; 2015a (Reapproved 2021).
- C. ASTM D312/D312M - Standard Specification for Asphalt Used in Roofing; 2016a (Reapproved 2023).

1.5 ADMINISTRATIVE REQUIREMENTS

- A. Coordinate with affected mechanical and electrical work associated with roof penetrations.
- B. Preinstallation Meeting: Convene one week before starting work of this section.
 - 1. Attendees:
 - a. Architect.
 - b. Contractor.

- c. Owner.
 - d. Installer.
 - e. Roofing system manufacturer's field representative.
 - 2. Meeting Agenda: Provide agenda to participants prior to meeting in preparation for discussions on the following:
 - a. Removal and installation schedule.
 - b. Necessary preparatory work.
 - c. Protection before, during, and after roofing system installation.
 - d. Removal of existing roofing system.
 - e. Installation of new roofing system.
 - f. Temporary roofing and daily terminations.
 - g. Transitions and connection to and with other work.
 - h. Inspections and testing of installed systems.
 - C. Schedule work to coincide with commencement of installation of new roofing system.
- 1.6 SUBMITTALS
- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
 - B. Product Data: Submit for each type of material.
 - C. Shop Drawings: Indicate size, configuration, and installation details.
- 1.7 QUALITY ASSURANCE
- A. Materials Removal Company Qualifications: Company specializing in performing work of type specified with at least Five years of documented experience.
 - 1. Comply with EPA notification regulations prior to start of roofing removal work.
 - 2. Comply with removal and disposal regulations of local authorities having jurisdiction (AHJ).
 - B. Installer Qualifications: Company specializing in performing work of the type specified and with at least Five years of documented experience.
- 1.8 DELIVERY, STORAGE, AND HANDLING
- A. Ensure storage and staging of materials does not exceed static and dynamic load-bearing capacities of roof decking.

1.9 FIELD CONDITIONS

- A. Do not remove existing roofing membrane when weather conditions threaten the integrity of building contents or intended continued occupancy.
- B. Maintain continuous temporary protection prior to and during installation of new roofing system.

1.10 WARRANTY

- A. See Section 01 78 00 - Closeout Submittals and individual specification sections for additional warranty requirements.

PART 2 PRODUCTS

2.1 COMPONENTS

- A. See the following sections for additional information on components relating to this work:
 - 1. Replacement and removal of existing roofing system in preparation for new roofing system in designated areas as indicated on drawings, refer to Section 07 52 00.
 - 2. Remove existing flashing and counterflashings in preparation for replacement of these materials as part of this work, see Section 07 62 00 for material requirements.

2.2 MATERIALS

- A. Patching Materials: Provide necessary materials in accordance with requirements of existing roofing system.
- B. Temporary Roofing Protection Materials:
 - 1. Contractor's responsibility to select appropriate materials for temporary protection of roofing areas as determined necessary for this work.

2.3 ACCESSORIES

- A. Fasteners: Type and size as required and compatible with new roofing system to resist local wind uplift.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that existing roof surface has been cleared of materials being removed from existing roofing system and ready for next phase of work as required.

3.2 PREPARATION

- A. Sweep roof surface clean of loose matter.
- B. Remove loose refuse and dispose of properly off-site.

3.3 MATERIAL REMOVAL

- A. Remove only existing roofing materials that can be replaced with new materials the same day.
- B. Remove metal counter flashings.
- C. Remove damaged portions of roofing membrane, perimeter base flashings, flashings around roof protrusions, pitch pans and pockets, insulation vents, and other roofing roofing accessories damaged by storm.
- D. Remove vapor retarder, sheathing paper, underlay, and base plies.
- E. Repair existing wood deck surface to provide smooth working surface for new roof system.

3.4 INSTALLATION

- A. Coordinate scope of this work with requirements for installation of new roofing system, see Section 07 51 00 for additional requirements.

3.5 FIELD QUALITY CONTROL

- A. Independent agency inspection and testing will be provided under provisions of Section 01 40 00.

3.6 PROTECTION

- A. Provide protection of existing roofing system that is not having work performed on it.
- B. Turn sheeting up and over parapets and curbing. Retain sheeting in position with weights.
- C. Provide for surface drainage from sheeting to existing drainage facilities.

END OF SECTION

**SECTION 071616
CRYSTALLINE WATERPROOFING**

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.1 SUMMARY

- A. Section includes the requirements for crystalline waterproofing admixture for concrete garden pool.
- B. Related Sections:
 - 1. Section 033000 "Cast-in-Place Concrete" for water feature basin to receive waterproofing.
 - 2. Section 079200 "Joint Sealants" for elastomeric and preformed sealants in concrete and concrete unit masonry walls and floors.

1.1 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated. Include material descriptions and installation instructions for crystalline waterproofing.

1.1 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Applicator.
- B. Product Certificates: For waterproofing, patching, and plugging materials, from manufacturer.
- C. Product Test Reports: Based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified testing agency, for crystalline waterproofing.
- D. Field quality-control reports.

1.1 QUALITY ASSURANCE

- A. Applicator Qualifications: A firm experienced in applying crystalline waterproofing similar in material, design, and extent to that indicated for this Project, whose work has resulted in applications with a record of successful in-service performance.
- B. Preinstallation Conference: Contractor shall inform Landscape Architect three (3) days prior to installation.

McNeese President's Residence
Improvements | 1427
19-627-21-01, F.19002606 &
01-107-05B-13, F.01004560 (Supplement)
Site Code: 5-10-004 | State ID : S05519
April 14, 2025

1.1 PROJECT CONDITIONS

- A. Weather Limitations: Proceed with application only when existing and forecasted weather conditions permit crystalline waterproofing to be performed according to manufacturer's written instructions.
- B. Proceed with waterproofing work only after pipe sleeves, vents, curbs, inserts, drains, and other projections through the substrate to be waterproofed have been completed. Proceed only after substrate defects, including honeycombs, voids, and cracks, have been repaired to provide a sound substrate free of forming materials, including reveal inserts.
- C. Ambient Conditions: Proceed with waterproofing work only if temperature is maintained at 40 degrees Fahrenheit or above during work and cure period, and space is well ventilated and kept free of water.

PART 2 - PRODUCTS

2.1 WATERPROOFING MATERIALS

- A. Crystalline Waterproofing: Prepackaged, gray-colored proprietary blend of portland cement, specially treated sand, and active chemicals that, when mixed with water and applied, penetrates into concrete and concrete unit masonry and reacts chemically with the byproducts of cement hydration in the presence of water to develop crystalline growth within substrate capillaries to produce an impervious, dense, waterproof substrate; that has VOC content complying with limits of authorities having jurisdiction; with properties meeting or exceeding the criteria specified below.
 - 1. Products: Subject to compliance with requirements, the contractor shall provide the following:
 - a. Xypex Chemical Corporation; Richmond, B.C., Canada
 - b. Equivalent materials as approved by the architect 7 days prior to acceptance of bids.
 - 2. Water Permeability: No leakage when subjected to pressure of 150 psi for 24 hours. Only 1.5 mm of penetration after 120 hours.
 - 3. Compressive Strength: Minimum 4000 psi at 28 days when tested according to ASTM C 109/C 109M.

2.1 ACCESSORY MATERIALS

- A. Patching Compound: Factory-premixed cementitious repair mortar, crack filler, or sealant recommended by waterproofing manufacturer for filling and patching tie holes, honeycombs, reveals, and other imperfections; compatible with substrate and other materials indicated; and VOC content complying with limits of authorities having jurisdiction.
- B. Plugging Compound: Factory-premixed cementitious compound with hydrophobic properties and recommended by waterproofing manufacturer; resistant to water and moisture but vapor permeable for all standard applications (vertical, overhead, and horizontal surfaces not exposed to vehicular traffic); compatible with substrate and other materials indicated; and VOC content complying with limits of authorities having jurisdiction.

- D. Sand: ASTM C 144.
- E. Polymer Admixture for Protective Topping: Polymer bonding agent and admixture designed to improve adhesion to prepared substrates and not to create a vapor barrier.
- F. Water: Potable.

2.1 MIXES

- A. Crystalline Waterproofing: Add prepackaged dry ingredients to water according to manufacturer's written instructions. Mix together with mechanical mixer or by hand to required consistency.
- B. Crystalline waterproofing admixture shall be added to the concrete at the time of batching. It is recommended that the Admix powder be added first to the rock and sand and blended thoroughly for 2 - 3 minutes before adding cement and water.
- C. Blend total concrete mix using normal practices to ensure formation of homogeneous mixture.
- D. For precast concrete manufacturers this usually means adding the Xypex into their pan type mixers.
- E. For ready-mix batch plants the Xypex Admix can be evenly distributed on a plant conveyor belt carrying the rock and sand, or the dry powder Admix can be added to the truck first and then 30 - 50% of the required water for the concrete batch is dispensed along with 300 - 500 pounds of aggregate and mixed thoroughly for 2 - 3 minutes. The rest of the materials are then added to the truck and mixed for at least 5 minutes.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Applicator present, for suitable conditions where waterproofing is to be applied.
- B. Proceed with application only after unsatisfactory conditions have been corrected.
- C. Notify Architect in writing of active leaks or defects that would affect system performance.

3.1 PREPARATION

- A. Protect other work from damage caused by cleaning, preparation, and application of waterproofing. Provide temporary enclosure as necessary to ensure adequate ambient temperatures and ventilation conditions for application.
- B. Repair damaged or unsatisfactory substrate with patching compound according to manufacturer's written instructions.
- C. Surface Preparation: Comply with waterproofing manufacturer's written instructions to ensure proper

3.1 APPLICATION

- A. General: Comply with waterproofing manufacturer's written instructions for application and curing.
- B. Placement of concrete shall be in accordance with Section 033100
- C. Curing: Concrete that contains Xypex admixture shall be cured as per "Standard for Curing Concrete" (ACI 308).
- D. Normal backfilling procedures may be used after concrete has cured for at least 7 days.

3.1 FIELD QUALITY CONTROL

- A. Inspection: Engage manufacturer's representative to inspect completed application and provide a written report that application complies with manufacturer's written instructions.

END OF SECTION 07 16 16

SECTION 07 21 20
SPRAY-APPLIED FOAM INSULATION

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes spray-applied semi-rigid thermal insulation in new ceiling cavities, applied to underside of new roof deck, encasing rafters and in areas where existing spray-applied insulation requires patching due to removal of existing roof penetrations or installation of new roof penetrations.

1.2 SUBMITTALS

- A. Submit product data, including installation instructions.

1.3 QUALITY ASSURANCE

- A. Applicator Qualifications: You must use an experienced applicator such as ProLevel Foam Insulation LLC who employs only technicians trained and approved by Thermoseal for application of our foam products. 225-413-3777

1.4 PROJECT CONDITIONS

- A. Environmental and Substrate Conditions: Proceed with application of insulation materials when environmental and substrate conditions are within manufacturer's recommendations and requirements.
- B. Protection: Protect against ignition with sheetrock or 15 minute thermal barrier.
- C. Protection of Raw Materials: Protect from freezing or extreme heat. Store components within manufacturer's recommended temperature ranges and conditions.
- D. Ventilation: Comply with manufacturer's ventilation and breathing apparatus requirements for installation and curing of insulation materials.
- E. Protect building and improvements and adjacent items from overspray of materials. Comply with manufacturer's recommended protective measures.

PART 2 - PRODUCTS

2.1 MANUFACTURER

- A. Basis of Design: *Thermoseal TS500*, with chemical components manufactured by Thermoseal LLC, UPC Foam by Universal Polymers Corporation & BASF Foam by BSAF or approved equal.
- B. Products by other manufacturers meeting project requirements and specifications may be provided subject to prior approval

2.2 DESCRIPTION

- A. A two component, open cell spray-applied semi-rigid polyurethane foam plastic system, fully water-blown having a density of 0.5pcf (8kg/m³). The low density insulating cellular plastic is produced from the controlled reaction of polymeric isocyanate (Part A) and resin (Part B). The by-products of the reaction include carbon dioxide and steam, which act as the blowing agent. The effective air-sealing capability of this product comes from the excellent adhesion of the polyurethane to most substrates.
- B. Thickness Required: 3.5 inches in walls for a minimum of R13 and 6 inches under roof decks for an R Value of R19 and Performance Value of P54.

2.3 PERFORMANCE & CHARACTERISTICS

- A. Thermal Performance:
 - 1. Thermal resistance (R Value) per inch: ASTM C 518 - 3.94 ft² h.°F/BTU in.
 - a. 2x4 cavity R13
 - b. 2x6 cavity R21
 - c. 2x6 roof rafters R38
 - 2. Insulation material does not settle, sag nor allow the free passage of air through the wall. The restriction of air movement through the wall allows more effective thermal performance R-value while preventing hot moisture laden air to condense at cold surfaces.
- B. Air Permeability - Air Barrier
 - 1. The fine cellular structure and adhesion of the polyurethane plastic to most building materials of insulation material inhibits the flow of air, thus creating an air impermeable insulation.
 - 2. Air Leakage ASTM E 283: 3½" Thick @ 25 mph - Zero Air Leakage
 - 3. Sustain Wind Load @ 90 mph No Damage
 - 4. Gust Wind Load @ 160 mph No Damage

2.4 TECHNICAL DATA

- A. Density: ASTM D 1622 0.47-0.50 lbs/ft³
- B. Tensile Strength: ASTM D 1623 5.6 lbf/in²
- C. ICC Evaluation requirement for tensile strength is 3 lbf/in² minimum.
- D. Closed Cell Content: ASTM D 2856
- E. ICC Evaluation requirement Closed Cell Content is less than 90%.

2.5 WATER VAPOR PERMEABILITY

- A. Insulation material has a relatively low water vapor permeance. This material is not a vapor barrier and does not entrap moisture in building materials. The low air permeability prevents the movement of moisture laden air to cold surfaces causing condensation. Only in northern climates a vapor barrier may be required.
 - 1. ASTM E 96 Water Vapor Transmission
 - 2. (Dry Cup) 2" 3.6 perms

2.6 WATER ABSORPTION

- A. Do not placed insulation material in areas with direct contact to liquid water. In the event that this product gets wet accidentally, it will eventually dry. Thermal performance of the product will be restored as soon as it is dry. Due to gravity, liquid water will drain through the insulation material.
1. ASTM D 2842 25-50%

2.7 BACTERIAL OR FUNGAL GROWTH

- A. Insulation material shall not provide food source for bacteria or fungi.
- B. ASTM C 1338 No Fungi Growth

2.8 ACOUSTICAL PROPERTIES

- A. Performance in a 2"x6" wood stud wall at frequencies of:
- | 125 | 250 | 500 | 1000 | 2000 | 4000 Hz |
|---------------------------------------|-----|-----|------|------|---------|
| (ASTM E 90) | | | | | |
| Sound Transmission Class (STC) 39 | | | | | |
| 17 | 29 | 37 | 45 | 47 | 48 |
| (ASTM C 423) | | | | | |
| Noise Reduction Coefficient (NRC) .75 | | | | | |
| .28 | .56 | .87 | .69 | .79 | .77 |

2.9 SURFACE BURNING CHARACTERISTICS

- A. Insulation material is a Class I insulation. It shall be separated from the inhabitants by a fifteen minutes thermal barrier. In attics and crawl spaces, the foam may be left exposed as stated in the ICC (ESR 1172). This product showed less flame propagation in the comparative crawl space and corner wall test than Kraft faced fiberglass insulation.
1. ASTM E 84 Tunnel Test 6" Thick Class I.
 2. Flame Spread 19.
 3. Smoke Developed 210.

2.10 CORROSION

- A. Insulation material does not cause corrosion to steel.

2.11 ENVIRONMENTAL/HEALTH/SAFETY

- A. Insulation material contains no formaldehyde or ozone-destroying CFCs, HCFCs, or hydrocarbons. An off-gassing and toxicological assessment has been conducted by government experts, it was determined that the product would be unlikely to cause adverse health problems. This product is certified by the Environmental Choice® Program as an environmentally responsible material.
1. ECP-40 Building Materials: Thermal Insulation

PART 3 - EXECUTION

3.1 EXAMINATION AND PREPARATION

- A. Examine substrates to receive insulation materials.
- B. Do not be apply insulation materials on wet substrates, or substrates covered with frost or ice, loose scales, rust, oil or grease.
- C. Remove surface contaminants that might interfere with bonding of insulation materials.
- D. Make corrections to unsatisfactory conditions.
- E. Seal joints and close off openings to prevent leakage.

3.2 APPLICATION

- A. Comply with manufacturer's written installation instructions.
- B. Sprayed-apply insulation materials on the job site using manufacturer's equipment. This material is applied by authorized contractors using approved applicators trained in the art of proper installation.
- C. Follow manufacturer's recommendations for precautions, protection and curing procedures.

3.3 PROTECTION

- A. Protect installed insulation materials from physical damage and from becoming wet or soiled between phases of the work or after the completed installation. Do not expose to sunlight, except to the extent necessary for period of installation and concealment.

3.4 CLEANING

- A. Remove overspray of insulation materials from surrounding surfaces. Clean work area to remove insulation materials.

END OF SECTION 07 21 20

SECTION 07 30 11
ROOFING UNDERLAYMENT, HIGH-TEMPERATURE

PART 1 GENERAL

1.1 SUMMARY

- A. This Section specifies a self-adhering sheet membrane used as underlayment at asphalt shingles and metal roofs.
- B. Related Sections: Refer to the following specification sections for coordination:
 - 1. Section 06 10 00 - Rough Carpentry.
 - 2. Section 07 31 13 – Fiberglass Reinforced Asphalt Shingles.
 - 3. Section 07 61 00 - Sheet Metal Roofing.
 - 4. Section 07 62 00 - Sheet Metal Flashing and Trim
- C. Referenced Standards: Comply with the requirements of the following standards published by ASTM International to the extent referenced in this section.
 - 1. ASTM D412 - Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers - Tension.
 - 2. ASTM D461 - Standard Test Methods for Felt.
 - 3. ASTM D 903 - Standard Test Method for Peel or Stripping Strength of Adhesive Bonds.
 - 4. ASTM D1970 - Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection.
 - 5. ASTM D3767 - Standard Practice for Rubber—Measurement of Dimensions.
 - 6. ASTM E96 - Standard Test Methods for Water Vapor Transmission of Materials.
 - 7. ASTM G90 – EMMAqua test.

1.2 SUBMITTALS

- A. Product Data: Submit the manufacturer's product data and installation instructions.

1.3 QUALITY ASSURANCE

- A. Regulatory Requirements: Comply with the requirements of authorities having jurisdiction and applicable codes at the location of the project.
- B. Manufacturer: Minimum 10 years experience producing roofing underlayment.
- C. Installer: Minimum 2 years experience with installation of similar underlayment.

1.4 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials and products in unopened factory-labeled packages. Protect from damage.
- B. Cover materials and store in dry condition between temperatures of 40 and 90 degrees F (5 and 32 degrees C). Use within one year of date of manufacture. Do not store at elevated temperatures as that will reduce the shelf life of the product.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Grace Ice & Water Shield HT by GCP Applied Technologies, Inc., 62 Whittemore Avenue, Cambridge, MA 02140, Toll Free 866-333-3726, www.gcpat.com.
- B. MetaLayment by CertainTeed Corporation P.O. Box 860 Valley Forge, PA 19482, 800-233-8990, www.certainteed.com.
- C. Substitutions under provisions of Section 01 60 00.

2.2 MATERIALS

- A. Self-Adhering Sheet Membrane Roof Underlayment: Basis of design is Grace Ice and Water Shield HT by GCP Applied Technologies, Inc with the following characteristics:
 - 1. Material: Cold applied, self adhering membrane composed of an innovative and proprietary rubberized asphalt adhesive and interwound with a disposable release sheet. An embossed, slip resistant surface is provided on the high performance film with UV barrier properties.
 - 2. Membrane Thickness: 40 mils (1.02 mm) per ASTM D3767 Method A.
 - 3. Membrane Tensile Strength: MD 33 lbf/in, CD 31 lbf/inch per ASTM D412 Die C Modified.
 - 4. Membrane Elongation: 250% per ASTM D412 Die C Modified.
 - 5. Low Temperature Flexibility: Unaffected at -20 degrees F (-29 degrees C) per ASTM D1970.
 - 6. Adhesion to Plywood: 5.0 lb/in. width (876 N/m) per ASTM D903.
 - 7. Maximum Permeance: 0.05 perms (2.9 ng/sgms Pa) per ASTM E96.
 - 8. Maximum Material Weight Installed: 0.22 pounds/sqft (1.1 kg/sqm) per ASTM D461.
 - 9. Service Temperature: 260 degrees F (115.6 degrees C) per ASTM D1204
 - 10. Compatibility: Suitable for use under all types of sloped roofing with the exception high altitude climates where zinc, copper or Cor-Ten roof coverings are used.
 - 11. Adhesive: Rubberized asphalt adhesive containing post-consumer recycled content, contains no calcium carbonate, sand or fly ash.

12. Exposure: Can be left exposed for a maximum of 120 days from date of installation per ASTM G90 – EMMAqua test.
13. Primer: Water-based Perm-A-Barrier WB Primer by GCP Applied Technologies, Inc.
14. Code and Standards Compliance: Grace Ice and Water Shield HT meets the following requirements:
 - a. ASTM D1970.
 - b. ICC-ES ESR-3121, per AC 48 Acceptance Criteria for Roof Underlayments used in Severe Climate Areas.
 - c. Underwriters Laboratories Inc. R13399 - Class A fire classification under fiber-glass shingles and Class C under organic felt shingles (per ASTM E108/UL 790).
 - d. Underwriters Laboratories Inc. Classified Sheathing Material Fire Resistance Classification with Roof Designs: P225, P227, P230, P237, P259, P508, P510, P512, P514, P701, P711, P717, P722, P723, P732, P734, P736, P742, P803, P814, P818, P824
 - e. Miami-Dade County Code Report NOA #15-0728.11
 - f. Florida State Approval Report No. FL289-R3
 - g. CCMC Approval No. 13671-L

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Prior to start of installation, inspect existing conditions to ensure surfaces are suitable for installation of roofing underlayment. Verify flashing has been installed. Starting work indicates installer's acceptance of existing conditions.

3.2 INSTALLATION

- A. Installation: Install roofing underlayment on sloped surfaces at locations indicated on the Drawings, but not less than at hips, ridges, eaves, valleys, sidewalls and chimneys, and surfaces over interior space within 36 inches (914 mm) from the inside face of the exterior wall. Strictly comply with manufacturer's installation instructions including but not limited to the following:
 1. Schedule installation such that underlayment is covered by roofing within the published exposure limit of the underlayment.
 2. Do not install underlayment on wet or frozen substrates.
 3. Install when surface temperature of substrate is a minimum of 40 degrees F (5 degrees C) and rising.
 4. Remove dust, dirt, loose materials and protrusions from deck surface.

5. Install membrane on clean, dry, continuous structural deck. Fill voids and damaged or unsupported areas prior to installation.
6. Prime concrete and masonry surfaces using specified primer at a rate of 500-600 square feet per gallon (12-15 sqm/L). Priming is not required for other suitable clean and dry surfaces.
7. Install membrane such that all laps shed water. Work from the low point to the high point of the roof at all times. Apply the membrane in valleys before the membrane is applied to the eaves. Following placement along the eaves, continue application of the membrane up the roof. Membrane may be installed either vertically or horizontally after the first horizontal course.
8. Side laps minimum 3-1/2 inches (89 mm) and end laps minimum 6 inches (152 mm) following lap lines marked on underlayment.
9. Patch penetrations and damage using manufacturer's recommended methods.

3.3 CLEANING AND PROTECTION

- A. Protection: Protect from damage during construction operations and installation of roofing materials. Promptly repair any damaged or deteriorated surfaces.
- B. Repair minor damage to eliminate all evidence of repair. Remove and replace work which cannot be satisfactorily repaired in the opinion of the Architect.
- C. Provide temporary protection to ensure work being without damage or deterioration at time of final acceptance. Remove protective film and reclean as necessary immediately before final acceptance.

END OF SECTION

SECTION 07 31 13
FIBERGLASS REINFORCED ASPHALT SHINGLES

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Fiberglass reinforced asphalt shingle roofing.
- B. Leak Barrier and roof deck protection
- C. Metal Flashing associated with shingle roofing
- D. Attic ventilation to meet code requirements and/or Enhanced Material & Labor NDL 20-Year State of Louisiana Approved Non-Prorated Shingle Manufacturer Roofing requirements, whichever is more stringent.

1.2 RELATED REQUIREMENTS

- A. Section 06 10 00 - Rough Carpentry: Roof sheathing, wood decking, and framing.
- B. Section 07 62 00 - Sheet Metal Flashing and Trim: Edge and cap flashings.
- C. Section 07 71 23 - Manufactured Gutters and Downspouts.

1.3 REFERENCE STANDARDS

- A. ASTM A153- Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware
- B. ASTM A653/ A653M- Standard Specification for Steel Sheet, Zinc Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvannealed) by Hot-Dip Process
- C. ASTM B209- Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate
- D. ASTM B370- Standard Specification for Copper Sheet and Strip for Building Construction
- E. ASTM D3018- Standard Specification for Class A Asphalt Shingles Surfaced with Mineral Granules
- F. ASTM E903- Standard Test Method for Solar Absorptance, Reflectance, and Transmission of Materials Using Integrating Spheres. Underwriters Laboratories (UL)- Roofing Systems and Materials Guide (TGFU R1306)
- G. ASTM D3161/D3161M - Standard Test Method for Wind-Resistance of Steep Slope Roofing Products (Fan-Induced Method); 2014.
- H. ASTM D3462/D3462M - Standard Specification for Asphalt Shingles Made from Glass Felt and Surfaced with Mineral Granules; 2023.
- I. ASTM D4586/D4586M - Standard Specification for Asphalt Roof Cement, Asbestos-Free; 2007 (Reapproved 2018).
- J. ASTM D7158/D7158M - Standard Test Method for Wind Resistance of Asphalt Shingles (Uplift Force/Uplift Resistance Method); 2020.

- K. ASTM E96/E96M - Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials; 2023.
- L. ASTM F1667 - Standard Specification for Driven Fasteners: Nails, Spikes, and Staples; 2021.
- M. ICC-ES AC188 - Acceptance Criteria for Roof Underlayments; 2023.
- N. NRCA (RM) - The NRCA Roofing Manual; 2017.
- O. SMACNA (ASMM) - Architectural Sheet Metal Manual; 2012.
- P. UL (DIR) - Online Certifications Directory; Current Edition.
- Q. UL 790-Tests for Fire Resistance of Roof Covering Materials.
- R. UL 997- Wind Resistance of Prepared Roof Covering Materials.
- S. UL 2218- Impact Resistance of Prepared Roof Covering Matrials
- T. ARMA (ARMA)- Asphalt Roofing Manufacturers Association
- U. ASCE 7 (ASCE)- American Society of Civil Engineers : Minimum Design Loads for Buildings and Other Structures

1.4 DEFINITIONS

- A. Roofing Terminology: Refer to ASTM D1079 and the glossary of the National Roofing Contractors Association (NRCA) Roofing and Waterproofing Manual for Definitions of roofing terms related to this section.

1.5 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide data indicating material characteristics.
- C. Shop Drawings: For metal flashings, indicate specially configured metal flashings.
- D. Samples: Submit two samples of each shingle color indicating color range and finish texture/pattern ; for color selection.
- E. Manufacturer's Installation Instructions: Indicate installation criteria and procedures.
- F. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- G. Manufacturer's Design Calculations: Certifying that system system is in conformance and will perform in condition of the project site which is a NON Wind-borne Debris Region, with Category II and 130 MPH Wind Speed.
- H. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 01 60 00 - Product Requirements for additional provisions.
 - 2. Extra Shingles: 300 sq ft of each type and color.

1.6 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Provide (from top surface of roof deck) all roofing system components, such as but not limited to, shingles, underlayment, leak barrier, roofing and attic appliances, etc. to meet the roofing manufacturer's warranty requirements of these specifications
- B. Installer Qualifications: Installer must be a Enhanced Material & Labor NDL 20-Year State of Louisiana Approved Non-Prorated Shingle Roofing Manufacturer Certified and Approved Roofing Company for the roofing system components to be installed for this project.
- C. Products are Required to Comply with Fire Resistance Criteria: UL (DIR) listed and labeled.

1.7 REGULATORY REQUIREMENTS

- A. Provide a roofing system achieving an Underwriters Laboratories (UL) Class A fire classification.
- B. Install all roofing products in accordance with all federal, state, and local building codes.
- C. All work shall be performed in a manner consistent with current OSHA guidelines.

1.8 WARRANTY

- A. Manufacturer's State of Louisiana Approved Warranty: Furnish the Enhanced Material and Labor NDL 20-Year State of Louisiana Approved Non-Prorated Shingle Manufacturer Roofing System Warranty
- B. Roofs installed by the specific Shingle Manufacturer Certified Contractor only
- C. Manufacturing defects: 100% coverage for materials and labor for:
 - 1. 20 years non- prorated for approved type of manufacturer shingles and system components.
 - 2. Workmanship errors: 100% coverage for workmanship errors for 20 years from date of State of Louisiana Notice of Acceptance date:
- D. Roof system NOT installed over an existing roof, all existing roof materials must be removed to the deck.
- E. Warranted against algae discoloration for 10 years minimum
- F. 130 mph (Category 3 Hurricane) Wind Warranty for 10 years - Material and Labor NDL and Non-Prorated minimum coverage.
- G. Full roof installations (Roofs installed on portions of buildings do not qualify) using the products as defined in the approved "Proposed Assembly Letter" from the Shingle Roofing Manufacturer, approved by the Owner.
- H. Manufacturer's prefinished metals 20 year State of Louisiana approved warranty.
- I. Installer WarrantyARRANTY: State of Louisiana R-2 if the Certified Roofing Installer is represented as both the General Contractor and the Certified Roofing Subcontractor; State of Louisiana R-1 if a separate General Contractor and Certified Roofing Subcontractor exist on the project.

- J. ROOF COMPLETION INFORMATION: The Certified Roofing Subcontractor and/or General Contractor is required to submit to Facility Planning and Control, State of Louisiana Roof Completion Information Format the time of warranty submittal.

1.9 FIELD CONDITIONS

- A. Do not install shingles or eave protection membrane when surface temperatures are below 45 degrees F.

1.10 ROOFING CONFERENCES

- A. Refer to Section 01 30 00 Administrative Requirements, Item 3.4 for general requirements. Supplementary requirements specific to each conference as follows:

1. PRELIMINARY ROOFING CONFERENCE

- a. A Preliminary Roofing Conference is required
- b. The Preliminary Roofing Conference will occur prior to ordering of any materials for the project. The conference requires the submittal to FP&C of a "Proposed Assembly Letter" from the Enhanced Material and Labor NDL 20-Year State of Louisiana Approved Non-Prorated Shingle Manufacturer.
- c. Submit Roofing Manufacturer's System Installation Instructions, including High Wind Application Instructions and any other application instructions to meet this project requirements.
- d. Submit prior to or day of the Preliminary Roofing Conference, the installer's certification form from the roofing manufacturer showing compliance to:
 - 1) CertainTeed Master Shingle Applicator Program
 - 2) GAF Master Elite Contractor Program
 - 3) Owens Corning Roofing Platinum Preferred Contractor Program
- e. The Preliminary Roofing Conference agenda is to discuss site access, site parking, site staging and storage requirements, hours of work that are agreeable to both the Roofing Manufacturer's Certified Contracting Company and the User Agency, project schedule and expected duration including anticipated incremental weather within the project, and the overall specifics of the project.
- f. Submit the Pre-Finished Metals 20-Yr Warranty Sample, along with color chart selector with color samples for selection at the preliminary roofing conference. Prior to ordering and pre-finished metals, the roofing contractor shall receive a signed/ dated color chart approved by the User Agency. The color chart must be signed and dated by the User Agency and a copy sent to FP&C for record files.

2. PRE-APPLICATION ROOFING CONFERENCE

- a. A Pre-Application Roofing Conference is required.

- b. The Pre-Application Roofing Conference will occur within one week of roofing application, to review final progress schedule, to review last minute details, change or corrections, to verify readiness of the project structure and User Agency preparation, and review last minute assignments that were to be met as determined at the preliminary roofing conference.
- c. Materials must be on site for verification of approved products.

3. PRE-CLOSEOUT ROOFING CONFERENCE

- a. A Pre-Close Out Roofing Conference is required toward the end of the roofing of this project.
- b. The Pre-Close Out Roofing Conference is to review the final installations for consideration of acceptance by the User Agency and FP&C representatives. Prior to the Pre-Close Out Roofing Conference date, the installer shall have completed all Roofing Manufacturer's reviews/ inspections, along with the completion of all Roofing Manufacturer's punch work.

1.11 DELIVERY, STORAGE, AND HANDLING

- A. Store all products in manufacturer's unopened, labeled packaging until they are ready for installation
- B. Store products in a covered, ventilated area, at temperature not more than 110 degrees F; do not store near steam pipes, radiators, or in direct sunlight.
- C. Store bundles on a flat surface. Maximum stacking height shall not exceed roofing manufacturer's guidelines/ recommendations. Store all rolls on end.
- D. Store and dispose of solvent-based materials in accordance with all federal, state and local regulations.

1.12 WEATHER CONDITIONS

- A. Proceed with work only when existing and forecasted weather conditions will permit work to be performed in accordance with roofing manufacturer's guidelines/ recommendations.
- B. Refer to Supplementary Conditions for Contractual Anticipated Days of Adverse Weather on a monthly basis.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Asphalt Shingles:
 - 1. CertainTeed Saint-Gobain Roofing Products
 - 2. GAF Building Materials Corporation
 - 3. Owens Corning Corp: www.owenscorning.com.

4. Substitutions: See Section 01 60 00 - Product Requirements.
 - a. Requests for substitutions will be considered, along with a letter from the proposed substitute roofing manufacturer stating their review and ability to comply with all aspects of these specifications. It is incumbent upon the submitter that full and complete information is submitted to enable review. Otherwise, the submittals will be considered incomplete and void from further review to avoid delay of RFP and/or bidding procedures.

2.2 ASPHALT SHINGLES

A. ENHANCED MATERIAL AND LABOR NDL 20-YEAR STATE OF LOUISIANA APPROVED NON-PRORATED SHINGLE MANUFACTURER ROOFING WARRANTY PRODUCTS

1. Shingles, Hip and Ridge Shingles, Starter Strip, Leak Barrier, Underlayments, Roofing Cement and Roof/Ventilations Appliances, along with any other Roofing System Components required to meet these specifications.
2. Shingles approved as follows – (Coordinate all roofing system components with the Roofing Manufacture to meet these specification requirements.)
 - a. CertainTeed – Landmark Pro Laminated Shingles
 - b. GAF – Timberline HD Multi-Faceted Dimensional Shingles
 - c. Owens Corning – TruDefinition Oakridge Laminated Dimensional Shingles
3. Substitutions: See Section 01 60 00 - Product Requirements.
4. Requests for substitutions will be considered, along with a letter from the proposed substitute roofing manufacture stating their review and ability to comply with all aspects of these specifications. It is incumbent upon the submitter that full and complete information is submitted to enable review. Otherwise, the submittals will be considered incomplete and void from further review to avoid delay of RFP and/or bidding procedures.

2.3 SHEET MATERIALS

- A. Valley Flashing and Protection: Closed-cut method over full width of membrane flashing: Grace Ice & Water Shield or equal. Substitutions under Section 01 60 00 – Product Requirements.

2.4 RIDGE, SOFFIT / EAVE VENTS

- A. Ridge Vent Manufacturer
 1. Cor-A-Vent V-300 Ridge Vent or equal to match existing
 2. Substitutions: Section 01 60 00 - Product Requirements
- B. Product Description: High density polypropylene, corrosion free, corrugated construction, nominal 11 inches wide with vent openings that do not permit direct water or weather entry; to receive cap shingles; minimum 13 sq inches/linear foot net free area.
- C. Starter and End Caps: Provided by same manufacturer and as required to suit application.

- D. Soffit / Eave Vent Manufacturer
 - 1. Cor-A-Vent S-400 Strip Vent or equal top match existing
 - 2. Substitutions: Section 01 60 00 - Product Requirements
- E. Product Description: High density polypropylene, corrosion free, nominal 1-1/2 inches wide with vent openings that do not permit direct water or weather entry; minimum 9 sq inch/linear foot net free area.

2.5 ACCESSORIES

- A. Roofing Nails: Standard round wire shingle type, Use Hot Dipped Zinc Mass Coating of ASTM A153 Class D Roofing Nails Only; 10 to 12 gauge, smooth, barbed or deformed shank, with heads 3/8" to 7/16" in diameter. Length must be sufficient to penetrate into solid wood at least 3/4" or through plywood or oriented strand board by at least 1/8".
- B. Plastic Cement: ASTM D4586, Asphalt type with mineral fiber components, free of toxic solvents, capable of setting within 24 hours at temperatures of 75 degrees F and 50 percent RH.
- C. Metal Flashing:
 - 1. 24 gauge hot-dip galvanized steel sheet, complying with ASTM A653/ A653M, G90/ Z275
 - 2. 16-oz/ sq. ft. copper sheet, complying with ASTM B370
 - 3. 0.032 aluminum sheet, complying with ASTM B209
- D. Bituminous Paint: Acid and alkali resistant type; black color

2.6 FABRICATION

- A. Form flashings to profiles indicated on Drawings, and to protect roofing materials from physical damage and shed water.
- B. Form flashing sections square and accurate to profile, in maximum possible lengths, free from distortion or defects detrimental to appearance or performance.
- C. Hem exposed edges of flashings minimum 1/4 inch on underside.
- D. Apply bituminous paint on concealed surfaces of flashings

PART 3 EXECUTION

3.1 PREPARATION AND EXAMINATION

- A. Coordinate with the User Agency, before removal of any roof top vents, exhaust hoods, etc. that may be powered or in use by the User Agency
- B. Remove and properly dispose of all existing roofing materials and/or roofing related appliances determined to be removed down to roof deck.
- C. Verify that the deck is dry, sound, clean and smooth. It shall be free of any depressions, waves, and projections. All holes over 1" in diameter, cracks over 1/2" in width, loose knots and

excessively resinous areas shall be covered to ensure dry, structurally and thermally sound clean and smooth surface for new roofing.

- D. Replace damaged deck with new decking materials with size and thickness to ensure a dry, structurally and thermally sound, clean and smooth surface for new roofing system.
- E. Clean deck surfaces thoroughly prior to installation of eaves protection membrane and underlayment.
- F. At areas that receive eaves protection membrane, fill knotholes and cracks with latex filler.
- G. Install crickets on the upslope side of all chimneys or similar appliances wider than 24", and on all roofs steeper than 6/12.
- H. Install eave edge flashings tight with fascia boards, weather lap joints 2 inches and seal with roof cement, and secure flange with nails spaced 8 inches on center.

3.2 INSTALLATION

A. General:

- 1. Install using methods recommended by roofing manufacturer, in accordance with local building codes. When local codes and application instructions are in conflict, the more stringent requirement shall take precedence.
- 2. **Only properly installed, hand-driven nails are acceptable**
- 3. **Six (6) nails per shingle**
- 4. Valleys shall be either closed valley or woven valley over metal valley flashing and required roofing accessories required by roofing manufacturer to meet their system requirements. Selection between a closed valley or woven valley is at the discretion of the Owner/ User Agency and will be determined at the preliminary roofing conference.
- 5. All metal flashings shall have metal clips; no exposed fasteners

B. Protective Underlayment Installation:

- 1. Place one ply of underlayment over area not protected by eave protection, with ends and edges weather lapped minimum 6 inches. Stagger end laps of each consecutive layer. Nail in place.
- 2. Install protective underlayment perpendicular to slope of roof and weather lap minimum 4 inches over eave protection.
- 3. Weather lap and seal watertight with plastic cement items projecting through or mounted on roof

C. Valley Protection Installation:

- 1. Install single layer ice and water shield underlayment in accordance with manufacturer's instruction.

2. Place one layer of sheet metal flashings, minimum 24 inches wide, centered over open valleys. Weather lap joints minimum 2 inches Nail in place minimum 18 inches oc, 1 inch from edges.

D. Metal Flashing and Accessories Installation:

1. Weather lap joints minimum 2 inches and seal weather tight with plastic cement.
2. Secure in place with nails. Conceal fastenings.
3. Flash and seal work weather tight, projecting through or mounted on roofing with plastic cement.

E. Fiberglass Reinforced Asphalt Shingles Installation:

1. Place shingles in straight coursing pattern with 5 inch weather exposure to produce double thickness over full roof area. Install double course of shingles at eaves.
2. Project first course of shingles 3/4 inch beyond fascia boards.
3. Extend shingles 1/2 inch beyond face of gable edge fascia boards.
4. Extend shingles on both slopes across valley in weave pattern and fasten. Extend shingles minimum of 12 inches beyond valley center line to achieve woven valley, concealing valley protection.
5. Cap hips and ridges with individual shingles, maintaining 5 inch weather exposure. Place to avoid exposed nails.
6. After installation, place two daubs of plastic cement, one inch diameter under each individual shingle tab exposed to weather, to prevent lifting.
7. Cap hips and ridges with individual shingles, maintaining 5 inch weather exposure. Place to avoid exposed nails.
8. Coordinate installation of roof mounted components or items projecting through roof with weather tight placement of counter flashings.
9. Complete installation to provide weather tight service.

3.3 **FIELD QUALITY CONTROL**

- A. Section 01 40 00 - Quality Requirements: Testing and Inspection Services 01 70 00 - Execution Requirements: Testing, adjusting, and balancing
- B. Before Substantial Completion, inspect roof to verify shingles self-sealed from exposure to prevent wind uplift. Apply plastic cement to secure shingles that failed to seal. Report results of inspection and required corrective measures.

3.4 **PROTECTION**

- A. Do not permit traffic over finished roof surface.

- B. **Any roof areas that are not completed by the end of the workday are to be protected from moisture and contaminants.**

END OF SECTION

SECTION 07 46 00

SIDING

PART 1 GENERAL

1.1 SUMMARY

- A. Provide exterior clapboard siding.

1.2 SUBMITTALS

- A. Product Data: Submit manufacturer's product data and installation instructions for each material and product used.
- B. Samples: Submit two representative samples of each material specified indicating visual characteristics and finish. Include range samples if variation of finish is anticipated.

1.3 QUALITY ASSURANCE

- A. Comply with governing codes and regulations. Provide products of acceptable manufacturers, which have been in satisfactory use in similar service for three years. Use experienced installers. Deliver, handle, and store materials in accordance with manufacturer's instructions.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Fiber-Cement Siding:
 - 1. Manufacturers: AZEK Corporation, James Hardie, Westlake Royal Building Products, TruExterior; or approved equal.
 - 2. Type: Artisan Lap
 - 3. Standard: ASTM C 1186, Type A, Grade II, factory primed.
 - 4. Surface Texture: Smooth.
 - 5. Exposure: 6".
 - 6. Finish: Shop-applied primer for field finish.
 - 7. Siding Accessories: Non-corrosive fasteners.
 - 8. Finish: Fluoropolymer finish, 2-coat.
 - 9. Finish: Primer and baked-on acrylic topcoat.
 - 10. Finish: Primer and baked polyester.
 - 11. Standard: AAMA 1402.
 - 12. Finish: 2-coat PVC finish.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Install materials and systems in accordance with manufacturer's instructions and approved submittals. Allow for expansion and contraction. Install materials and systems in proper relation with adjacent construction and with uniform appearance. Coordinate with work of other sections.
- B. Restore damaged components. Clean and protect work from damage.

END OF SECTION

**SECTION 07 61 00
SHEET METAL ROOFING**

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Pre-Finished galvalume sheet steel roofing and associated flashings.
 - 1. Provide fascias and counterflashings fabricated from the same materials
 - 2. Provide gutters and downspouts of same material and color, refer to Section 07 62 00- Sheet Metal Flashing and Trim.

1.2 RELATED REQUIREMENTS

- A. Section 06 10 00- Rough Carpentry
- B. Section 07 62 00- Sheet Metal Flashing and Trim
- C. Section 07 90 00- Joint Protection
- D. Section 09 91 00- Paintings

1.3 REFERENCE STANDARDS

- A. AAMA 2605 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix); 2022.
- B. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2023.
- C. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2023.
- D. ASTM B32 - Standard Specification for Solder Metal; 2020.
- E. ASTM B370 - Standard Specification for Copper Sheet and Strip for Building Construction; 2022.
- F. ASTM B69 - Standard Specification for Rolled Zinc; 2021.
- G. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2018.
- H. ASTM D1970/D1970M - Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection; 2021.
- I. ASTM E96/E96M - Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials; 2023.
- J. ASTM E108 - Standard Test Methods for Fire Tests of Roof Coverings; 2020a.
- K. ICC-ES AC188 - Acceptance Criteria for Roof Underlayments; 2023.

L. SMACNA (ASMM) - Architectural Sheet Metal Manual; 2012.

1.4 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting: Convene one week before starting work of this section.

1.5 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

B. Product Data: Provide data on metal types, finishes, characteristics.

C. Shop Drawings: Indicate material profile, jointing pattern, jointing details, fastening methods, flashings, terminations, and installation details.

D. Manufacturer's installation instructions

E. Manufacturer's Certificate: Certify products meet or exceed specified requirements

F. Letter from the proposed primary roofing manufacturer confirming that the bidder is an acceptable Contractor authorized to install proposed system.

G. Letter from the primary roofing manufacturer stating that the proposed application will comply with the manufacturer's requirements in order to qualify for the project specified guarantee.

H. Samples:

1. Submit two samples 12 X 12 inch in size illustrating metal roofing mounted on system, illustrating typical seam, materials, and finish.

2. Submit two samples 6 x 6 inch in size illustrating metal finish color.

1.6 QUALITY ASSURANCE

A. Perform work in accordance with SMACNA (ASMM) requirements and standard details, except as otherwise noted.

B. Installer Qualifications: Company specializing in performing work of the type specified and with documented experience and approved by manufacturer.

1.7 MOCK-UPS

A. See Section 01 40 00 - Quality Requirements for additional requirements.

B. Construct mock-up of sheet metal roofing, 6 feet long by 2 feet wide, illustrating associated attachments.

C. Mock-up may remain as part of work.

1.8 PRE-INSTALLATION MEETINGS

A. Section 01 30 00- Administrative Requirements- Pre-Installation Meeting

B. Convene minimum of one week prior to commencing work of this section.

McNeese President's Residence

Improvements | 1427

19-627-21-01, F.19002606 &

01-107-05B-13, F.01004560 (Supplement)

Site Code: 5-10-004 | State ID : S05519

April 14, 2025

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Section 01 60 00- Product Requirements: Product storage and handling requirements.
- B. Stack material to prevent twisting, bending, or abrasion, and to provide ventilation. Slope metal sheets to ensure drainage.
- C. Prevent contact with materials that could cause discoloration or staining.

1.10 COORDINATION

- A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.

1.11 WARRANTY

- A. See Section 01 70 00- Execution and Closeout Requirements
- B. Roofing subcontractor and general contractor shall jointly execute 2 year roofing guarantee for custom sheet metal roofing prior to project acceptance. Form and terms of guarantee identified on Guarantee from R3 and Twenty (20) Year Weathertightness Metal Roof System - Limited Warranty Per Section 00 94 00
- C. In addition to contractor warranty, furnish 20 year manufacturer material and labor warranty to cover failure to prevent penetration of water.
- D.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Symmetrical Metal Roof Panel System with Seam Caps / Batten Caps
- B. Sheet Metal Roofing Manufacturers:
 - 1. McElroy Metal -238T
 - 2. Berridge : Tee-Lock Panel
 - 3. Pac-Clad Petterson: Pac-t250
 - 4. Substitutions: See Section 01 60 00 - Product Requirements.

2.2 SHEET MATERIALS

- A. Pre-Finished Galvanized Steel Sheet: ASTM A653/A653M, with G90/Z275 zinc coating; 24-gauge, 0.0239-inch minimum base metal thickness, shop pre-coated with PVDF (polyvinylidene fluoride) coating; color as selected.

2.3 ACCESSORIES

- A. Fasteners: type recommended by roofing manufacturer, with soft neoprene washers.

- B. Underlayment: Ice Dam Underlayment: ASTM D3767, ASTM D1970, self-adhering, self-sealing two ply butyl rubber based adhesive backed by a layer of high density cross laminated polyethylene, 40 mils thick.
- C. Slip Sheet: Rosin sized building paper.
- D. Primer: Iron oxide linseed oil type.
- E. Protective Backing Paint: Zinc molybdate alkyd. FS TT-C-494, Bituminous.
- F. Sealant: Type E butyl.
- G. Sealant: Polyurethane type
- H. Plastic Cement: ASTM D4586, Type I, asbestos free
- I. Reglets: Recessed type, galvanized steel; face and ends covered with plastic tape
- J. Solder: ASTM B32; type suitable for application and material being soldered.

2.4 FABRICATION

- A. Form sections shape as indicated on Drawings, accurate in size, square, and free from distortion or defects.
- B. Form sections true to shape, accurate in size, square, and free from distortion or defects.
- C. Fabricate cleats of same material as sheet, thickness to match roofing sheet, and at least 6 inch wide, interlockable with sheet.
- D. Fabricate starter strips, interlockable with sheet.
- E. Form pieces in longest practical lengths.
- F. Hem exposed edges on underside 1/2 inch; miter and seam corners.
- G. Form material with standing seams, except where otherwise indicated. At moving joints, use sealed lapped, bayonet-type or interlocking hooked seams.
- H. Fabricate corners from single piece with minimum 18-inch long legs; seam for rigidity, seal with sealant.
- I. Fabricate vertical faces with bottom edge formed outward 1/4 inch and hemmed to form drip.
- J. Fabricate flashings to allow toe to extend 2 inches over roofing gravel; return and brake edges.

2.5 FINISHES

- A. PVDF (Polyvinylidene Fluoride) Coating: Superior Performance Organic Finish, AAMA 2605; multiple coat, thermally cured fluoropolymer finish system.
- B. Color: As selected by Architect from manufacturer's standard colors.

- C. Primer Coat: On coated sheets, finish concealed side of sheet with primer compatible with finish system as recommended by finish system manufacturer.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Inspect roof deck to verify deck is clean and smooth, free of depressions, waves, or projections, properly sloped to drains.
- B. Verify deck is dry and free of snow or ice. Verify joints in wood deck are solidly supported and fastened.
- C. Verify correct placement of wood nailers and insulation positioning between nailers.
- D. Verify roof openings, curbs, pipes, sleeves, ducts, or vents through roof are solidly set, reglets are in place, and nailing strips located.
- E. Verify roofing termination and base flashings are in place, sealed, and secure.

3.2 PREPARATION

- A. Fill knot holes and surface cracks with latex filler at areas of bonded eave protection.
- B. Broom clean deck surfaces under eave protection and underlayment.
- C. Install starter and edge strips, and cleats before starting installation.
- D. Install surface-mounted reglets true to lines and levels, seal top of reglets with sealant.
- E. Back paint concealed metal surfaces and surfaces in contact with dissimilar metals with protective backing paint to a minimum dry film thickness of 15 mil, 0.015 inch.

3.3 INSTALLATION - ROOFING

- A. Ice Dam Membrane Installation:
 - 1. Place eave edge and gable edge metal flashings tight with fascia boards. Weather lap joints minimum 2 inches and seal with plastic cement. Secure flange with nails at maximum 12 inches on center.
 - 2. Install ice dam membrane parallel with eave edge, flush with face of eave edge flashing with edges lapped shingle style and ends lapped and staggered between rows.
 - 3. Starting from lower edge of starter strip, lay additional 36 inch wide strips of ice dam membrane, to produce two ply membrane. Weather lap plies minimum 19 inches and nail in place. Lap ends minimum 6 inches. Stagger end joints of each consecutive ply.
 - 4. Cover entire slope roof surface

3.4 INSTALLATION - STANDING SEAM ROOFING

- A. Comply with SMACNA (ASMM) details.

- B. Lay sheets with long dimension perpendicular to eaves. Apply pans beginning at eaves.
- C. Lock cleats into seams and flatten.
- D. Stagger transverse joints of roofing sheets.
- E. At eaves and gable ends, terminate roofing by hooking over edge strip.
- F. Bend up one side edge 1-1/2 inches and other edge 1-3/4 inches.
- G. Make first fold 1/4-inch wide single fold and second fold 1/2 inch wide, providing locked portion of standing seam, five plies in thickness.
- H. Fold lower ends of seams at eaves over at 45 degree angle.
- I. Form valleys of sheets not exceeding 10 feet in length, and lap joints 6 inches in direction of drainage.
- J. Extend valley sheet minimum 6 inches under roofing sheets.
- K. At valley, double fold valley and roofing sheets and secure with cleats spaced 18 inches on center.

3.5 INSTALLATION - BUILT-IN GUTTERS AND DOWNSPOUTS

- A. Refer to requirements listed on Section 07 71 23 - Gutters and Downspouts.
- B. Secure gutter lining to substrate with cleats spaced minimum 36 inches on center along edges of gutters.
- C. Longitudinal joints not acceptable.
- D. At roof edges, extend gutter lining under metal roofing 6 inches minimum and terminate in 3/4-inch folded edge secured by cleats; hook lower end of roofing into lock strip to form 3/4-inch wide loose-lock seam.
- E. Seal gutters watertight, and seal joint of gutter to drain.
- F. Set splash pans under downspouts, and secure in place.

3.6 INSTALLATION - FLASHINGS

- A. Insert flashings into reglets to form tight fit.
 - 1. Secure in place with lead wedges at maximum 12 inches on center. Pack remaining spaces with lead wool.
 - 2. Seal flashings into reglets with sealant.
- B. Secure flashings in place using concealed fasteners, and use exposed fasteners only where permitted.
- C. Cleat and seam each joint.
- D. Apply roof cement compound between metal flashings and felt flashings.

- E. Fit flashings tight in place, and make corners square, surfaces true and straight in planes, and lines accurate to profiles.
- F. Seal metal joints watertight.

3.7 PROTECTION

- A. Do not permit traffic over unprotected roof surface.

END OF SECTION

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SECTION 07 62 00
SHEET METAL FLASHING AND TRIM

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Fabricated Pre-Finished sheet metal items, including flashings, counterflashings, gutters, and downspouts.

1.2 RELATED REQUIREMENTS

- A. Section 06 10 00 - Rough Carpentry: Wood nailers for sheet metal work.
- B. Section 07 31 13 - Fiberglass Reinforced Asphalt Shingles: Non-metallic flashings associated with shingle roofing.
- C. Section 07 61 00 - Sheet Metal Roofing.
- D. Section 07 71 23 - Manufactured Gutters and Downspouts.
- E. Section 07 92 00 - Joint Sealants: Sealing non-lap joints between sheet metal fabrications and adjacent construction.

1.3 REFERENCE STANDARDS

- A. AAMA 2605 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix); 2022.
- B. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2023.
- C. ASTM B32 - Standard Specification for Solder Metal; 2020.
- D. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2018.
- E. ASTM D4586/D4586M - Standard Specification for Asphalt Roof Cement, Asbestos-Free; 2007 (Reapproved 2018).
- F. CDA A4050 - Copper in Architecture - Handbook; current edition.
- G. SMACNA (ASMM) - Architectural Sheet Metal Manual; 2012.

1.4 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Meeting: Convene one week before starting work of this section.

1.5 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
- B. Shop Drawings: Indicate material profile, jointing pattern, jointing details, fastening methods, flashings, terminations, and installation details.

1.6 QUALITY ASSURANCE

- A. Perform work in accordance with SMACNA (ASMM) and CDA A4050 requirements, except as otherwise indicated.
- B. Maintain one copy of each document on site.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. See Section 01 74 19 - Construction Waste Management and Disposal for packaging waste requirements.
- B. Stack material to prevent twisting, bending, and abrasion, and to provide ventilation. Slope metal sheets to ensure drainage.
- C. Prevent contact with materials that could cause discoloration or staining.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Pre-Finished Sheet Metal Flashing and Trim Manufacturers:
 - 1. McElroy Metal
 - 2. Berridge
 - 3. Pac-Clad Petterson
 - 4. Substitutions: See Section 01 60 00 - Product Requirements.

2.2 SHEET MATERIALS

- A. Pre-Finished Galvanized Steel: ASTM A653/A653M, with G90/Z275 zinc coating; minimum 24-gauge, 0.0239-inch thick base metal, shop pre-coated with PVDF coating.
 - 1. Polyvinylidene Fluoride (PVDF) Coating: Superior performing organic powder coating, AAMA 2605; multiple coat, thermally cured fluoropolymer finish system.
 - 2. Color: As selected by Architect from manufacturer's standard colors.

2.3 FABRICATION

- A. Form sections true to shape, accurate in size, square, and free from distortion or defects.
- B. Form pieces in longest possible lengths.
- C. Hem exposed edges on underside 1/2 inch; miter and seam corners.
- D. Form material with flat lock seams, except where otherwise indicated; at moving joints, use sealed lapped, bayonet-type or interlocking hooked seams.
- E. Fabricate corners from one piece with minimum 18-inch long legs; seam for rigidity, seal with sealant.

- F. Fabricate vertical faces with bottom edge formed outward 1/4 inch and hemmed to form drip.
- G. Fabricate flashings to allow toe to extend 2 inches over roofing gravel. Return and brake edges.

2.4 GUTTER AND DOWNSPOUT FABRICATION

2.5 EXTERIOR PENETRATION FLASHING PANELS

- A. Flashing Panels for Exterior Wall Penetrations: Premanufactured components and accessories as required to preserve integrity of building envelope; suitable for conduits and facade materials to be installed.

2.6 ACCESSORIES

- A. Fasteners: Galvanized steel, with soft neoprene washers.
- B. Primer: Zinc chromate type.
- C. Concealed Sealants: Non-curing butyl sealant.
- D. Exposed Sealants: ASTM C920; elastomeric sealant, with minimum movement capability as recommended by manufacturer for substrates to be sealed; color as selected by Architect.
- E. Asphalt Roof Cement: ASTM D4586/D4586M, Type I, asbestos-free.
- F. Reglets: Recessed type, galvanized steel; face and ends covered with plastic tape.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify roof openings, curbs, pipes, sleeves, ducts, and vents through roof are solidly set, reglets in place, and nailing strips located.
- B. Verify roofing termination and base flashings are in place, sealed, and secure.

3.2 PREPARATION

- A. Install starter and edge strips, and cleats before starting installation.
- B. Back paint concealed metal surfaces with protective backing paint to a minimum dry film thickness of 15 mil, 0.015 inch.

3.3 INSTALLATION

- A. Insert flashings into reglets to form tight fit; secure in place with lead wedges; pack remaining spaces with lead wool; seal flashings into reglets with sealant.
- B. Secure flashings in place using concealed fasteners, and use exposed fasteners only where permitted..
- C. Apply plastic cement compound between metal flashings and felt flashings.

- D. Fit flashings tight in place; make corners square, surfaces true and straight in planes, and lines accurate to profiles.
- E. Seal metal joints watertight.

3.4 FIELD QUALITY CONTROL

- A. See Section 01 40 00 - Quality Requirements for field inspection requirements.
- B. Inspection will involve surveillance of work during installation to ascertain compliance with specified requirements.

END OF SECTION

**SECTION 07 90 00
JOINT PROTECTION**

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes sealants and joint backing, sealers and accessories for interior and landscaping applications.
- B. Related Sections:
 - 1. Section 07 25 00 - Air Barriers: Sealants required in conjunction with air barriers:
 - 2. Section 07 90 00 - Joint Sealants: Exterior building envelope sealants
 - 3. Section 08 80 00 - Glazing: Glazing sealants and accessories.
 - 4. Section 09 21 16 - Gypsum Board Assemblies: Acoustic sealant.
 - 5. Section 09 30 00 - Tiling: Sealant used as tile grout.

1.2 REFERENCES

- A. ASTM International:
 - 1. ASTM C834 - Standard Specification for Latex Sealants.
 - 2. ASTM C919 - Standard Practice for Use of Sealants in Acoustical Applications.
 - 3. ASTM C920 - Standard Specification for Elastomeric Joint Sealants.
 - 4. ASTM C1193 - Standard Guide for Use of Joint Sealants.
 - 5. ASTM D1056 - Standard Specification for Flexible Cellular Materials-Sponge or Expanded Rubber.
 - 6. ASTM D1667 - Standard Specification for Flexible Cellular Materials-Vinyl Chloride Polymers and Copolymers (Closed-Cell Foam).
 - 7. ASTM D2628 - Standard Specification for Preformed Polychloroprene Elastomeric Joint Seals for Concrete Pavements.
- B. South Coast Air Quality Management District:
 - 1. SCAQMD Rule 1168 - Adhesive and Sealant Applications.

1.3 SUBMITTALS

- A. Section 01 30 00 - Submittal Procedures: Submittal procedures.
- B. Products Data: Submit data indicating sealant chemical characteristics, performance criteria, substrate preparation, limitations, and color availability.

- C. Samples: Submit two samples, 1 x 3 inch in size illustrating sealant colors for selection.
- D. Manufacturer's Installation Instructions: Submit special procedures, surface preparation, and perimeter conditions requiring special attention.
- E. Warranty: Include coverage for installed sealants and accessories failing to achieve airtight seal, watertight seal, exhibit loss of adhesion or cohesion, and sealants which do not cure.

1.4 SUSTAINABLE DESIGN SUBMITTALS

- A. Manufacturer's Certificate: Certify products meet or exceed specified sustainable design requirements.
 - 1. Materials Resources Certificates:
 - a. Certify source for local and regional materials and distance from Project site.
 - 2. Indoor Air Quality Certificates:
 - a. Certify volatile organic compound content for each interior adhesive and sealant and related primer.
- B. Product Cost Data: Submit cost of products to verify compliance with Project sustainable design requirements. Exclude cost of labor and equipment to install products.
 - 1. Provide cost data for the following products:
 - a. Local and regional products.

1.5 QUALITY ASSURANCE

- A. Sustainable Design Requirements:
 - 1. Regional Materials: Furnish materials extracted, processed, and manufactured within 500 miles of Project site.

1.6 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.
- B. Applicator: Company specializing in performing Work of this section with minimum three years documented experience.

1.7 GUARANTEE / WARRANTY

- A. The sealant guarantee shall be a 10-year from the date of acceptance of the project material and labor guarantee / warranty, furnished by the manufacturer of the materials.
- B. The contractor shall be a certified contractor approved by the waterproofing material manufacturer, to conduct necessary testing and inspections as required by the waterproofing material manufacturer to obtain said guarantee.

- C. The guarantee shall not require the owner's signature to be effective, shall not be DL/pro-rated, nor state the manufacturer will not honor the warranty until the waterproofing contractor, the supplier, and/or the manufacturer have been paid in full. The sample form of the guarantee shall be delivered to the owner, and said guarantee shall be approved by the owner prior to any ordering of materials.
- D. The manufacturer's labor and material guarantee shall guarantee, at the manufacturer's own cost and expense, to make or cause to be made such re-applications of, and to correct any and all faulty installations / applications.
- E. All riders or attachments noting changes to the original guarantee shall be so noted on the face of the original guarantee.
- F. Any legal action to be in the Seventeenth Judicial Court in and for the Parish of Lafourche, State of Louisiana, and so noted in the guarantee / rider.

1.8 MOCKUP

- A. Section 01 40 00 - Quality Requirements: Requirements for mockup.
- B. Construct mockup of sealant joints in conjunction with masonry window wall, mockups specified in other sections.
- C. Construct mockup with specified sealant types and with other components noted.
 - 1. Determine preparation and priming requirements based on manufacturers recommendations; take action necessary for correction of failure of sealant tests on mock-up.
 - 2. Verify sealants, primers, and other components do not stain adjacent materials.
- D. Locate where indicated on Drawings.
- E. Incorporate accepted mockup as part of Work.

1.9 ENVIRONMENTAL REQUIREMENTS

- A. Section 01 60 00 - Product Requirements.
- B. Maintain temperature and humidity recommended by sealant manufacturer during and after installation.

1.10 COORDINATION

- A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.
- B. Coordinate Work with sections referencing this section.

PART 2 PRODUCTS

2.1 JOINT SEALERS

- A. Manufacturers:

1. Dow Corning Corp.
2. GE Silicones
3. Pecora Corp.
4. Sika Corp.
5. Tremco Sealants & Waterproofing
6. Substitutions: Section 01 60 00 - Product Requirements.

B. Products Description:

1. General Purpose Traffic Bearing Sealant: Polyurethane; ASTM C920, Grade P, Class 25, Use T; single component.
 - a. Type: F
 - b. Color: Standard colors matching finished surfaces.
 - c. Applications: Use for exterior pedestrian and vehicular traffic bearing joints.
 - d. Interior Sealants and Sealant Primers: Maximum volatile organic compound content in accordance with SCAQMD Rule 1168.
 - e. Shore A Hardness Range: 20 to 35
 - f. Movement Capability: +/- 25%
2. Exterior Foam Expansion Joint Sealer: Precompressed foam sealer; Polyurethane with water-repellent; products recommended by manufacturer for traffic-bearing use.
 - a. Type: G
 - b. Color: Black color.
 - c. Size: As required to provide weathertight seal when installed.
 - d. Applications: Use for exterior wall expansion joints and parking deck expansion joints.
3. General Purpose Interior Sealant: Acrylic emulsion latex; ASTM C834, single component, paintable.
 - a. Type: H
 - b. Color: Standard colors matching finished surfaces.
 - c. Applications: Use for interior wall and ceiling control joints, joints between door and window frames and wall surfaces, and other interior joints for which no other type of sealant is indicated.

- d. Interior Sealants and Sealant Primers: Maximum volatile organic compound content in accordance with SCAQMD Rule 1168.
- 4. Bathtub/Tile Sealant: White silicone; ASTM C920, Uses M and A; single component, mildew resistant.
 - a. Type: J
 - b. Applications: Use for joints between plumbing fixtures and floor and wall surfaces, and joints between toilet room counter tops and wall surfaces.
 - c. Interior Sealants and Sealant Primers: Maximum volatile organic compound content in accordance with SCAQMD Rule 1168.
 - d. Shore A Hardness Range: 15 to 35
 - e. Movement Capability: +/- 25%
- 5. Acoustical Sealant: Butyl or acrylic sealant; ASTM C920, Grade NS, Class 12-1/2, Uses M and A; single component, solvent release curing, non-skinning.
 - a. Type: K
 - b. Applications: Use for concealed locations only at acoustically rated construction.
 - 1) Provide sealant bead between top stud runner and structure and between bottom stud track and floor.
 - c. Interior Sealants and Sealant Primers: Maximum volatile organic compound content in accordance with SCAQMD Rule 1168.
 - d. Shore A Hardness Range: 10 to 30
 - e. Movement Range: +/- 12-1/2%
- 6. Sealant for Continuous Water Immersion: Polysulfide; ASTM C920, Grade NS, Class 25, Uses M and A; approved by manufacturer for continuous water immersion; single or multi-component.
 - a. Type: L
 - b. Color: Standard colors matching finished surfaces.
 - c. Applications: Use for joints in fountain pool, aquarium joints.
 - d. Interior Sealants and Sealant Primers: Maximum volatile organic compound content in accordance with SCAQMD Rule 1168.
 - e. Shore A Hardness Range: 20 to 35
 - f. Movement Capability: +/- 25%

2.2 ACCESSORIES

- A. Primer: Non-staining type, recommended by sealant manufacturer to suit application.
 - 1. Interior Sealants and Sealant Primers: Maximum volatile organic compound content in accordance with SCAQMD Rule 1168.
- B. Joint Cleaner: Non-corrosive and non-staining type, recommended by sealant manufacturer; compatible with joint forming materials.
- C. Joint Backing: Round foam rod compatible with sealant; ASTM D1056, sponge or expanded rubber; oversized 30 to 50 percent larger than joint width.
- D. Bond Breaker: Pressure sensitive tape recommended by sealant manufacturer to suit application.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.
- B. Verify substrate surfaces and joint openings are ready to receive work.
- C. Verify joint backing and release tapes are compatible with sealant.

3.2 PREPARATION

- A. Remove loose materials and foreign matter impairing adhesion of sealant.
- B. Clean and prime joints.
- C. Perform preparation in accordance with ASTM C1193.
- D. Protect elements surrounding Work of this section from damage or disfiguration.

3.3 INSTALLATION

- A. Perform installation in accordance with ASTM C1193.
- B. Perform acoustical sealant application work in accordance with ASTM C919.
- C. Measure joint dimensions and size joint backers to achieve width-to-depth ratio, neck dimension, and surface bond area as recommended by manufacturer, except where specific dimensions are indicated.
- D. Install bond breaker where joint backing is not used.
- E. Install sealant free of air pockets, foreign embedded matter, ridges, and sags.
- F. Apply sealant within recommended application temperature ranges. Consult manufacturer when sealant cannot be applied within these temperature ranges.
- G. Tool joints concave as detailed.

- H. Precompressed Foam Sealant: Do not stretch; avoid joints except at corners, ends, and intersections; install with face 1/8 to 1/4 inch below adjoining surface.
- I. Compression Gaskets: Avoid joints except at ends, corners, and intersections; seal joints with adhesive; install with face 1/8 to 1/4 inch below adjoining surface.

3.4 CLEANING

- A. Section 01 70 00 - Execution and Closeout Requirements: Final cleaning.
- B. Clean adjacent soiled surfaces.

3.5 PROTECTION OF INSTALLED CONSTRUCTION

- A. Section 01 70 00 - Execution and Closeout Requirements: Protecting installed construction.
- B. Protect sealants until cured.

END OF SECTION

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SECTION 07 92 00
JOINT SEALANTS FOR PAVING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Urethane joint sealants.
 - 2. Preformed joint sealants.

1.3 ACTION SUBMITTALS

- A. Product Data: For each joint-sealant product indicated.
- B. Samples: For each kind and color of joint sealant required.
- C. Joint-Sealant Schedule: Include the following information:
 - 1. Joint-sealant application, joint location, and designation.
 - 2. Joint-sealant manufacturer and product name.
 - 3. Joint-sealant formulation.
 - 4. Joint-sealant color.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified Installer
- B. Product Certificates: For each kind of joint sealant and accessory, from manufacturer.
- C. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, indicating that sealants comply with requirements.
- D. Preconstruction compatibility and adhesion test reports.
- E. Preconstruction field-adhesion test reports.
- F. Warranties: Sample of special warranties.

1.5 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Qualified according to ASTM C 1021 to conduct the testing indicated.
- B. Preinstallation Conference: Conduct conference at Project site.
- C. Source Limitations: Obtain each kind of joint sealant from single source from single manufacturer.

1.6 PROJECT CONDITIONS

- A. Do not proceed with installation of joint sealants under the following conditions:
 - 1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer or are below 40 deg F
 - 2. When joint substrates are wet.

3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
4. Where contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

1.7 WARRANTY

- A. Special Installer's Warranty: Manufacturer's standard form in which Installer agrees to repair or replace joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.
 1. Warranty Period: Two years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

- A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint-sealant manufacturer, based on testing and field experience.
- B. Liquid-Applied Joint Sealants: Comply with ASTM C 920 and other requirements indicated for each liquid-applied joint sealant specified, including those referencing ASTM C 920 classifications for type, grade, class, and uses related to exposure and joint substrates.
 1. Suitability for Immersion in Liquids. Where sealants are indicated for Use I for joints that will be continuously immersed in liquids, provide products that have undergone testing according to ASTM C 1247. Liquid used for testing sealants is deionized water, unless otherwise indicated.
- C. Stain-Test-Response Characteristics: Where sealants are specified to be non-staining to porous substrates, provide products that have undergone testing according to ASTM C 1248 and have not stained porous joint substrates indicated for Project.
- D. Colors of Exposed Joint Sealants: As selected by Landscape Architect from manufacturer's full range.

2.2 URETHANE JOINT SEALANTS

- A. Single-Component, Non-sag, Urethane Joint Sealant: ASTM C 920, Type S, Grade NS, Class 25, for Use NT.
 1. Products: Subject to compliance with requirements, provide products by one of the following:
 - a. BASF Building Systems.
 - b. Pecora Corporation.
 - c. Sika Corporation.
 - d. Tremco Incorporated.

2.3 SILICONE JOINT SEALANTS

- A. Manufacturers: Subject to compliance with requirements, provide products from one of the following:
 1. Dow Corning Corporation.
 2. GE Advanced Materials – Silicones.
 3. Tremco Incorporated.
- B. Neutral-Curing Silicone Joint Sealant: ASTM C 920.
 1. Type: Single Component (S).

2. Grade: Non-sag (NS).
3. Class: 50.
4. Uses Related to Exposure: Nontraffic (NT).

2.4 JOINT SEALANT BACKING

- A. General: Provide sealant backings of material that are non-staining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.
- B. Cylindrical Sealant Backings: ASTM C 1330, Type C (closed-cell material with a surface skin), and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.

2.5 MISCELLANEOUS MATERIALS

- A. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.
- B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants to joint substrates.
- C. Masking Tape: Non-staining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint-sealant performance.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions and the following requirements:
 1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
 2. Clean, porous joint substrate surfaces by brushing, grinding, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining after cleaning operations above by vacuuming or blowing out joints with oil-free compressed air. Porous joint substrates include the following:
 - a. Concrete.
 - b. Masonry
 3. Remove laitance and form-release agents from concrete.

4. Clean nonporous joint substrate surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants. Nonporous joint substrates include the following:
 - a. Metal.
 - b. Glass.
 - c. Porcelain enamel.
 - d. Glazed surfaces of ceramic tile.
- B. Joint Priming: Prime joint substrates where recommended by joint-sealant manufacturer or as indicated by preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.
- C. Masking Tape: Use masking tape where required to prevent contact of sealant or primer with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.3 INSTALLATION OF JOINT SEALANTS

- A. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.
- B. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.
- C. Install sealant backings of kind indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
 1. Do not leave gaps between ends of sealant backings.
 2. Do not stretch, twist, puncture, or tear sealant backings.
 3. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.
- D. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.
- E. Install sealants using proven techniques that comply with the following and at the same time backings are installed:
 1. Place sealants so they directly contact and fully wet joint substrates.
 2. Completely fill recesses in each joint configuration.
 3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.
- F. Tooling of Non-sag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified in subparagraphs below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.
 1. Remove excess sealant from surfaces adjacent to joints.
 2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
 3. Provide concave joint profile per Figure 8A in ASTM C 1193, unless otherwise indicated.
 4. Provide flush joint profile where indicated per Figure 8B in ASTM C 1193.
 5. Provide recessed joint configuration of recess depth and at locations indicated per Figure 8C in ASTM C 1193.

3.4 FIELD QUALITY CONTROL

- A. Evaluation of Field-Adhesion Test Results: Sealants not evidencing adhesive failure from testing or noncompliance with other indicated requirements will be considered satisfactory. Remove sealants that fail to adhere to joint substrates during testing or to comply with other requirements. Retest failed applications until test results prove sealants comply with indicated requirements.

3.5 CLEANING

- A. Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

3.6 PROTECTION

- A. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from original work.

3.7 JOINT-SEALANT SCHEDULE

- A. Joint-Sealant Application: Exterior joints in vertical surfaces and horizontal non-traffic surfaces.
 - 1. Joint Locations:
 - a. Construction joints in cast-in-place concrete.
 - b. Control and expansion joints in unit masonry.
 - 2. Joint Sealant: Silicone
 - 3. Joint-Sealant Color: As selected by Landscape Architect from manufacturer's full range of colors

END OF SECTION 07920

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SECTION 08 14 00

WOOD DOORS

PART 1 GENERAL

1.1 SUMMARY

- A. Provide wood doors.

1.2 SUBMITTALS

- A. Product Data: Submit manufacturer's product data and installation instructions for each material and product used.
- B. Samples: Submit two representative samples of each material specified indicating visual characteristics and finish. Include range samples if variation of finish is anticipated.
- C. Warranty: Submit manufacturer's standard warranty. Include labor and materials to repair or replace defective materials.
 - 1. Solid-Core Interior Doors: Life of installation.

1.3 QUALITY ASSURANCE

- A. Comply with governing codes and regulations. Provide products of acceptable manufacturers which have been in satisfactory use in similar service for three years. Use experienced installers. Deliver, handle, and store materials in accordance with manufacturer's instructions.
- B. Quality Standards for Stile and Rail Doors: NWWDA I.S. 6.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Interior Stile and Rail Wood Doors:
 - 1. Manufacturers: Algoma Hardwoods, Inc., Eggers, VT Industries, Maiman or approved equal.
 - 2. Type: Wood raised panel with stile and rail.
 - 3. Thickness: 1-3/4 inches thick.
 - 4. Grade: Premium.
 - 5. Frames: Wood.
 - 6. Species: Spanish Cedar.
 - 7. Finish: Opaque.
 - 8. Finish Application: Site finished.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Comply with NWMA I.S. 1A and specified quality standard.
- B. Prefit doors to frames. Premachine doors for hardware listed on final schedules. Factory bevel doors.

- C. Install doors with not more than 1/8 inch clearance at top and sides, 1/4 inch at bottom. Comply with NFPA 80 for rated assemblies.
- D. Adjust, clean, and protect.

END OF SECTION

SECTION 08 14 33.13
WOOD TERRACE DOORS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Aluminum-clad hinged wood-framed glass doors.
- B. Related Requirements:
- C. Preinstallation Conference: Conduct conference at .

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of hinged wood-framed glass door.
 - 1. Include construction details, material descriptions, fabrication methods, dimensions of individual components and profiles, hardware, finishes, and operating instructions.
- B. Samples for Initial Selection: For doors with factory-applied color finishes.
 - 1. Include Samples of hardware and accessories involving color selection.

1.3 WARRANTY

- A. Manufacturer's Special Warranty: Manufacturer agrees to repair or replace hinged wood-framed glass doors that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period:
 - a. Hinged Door: 10 years from date of shipment and issued to Owner at Substantial Completion.
 - b. Insulating Glass: 20 years from date of shipment and issued to Owner at Substantial Completion.
 - c. Metal Finish: 30 years from date shipment and issued to Owner at Substantial Completion.

PART 2 - PRODUCTS

2.1 SOURCE LIMITATIONS

- A. Obtain hinged wood-framed glass doors from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

- A. Product Standard: Comply with AAMA/WDMA/CSA 101/I.S.2/A440 for minimum standards of performance, materials, components, accessories, and fabrication unless more stringent requirements are indicated.
 - 1. Product Certification: AMMA certified with label attached to each door.
- B. Performance Class and Grade: AAMA/WDMA/CSA 101/I.S.2/A440 as follows:
 - 1. Minimum Performance Class: R.
 - 2. Minimum Performance Grade: 35
- C. Thermal Transmittance: NFRC 100 maximum total fenestration product U-factor of 0.32 Btu/sq. ft. x h x deg F.
- D. Solar Heat-Gain Coefficient (SHGC): NFRC 200 maximum total fenestration product SHGC of 0.23.

2.3 ALUMINUM-CLAD HINGED WOOD-FRAMED GLASS DOORS

- A. www.kolbewindows.com/doors/ultra-swinging-patioBasis-of-Design Product: Kolbe Windows & Doors; Ultra Series or comparable product by one of the following:
 - 1. Loewen Windows.
 - 2. Marvin Windows and Doors.
- B. Exterior Surfaces: Aluminum cladding with manufacturer's standard fluoropolymer two-coat system with fluoropolymer color topcoat containing not less than 70 percent PVDF resin by weight and complying with AAMA 2605
- C. Interior Surfaces: Unfinished
 - 1. Wood Species: Pine
- D. Wood Components: Manufacturer's standard LVL or fine-grained wood lumber complying with AAMA/WDMA/CSA 101/I.S.2/A440; kiln-dried to a moisture content of not more than 12 percent at time of fabrication; free of visible finger joints, blue stain, knots, pitch pockets, and surface checks larger than 1/32 inch (0.8 mm) deep by 2 inches (51 mm) wide; water-repellent preservative treated.
- E. Trim and Glazing Stops: Material and finish to match adjacent door panel.
- F. Nailing Fin: Manufacturer's standard nailing fins for securing frame to structure during installation to hold unit plumb, square, and true; provide sufficient strength to withstand design pressure indicated.
- G. Drip Caps: Factory-fabricated material; designed to direct water away from building when installed horizontally at head of hinged wood-framed glass doors.
- H. Threshold: Provide extruded-aluminum weep sill with wood interior threshold

1. Color: Bronze anodized.

I. Glass and Glazing: Manufacturer's standard glazing system that produces weathertight seal.

1. Glass: ASTM C1036, Type 1, q3, Category II safety glass complying with testing requirements in 16 CFR 1201.
2. Safety Glazing Labeling: Permanently mark safety glazing with certification label of the SGCC and the manufacturer. Label indicates manufacturer's name, type of glass, and date of manufacture.
3. Tint: Clear.
4. Insulating-Glass Units: ASTM E2190
 - a. Filling: Fill space between glass lites with argon.
 - b. Lites: Two.
 - c. Low-E Coating: Cardinal LoE366, Solar Control LoE

2.4 HARDWARE

- A. General: Provide manufacturer's standard hardware, fabricated from a corrosion-resistant material compatible with wood and aluminum cladding complying with AAMA 907; designed to smoothly operate, tightly close, and securely lock hinged wood-framed glass doors and sized to accommodate panel weight and dimensions.
- B. Lock: Install manufacturer's standard keyed multipoint locking device on each operable panel, lockable from the inside and outside.
1. Design Refer to Section 08 71 00 Door Hardware
 2. Finish: Refer to Section 08 71 00 Door Hardware
 3. Keying System: All cylinders keyed alike. Confirm with user agency

2.5 ACCESSORIES

- A. Grilles (False Muntins): Provide grilles in designs indicated, for removable application to inside of each panel lite.
1. Type: Exterior and interior, adhered to glass with bars between the glass.
 2. Material: To match adjacent finish of door panel.
 3. Design: As indicated on Drawings.
 4. Bar Width: Not less than 5/8 inch
 5. Interior Bar Profile: Beveled
- B. Casing: Extruded-aluminum 1-15/16-inch brickmould, with 1-5/8" sill nosing

2.6 FABRICATION

- A. Fabricate hinged wood-framed glass doors in sizes indicated. Include a complete system for assembling components and anchoring doors.
- B. Fabricate hinged wood-framed glass doors that are reglazable without dismantling panel

- C. Weather Stripping: Provide weather stripping for each door panel unless otherwise indicated.
- D. Factory machine hinged wood-framed glass doors for openings and hardware that is not surface applied.
- E. Complete fabrication, assembly, finishing, hardware application, and other work in the factory to greatest extent possible. Disassemble components only as necessary for shipment and installation. Allow for scribing, trimming, and fitting at Project site.
- F. Factory-Glazed Fabrication: Glaze hinged aluminum-framed glass doors in the factory.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine openings, substrates, structural support, anchorage, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of Work.
- B. Verify rough opening dimensions, levelness of threshold substrate, and operational clearances.
- C. Examine wall flashings, vapor retarders, water and weather barriers, and other built-in components to ensure a coordinated, weathertight hinged door installation.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Comply with Drawings, Shop Drawings, and manufacturer's written instructions for installing hinged doors, hardware, accessories, and other components.
- B. Install hinged wood-framed glass doors level, plumb, square, true to line; without distortion, warp, or rack of frames and panels, and without impeding thermal movement; anchored securely in place to structural support; and in proper relation to wall flashing, vapor retarders, air barriers, water/weather barriers, and other adjacent construction. Comply with ASTM E2112.
- C. Set sill members in bed of sealant or with gaskets, as indicated, to provide weathertight construction.

3.3 ADJUSTING, CLEANING, AND PROTECTION

- A. Lubricate hardware and moving parts.
- B. Adjust operating panels and screens to provide a tight fit at contact points and weather stripping for smooth operation, without binding, and weathertight closure.
- C. Adjust hardware for proper alignment, smooth operation, and proper latching without unnecessary force or excessive clearance.

- D. Clean exposed surfaces immediately after installing hinged wood-framed glass doors. Avoid damaging protective coatings and finishes. Remove nonpermanent labels, excess sealants, glazing materials, dirt, and other substances.
- E. Remove and replace glass that has been broken, chipped, cracked, abraded, or damaged during construction period.
- F. Protect hinged wood-framed glass door surfaces from contact with contaminating substances resulting from construction operations. If contaminating substances contact hinged wood-framed glass door surfaces, remove contaminants immediately in accordance with manufacturer's written instructions.

END OF SECTION 081433.13

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SECTION 08 16 00
COMPOSITE DOORS

PART 1 GENERAL

1.1 SUMMARY

- A. Solid core doors and frames.
- B. Fiberglass doors and frames.

1.2 SUBMITTALS

- A. Product Data: Submit manufacturer's product data and installation instructions for each material and product used.
- B. Shop Drawings: Submit shop drawings indicating material characteristics, details of construction, connections, and relationship with adjacent construction.

1.3 QUALITY ASSURANCE

- A. Comply with governing codes and regulations. Provide products of acceptable manufacturers which have been in satisfactory use in similar service for three years. Use experienced installers. Deliver, handle, and store materials in accordance with manufacturer's instructions.

1.4 WARRANTY

- A. Solid core door - Limited 1-Year Please check with manufacturer or distributor for current warranty terms and conditions.
- B. Fiberglass door - Manufacturer warrants the panel to be free of manufacturing defects in material and workmanship for the lifetime of the panel. Please check with manufacturer or distributor for current warranty terms and conditions.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Composite Interior Doors:
 - 1. Manufacturers: Masonite, Extrutech Plastics, Inc.; FIB-R-Dor, Div. of Advance Fiberglass, Inc.; Therma-Tru Doors; or approved equal.
 - 2. Door Panel: Masonite □ Molded Panel doors shall be fabricated using loose layup assembly that includes molded wood fiber facings, wood stiles, wood or MDF rails and particleboard core. Door facings are to be bonded to stiles, rails and core forming a 3-ply structural attachment. Water based latex primer used on door facings (stile and rails per request) unless factory pre-finished.
 - 3. Hinge preparations for 1-3/4" thick doors to be machined to accept 4" hinges. Face bore(s) for cylindrical lock and deadbolt are to be 2-1/8" diameter at 2-3/4" or 2-3/8" backset.
 - 4. Vertical edge of door to be square, beveled both sides or lock stile only. Edge preparation

should be clearly noted when the product is ordered.

5. Door Frame: Wood jambs shall be fabricated as a flat jamb with doorstop applied. Hinge jamb preparations for 1-3/4" thick doors to be machined to accept 4" hinges. Strike jamb preparations are to be machined for full lip cylindrical strike plate. Double door units shall include preparations for ball catch located at the top of door on both door panels designed to strike into the head jamb.
6. Hinges: Refer to Door Hardware Section 08 71 00.

B. Fiberglass Exterior Doors:

1. Manufacturers: Masonite, Extrutech Plastics, Inc.; FIB-R-Dor, Div. of Advance Fiberglass, Inc.; Therma-Tru Doors; or approved equal.
2. Door Panel: Belleville® Smooth fiberglass doors shall be fabricated using 6-piece construction that includes fiberglass reinforced facings featuring high-definition sticking design, laminated lock stile, finger-jointed or laminated wood hinge stile, wood top rail and rot resistant composite bottom rail. Door facings are to be bonded to stiles and rails forming a structural attachment. Insulated core to be poured-in-place polyurethane foam forming a secure attachment to all door components.
3. Bottom rail may be machined to accept weather seal. Mounting surface for latching hardware to be reinforced with solid internal blocking. Hinge preparations are to be placed at manufacturer's specifications and are to be machined for standard weight full mortise 4" butt hinges. Latch preparations are to be placed at manufacturer's specifications. Face bore(s) for cylindrical lock and deadbolt are to be 2-1/8" diameter at 2-3/4" or 2-3/8" backset and 5-1/2" on center (5-1/2" or 10-1/2" on 8'0" panels). Refer to Door Hardware Section 08 71 00.
4. Door Frame: Wood frames shall be fabricated as a single rabbet jamb design. Hinge jamb(s), strike jamb, head jamb, and mullion(s) shall be machined to accept a kerf applied weather seal. Hinge jamb preparations are to be placed at manufacturer's specifications and are to be machined for standard weight full mortise 4" butt hinges. Strike jamb preparations are to be placed at manufacturer's specifications and are to be machined for full lip cylindrical strike plate. In-swing or bumper outswing threshold shall be high-dam design. Low profile threshold shall be required for handicap accessible openings. Double door units shall include a t-astragal attached to the "passive" panel with top and bottom flush bolts that securely strike into the head jamb and threshold.
5. Hinges: (3) standard weight full mortise 4" butt hinges are required on doors 7'0" height or smaller & (4) on doors greater than 7'0". Refer to Door Hardware Section 08 71 00.
6. Weather Seal: Door frame shall be fabricated featuring a vinyl wrapped foam filled compression design that is kerf installed. Corner seals shall be installed to the rabbet section of the door frame at the bottom of the hinge and lock jamb. Door bottom sweep shall be sealed and securely attached to the operable door panel(s). Refer to Door Hardware Section 08 71 00.

PART 3 EXECUTION

3.1 INSTALLATION OF SOLID CORE DOORS AND FRAMES

- A. Delivery: Reasonable care shall be exercised during shipping and handling in keeping with the

decorative nature of product.

- B. Storage & Protection: Store upright in a dry, well-ventilated building or shelter at a constant temperature. Do not store in damp, freshly plastered, drywall or concrete areas until materials have completely dried. Doors should be stored at least 10' away from any heat source to help prevent uneven drying. Doors must be sealed with an oil-based sealer or primer if stored for long periods.
- C. Examination: Site verification of substrate conditions, which have been previously completed, are acceptable for the product installation instructions in accordance with manufacturer's specifications. Verify that door frame openings are constructed plumb, true and level before beginning installation process. Select fasteners of adequate type, number and quality to perform the intended functions.
- D. Installation: Remove protective packaging just prior to installation. Installer shall be experienced in performing work required and shall be specialized in the installation of work similar to that required for this project. Comply with manufacturer's product data, including product technical bulletins, product catalog installation instructions and product packaging instructions for installation.
- E. Finishes: See manufacturer's - How To Paint instructions for complete finishing details. Various types of materials are used in the construction of the door system; each shall be sealed in accordance with manufacturer's specifications to protect against various environmental conditions. Make sure to completely seal and inspect all 6 surfaces (top, hinge side, bottom, lock side, front face and back face) with two coat minimum on operable panel(s). Finishing and/or re-finishing must be completed immediately after door has acclimated to the environment where it is to be installed and within a maximum of 7 days. Avoid finishing after a rain or damp and during periods of higher than average humidity. Conduct periodic inspections of all coated surfaces to insure that door components are not exposed. Inspections should occur at least once a year. Reseal the surface as needed.
- F. Acoustical Performance: Unit scheduled for installation in opening requiring a specific noise control rating shall be clearly noted when product is ordered. 1-3/4" thick Molded Panel Series door with particleboard core sound transmission class (STC) rating is 30. (See acoustical performance data for unit specific acoustical information.)
- G. Thermal Performance: Unit scheduled for installation in opening requiring a specific thermal rating shall be clearly noted when product is ordered. 1-3/4" thick Molded Panel door with particleboard core at R-value of 3.54. (See thermal performance data for unit specific thermal information.)
- H. Fire Resistance: Unit scheduled for installation in openings requiring compliance with national, state or local fire guidelines shall be clearly noted when product is ordered. Masonite® 1-3/4" Molded Panel Series door panels have been evaluated for use as fire doors in 20-minute locations. Labeling is available under the Intertek Testing services / Warnock Hersey program. Fire doors require the use of a fire rated frame system and must be installed in accordance with NFPA 80 guidelines. (Please check with manufacturer or distributor for limitations of use).

3.2 INSTALLATION OF FIBERGLASS DOORS AND FRAMES

- A. Delivery: Reasonable care shall be exercised during shipping and handling in keeping with the decorative nature of product.
- B. Storage & Protection: Store upright in a dry, well-ventilated building or shelter at a constant

temperature. Do not store in damp areas or freshly plastered buildings. Place units on wood blocks at least 2" high to prevent moisture at threshold and/or possible damage. Do not place in non-vented plastic or canvas shelters.

- C. Examination: Site verification of substrate conditions, which have been previously completed, are acceptable for the product installation instructions in accordance with manufacturer's specifications. Verify that door frame openings are constructed plumb, true and level before beginning installation process. Select fasteners of adequate type, number and quality to perform the intended functions.
- D. Installation: Remove protective packaging just prior to installation. Installer shall be experienced in performing work required and shall be specialized in the installation of work similar to that required for this project. Comply with manufacturer's product data, including product technical bulletins, product catalog installation instructions and product packaging instructions for installation.
- E. Flashing, Insulating & Trimming: Exterior of installed unit shall be flashed, trimmed & sealed to prevent air infiltration and/or water penetration. Interior of installed unit shall be insulated & trimmed to prevent thermal and/or acoustical transmission.
- F. Finishes: Various types of materials are used in the construction of the door system; each shall be sealed in accordance with manufacturer's specifications to protect against various environmental conditions. Make sure to seal and inspect all 5-surfaces (top, hinge side, lock side, exterior face and interior face) of the active door panel(s). Finishing and/or re-finishing must be completed within 45-days from the time the protective packaging was removed and/or the installation was performed. Conduct periodic inspections of all coated surfaces to insure that door components are not exposed. Inspections should occur at least once a year. Reseal the surface as needed.

3.3 FIBERGLASS DOORS & FRAMES BUILDING CODE & REGULATORY COMPLIANCE

- A. Structural Performance & Impact Rating: Unit scheduled for installation in openings requiring compliance with national, state or local wind load and/or missile impact resistance shall be clearly noted when product is ordered. Design pressure (DP) ratings are available for a wide selection of door styles and configurations are listed under the National Accreditation & Management Institute (NAMI). Belleville Wood-Grain Textured and Belleville Smooth fiberglass door unit at +70.0 / -70.0 maximum rating. (See structural performance data for unit specific DP/impact information).
- B. Thermal Performance: Unit Scheduled for installations in openings requiring compliance with national, state, or local thermal resistance and/or solar heat gain shall be clearly noted when product is ordered. LI-Value & SHGC ratings in accordance with the International Energy Conservation Code (IECC) and/or the National Fenestration Rating Council (NFRC) are available for a wide selection of door styles. ENERGY STAR compliance / labeling is available for various door styles. Belleville Wood-Grain Textured and Belleville Smooth fiberglass at LI-value of 0.17 & SHGC of 0.37 minimum rating. (See thermal performance data for unit specific thermal information).
- C. Acoustical Performance: Unit scheduled for installation in openings requiring a specified noise control rating shall be clearly noted when product is ordered. Belleville Wood-Grain Textured and Belleville Smooth fiberglass sound transmission classification (STC) rating is 22 for a door without a glass insert. (See acoustical performance data for unit specific acoustical information).
- D. General Performance: All door systems are designed to comply with water penetration

guidelines in accordance with ASTM E331 and/or Florida Building Code TAS202; air infiltration guidelines in accordance with ASTM E283 and/or Florida Building Code TAS202; forced entry resistance guidelines in accordance with Florida Building Code TAS202; physical endurance guidelines in accordance with ANSI A151.1 / level C.

END OF SECTION

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SECTION 08 52 00

WOOD WINDOWS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Aluminum-clad wood windows.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, glazing and fabrication methods, dimensions of individual components and profiles, hardware, and finishes for wood windows.

B. Samples: For each exposed product and for each color specified, 2 by 4 inches in size.

C. Samples for Initial Selection

1. Include Samples of hardware and accessories involving color selection.

D. Product Schedule: For wood windows. Use same designations indicated on Drawings.

1.3 WARRANTY

A. Manufacturer's Warranty: Manufacturer agrees to repair or replace wood windows that fail in materials or workmanship within a specified warranty period.

1. Warranty Period:

- a. Window: **10** years from date of shipment and issued to the owner at Substantial Completion.
- b. Glazing Units: **20** years from date of shipment and issued to the owner at Substantial Completion.
- c. Aluminum-Cladding Finish: **30** years from date of shipment and issued to the owner at Substantial Completion.

PART 2 - PRODUCTS

2.1 SOURCE LIMITATIONS

- A. Obtain wood windows from single source from single manufacturer.

2.2 WINDOW PERFORMANCE REQUIREMENTS

- A. Product Standard: Comply with AAMA/WDMA/CSA 101/I.S.2/A440 for definitions and minimum standards of performance, materials, components, accessories, and fabrication unless more stringent requirements are indicated.
 - 1. Window Certification: WDMA certified with label attached to each window.
- B. Performance Class and Grade: AAMA/WDMA/CSA 101/I.S.2/A440 as follows:
 - 1. Minimum Performance Class: R
 - 2. Minimum Performance Grade: 35
- C. Thermal Transmittance: NFRC 100 maximum whole-window U-factor of 0.32 Btu/sq. ft. x h x deg F
- D. Solar Heat-Gain Coefficient (SHGC): NFRC 200 maximum whole-window SHGC of .23

2.3 WOOD WINDOWS

- A. Aluminum-Clad Wood Windows:
 - 1. Basis-of-Design Product: Subject to compliance with requirements, provide Kolbe Windows & Doors; Ultra Series or comparable product by one of the following:
 - a. Loewen Windows.
 - b. Marvin Windows and Doors.
- B. Operating Types: Provide the following operating types in locations indicated on Drawings:
 - 1. Double hung.
 - 2. Fixed.
- C. Frames and Sashes: Fine-grained wood lumber complying with AAMA/WDMA/CSA 101/I.S.2/A440; kiln-dried to a moisture content of not more than 12 percent at time of fabrication; free of visible finger joints, blue stain, knots, pitch pockets, and surface checks larger than 1/32 inch (0.8 mm) deep by 2 inches (51 mm) wide; water-repellent preservative treated.
 - 1. Exterior Aluminum Surfaces: Aluminum cladding with manufacturer's standard fluoropolymer two-coat system with fluoropolymer color topcoat containing not less than 70 percent PVDF resin by weight and complying with AAMA 2605
 - 2. Interior Wood Surfaces: Unfinished

- a. Wood Species: Pine
- 3. Nailing Fin: Manufacturer's standard nailing fins for securing frame to structure during installation to hold unit plumb, square and true.
- 4. Installation Clips: Provide manufacturer's standard clips of sufficient strength to withstand design pressure indicated.
- D. Glass: Clear annealed glass, ASTM C1036, Type 1, Class 1, q3.
 - 1. Kind: Fully tempered where required by code.
- E. Insulating-Glass Units: ASTM E2190.
 - 1. Glass: ASTM C1036, Type 1, Class 1, q3.
 - a. Tint: Clear.
 - 2. Lites: Two.
 - 3. Filling: Fill space between glass lites with argon.
 - 4. Low-E Coating: Cardinal LoE366, Solar Control LoE
- F. Hardware, General: Provide manufacturer's standard hardware fabricated from aluminum, stainless steel, carbon steel complying with AAMA 907, or other corrosion-resistant material compatible with adjacent materials; designed to smoothly operate, tightly close, and securely lock windows, and sized to accommodate sash weight and dimensions.
 - 1. Exposed Hardware Color and Finish: As selected by Architect from manufacturer's full range.
- G. Hung Window Hardware:
 - 1. Counterbalancing Mechanism: Complying with AAMA 902, concealed, of size and capacity to hold sash stationary at any open position.
 - 2. Locks and Latches: Allow unobstructed movement of the sash across adjacent sash in direction indicated and operated from the inside only.
 - 3. Tilt Hardware: Releasing tilt latch allows sash to pivot about horizontal axis to facilitate cleaning exterior surfaces from the interior.
- H. Weather Stripping: Provide full-perimeter weather stripping for each operable sash unless otherwise indicated.
- I. Fasteners: Noncorrosive and compatible with window members, trim, hardware, anchors, and other components.
 - 1. Exposed Fasteners: Do not use exposed fasteners to greatest extent possible. For application of hardware, use fasteners that match finish hardware being fastened.

2.4 ACCESSORIES

- A. Grilles (False Muntins): Provide grilles in designs indicated to each sash lite.
 - 1. Type: Exterior and interior, adhered to glass with bars between the glass.

2. Material: To match adjacent finish of window sash.
3. Design: As indicated on Drawings
4. Bar Width: Not less than 5/8 inch
5. Interior Bar Profile: Beveled.

B. Casing: Extruded aluminum 1-15/16-inch brickmould, with 1-5/8-inch sill nosing

2.5 INSECT SCREENS

- A. General: Fabricate insect screens to integrate with window frame. Provide screen for each operable exterior sash. Screen wickets are not permitted.

2.6 FABRICATION

- A. Fabricate wood windows in sizes indicated. Include a complete system for installing and anchoring windows.
- B. Glaze wood windows in the factory.
- C. Weather strip each operable sash to provide weathertight installation.
- D. Mullions: Provide mullions and cover plates, matching window units, complete with anchors for support to structure and installation of window units. Allow for erection tolerances and provide for movement of window units due to thermal expansion and building deflections. Provide mullions and cover plates capable of withstanding design wind loads of window units.
- E. Complete fabrication, assembly, finishing, hardware application, and other work in the factory to greatest extent possible. Disassemble components only as necessary for shipment and installation. Allow for scribing, trimming, and fitting at Project site.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine openings, substrates, structural support, anchorage, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Verify rough opening dimensions, levelness of sill plate, and operational clearances.
- C. Examine wall flashings, vapor retarders, water and weather barriers, and other built-in components to ensure weathertight window installation.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Comply with manufacturer's written instructions for installing windows, hardware, accessories, and other components. For installation procedures and requirements not addressed in manufacturer's written instructions, comply with installation requirements in ASTM E2112.
- B. Install windows level, plumb, square, true to line, without distortion, anchored securely in place to structural support, and in proper relation to wall flashing and other adjacent construction to produce weathertight construction.
- C. Separate aluminum and other corrodible surfaces from sources of corrosion or electrolytic action (dissimilar materials, treated lumber, and so on) at points of contact with other materials.
- D. For fin method of attachment, integrate window system installation with exterior water-resistant barrier using flashing/sealant tape. Apply and integrate flashing/sealant tape with water-resistant barrier using watershed principles in accordance with window manufacturer's written instructions.
- E. Place interior seal around window perimeter to maintain continuity of building thermal and air barrier using insulating-foam sealant.
- F. Seal window to exterior wall cladding with sealant and related backing materials at perimeter of assembly.
- G. Leave windows closed and locked.

3.3 ADJUSTING, CLEANING, AND PROTECTION

- A. Adjust operating sashes and hardware for a tight fit at contact points and weather stripping for smooth operation and weathertight closure.
- B. Clean exposed surfaces immediately after installing windows. Remove excess sealants, glazing materials, dirt, and other substances.
 - 1. Keep protective films and coverings in place until final cleaning.
- C. Remove and replace sashes if glass has been broken, chipped, cracked, abraded, or damaged during construction period.
- D. Protect window surfaces from contact with contaminating substances resulting from construction operations. If contaminating substances do contact window surfaces, remove contaminants immediately in accordance with manufacturer's written instructions.

END OF SECTION 085200

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SECTION 08 71 00
DOOR HARDWARE

PART 1 GENERAL

1.1 SUMMARY

- A. Provide door hardware.

1.2 SUBMITTALS

- A. Product Data: Submit manufacturer's product data and installation instructions for each material and product used.
- B. Samples: Submit two representative samples of each material specified indicating visual characteristics and finish. Include range samples if variation of finish is anticipated.
- C. Submit for approval hardware schedule proposed for use based on Owner's requirements.

1.3 QUALITY ASSURANCE

- A. Comply with governing codes and regulations. Provide products of acceptable manufacturers which have been in satisfactory use in similar service for three years. Use experienced installers. Deliver, handle, and store materials in accordance with manufacturer's instructions.
- B. Hardware for Fire-Rated Openings: NFPA 80, and local requirements.
- C. Materials and Application: ANSI A156 series standards.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Door Hardware:
 - 1. Manufacturers: Emtek, Baldwin, Rocky Mountain or approved equal.
 - 2. Quality Level: Residential.
 - 3. Locksets and Latchsets: Bored cylindrical type.
 - 4. Locksets and Latchsets: Mortise type.
 - 5. Lock Cylinders: Integral.
 - 6. Lock Cylinders: Interchangeable.
 - 7. Keying: Owner's requirements.
 - 8. Keying: Multiple building keying and key control system.
 - 9. Keying: Match existing keying and key control system.
 - 10. Hinges and Butts: Full-mortise type at interior, with nonremovable pins at exterior doors. Use Emtek square barrel heavy duty hinges. 4" downstairs doors and 3" for upstairs doors. 3 hinges for all 6'-8" & 7'-0" doors and 4 hinges for all 8'-0" and taller doors.
 - 11. Pivots: Offset or center-hung type.
 - 12. Push/Pull Units: Through-bolted type.
 - 13. Hardware Finishes: Antique brass finish on exposed surfaces of all hardware listed in hardware schedule below.
 - 14. Auxiliary Materials:
 - a. Door Trim Units: Kickplates, edge trim, viewers, knockers, and mail drop, and related

- trim.
- b. Stops and overhead door holders.
- c. Interior pocket door hardware.
- d. Weatherstripping and thresholds.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Follow guidelines of DHI "Recommended Locations for Builder's Hardware" and hardware manufacturers' instructions.
- B. Install materials and systems in accordance with manufacturer's instructions and approved submittals. Install materials and systems in proper relation with adjacent construction and with uniform appearance. Coordinate with work of other sections.
- C. Adjust operation, clean and protect.

3.2 SCHEDULE

A. Hardware Schedule:

- 1. Door no. 1 –
Emtek – Merrimack Lever.
Emtek – Entry Set - Melrose Tubular Entry Set.
Emtek – Surface bolt 18" on each door.
- 2. Door nos. 2,3,4,6,7,8,9,10 & 11 –
Emtek – Merrimack Lever.
Emtek – Entry Set – Wilshire Keyed 5 ½" C-to-C
Sideplate Lock.
Emtek – Surface bolt 18" on each door.
- 3. All interior doors, except nos. 19, –
22A,33,34,35,39 & 40.
Emtek – Merrimack Lever with rectangular rosette.
Emtek – Entry Set – Wilshire Keyed 5 ½" C-to-C
Locksets – Privacy - All Bedrooms & Bathroom doors.
Passage – All other doors except door no. 19.
- 4. Pocket door nos. 22A, –
33,34,35,39 & 40.
Emtek – Modern Rectangular Pocket Door, Privacy Lock.
Finish – French Antique US7.
Guides – Emtek as recommended by manufacturer for ea. door.
- 5. Door no. 19 –
Emtek – Knoxville Push Plate on Keeping Room side.
Emtek – Knoxville Pull Plate on Catering Kitchen side.
Emtek – Baldwin Kick Plate, 8" x 30" on each side. Solid Brass.
.05" thick no. 20000830.
Emtek – Pivot hinge hardware at top and bottom as recommended by
Manufacturer.

END OF SECTION

SECTION 09 21 16
GYPSUM BOARD ASSEMBLIES

PART 1 GENERAL

1.1 SUMMARY

- A. Provide gypsum board assemblies.

1.2 SUBMITTALS

- A. Product Data: Submit manufacturer's product data and installation instructions for each material and product used.

1.3 QUALITY ASSURANCE

- A. Comply with governing codes and regulations. Provide products of acceptable manufacturers which have been in satisfactory use in similar service for three years. Use experienced installers. Deliver, handle, and store materials in accordance with manufacturer's instructions.
- B. Tolerances: Not more than 1/16-inch difference in true plane at joints between adjacent boards before finishing. After finishing, joints shall be not be visible. Not more than 1/8 inch in 10 feet deviation from true plane, plumb, level and proper relation to adjacent surfaces in finished work.
- C. Fire Resistance for Fire-Rated Assemblies: ASTM E 119.
- D. Mock-Ups: Provide mock-up as required to demonstrate quality of workmanship and level of finish.
- E. Performance: Fire, structural, and seismic performance meeting requirements of building code and local authorities.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Gypsum Board:
 - 1. Manufacturers: Georgia Pacific; National Gypsum Co.; Lafarge North America; United States Gypsum Company, or approved equal.
 - 2. Application: Interior walls, partitions, and ceilings with tape and joint compound finish.
 - 3. Material Standard: ASTM C1396.
 - 4. Type: Board for tape and joint compound finish.
 - a. Type: Regular, moisture-resistant and fire-rated types as required.
 - b. Typical Thickness: 1/2 inch.
 - 5. Joint Treatment: ASTM C474 and ASTM C840, 3-coat system, paper or fiberglass tape.
 - 6. Auxiliary Materials:
 - a. Corner bead, edge trim and control joints.
 - b. Gypsum board screws, ASTM C 1002.
 - c. Fastening adhesive, low VOC type.
 - d. Polyethylene vapor retarder, 6 mils.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Wood Framing: Install wood framing in compliance with Section 06100 - Rough Carpentry. Install with tolerances necessary to produce substrate for gypsum board assemblies with tolerances specified. Include blocking for items such as railings, grab bars, casework, toilet accessories, window treatment and similar items.
- B. Tape and Joint Compound: Install gypsum board for tape and 3-coat joint compound finish in compliance with ASTM C 840 and GA 216, Level 4 finish. Install gypsum board assemblies true, plumb, level and in proper relation to adjacent surfaces.
- C. Provide continuous vapor retarder at exterior walls.
- D. Provide fire-rated systems where indicated and where required by authorities having jurisdiction.
- E. Install boards vertically. Do not allow butt-to-butt joints and joints that do not fall over framing members.
- F. Provide insulation full height and thickness in partitions at conference rooms, toilet rooms, between different occupancies, and where required.
- G. Provide acoustical sealant at both faces at top and bottom runner tracks, wall perimeters, openings, expansion and control joints.
- H. Install trim in strict compliance with manufacturer's instructions and recommendations.
- I. Repair surface defects. Leave ready for finish painting or wall treatment.

END OF SECTION

SECTION 09 30 00

TILING

PART 1 GENERAL

1.1 SUMMARY

- A. Provide tile.

1.2 SUBMITTALS

- A. Product Data: Submit manufacturer's product data and installation instructions for each material and product used.
- B. Samples: Submit two representative samples of each material specified indicating visual characteristics and finish. Include range samples if variation of finish is anticipated.
 - 1. Include manufacturer's full range of color and finish options if additional selection is required.

1.3 QUALITY ASSURANCE

- A. Comply with governing codes and regulations. Provide products of acceptable manufacturers which have been in satisfactory use in similar service for three years. Use experienced installers. Deliver, handle, and store materials in accordance with manufacturer's instructions.
- B. Tile: ANSI A 137.1.
- C. Tile Setting Materials: ANSI A 118 series standard specifications.
- D. Tile Installation: ANSI 108 series standard specifications and Tile Council of America, Handbook for Ceramic Tile Installation.
- E. Mock-Ups: Provide mock-up as required to demonstrate quality of workmanship.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Tile:
 - 1. Manufacturers: Refer to drawing sheets A120, A121 & A600 sheets.
 - 2. Application: Interior floor tile over concrete slab.
 - 3. Application: Interior floor tile over existing wood deck.
 - 4. Application: Interior wall tile over durarock tile backer board.
 - 5. Sizes & Patterns: Refer to drawing sheets A120, A121 & A600 sheets.
 - 6. Colors: Refer to drawing sheets A120, A121 & A600 sheets.
- B. Setting Materials:
 - 1. Manufacturers: Schluter Systems, American Olean Tile Co.; American Slate Company; Bostik, Inc.; Custom Building Products; LATICRETE International, Inc.; MAPEI Corp. ; ProSpec (formerly Bonsal branded products); Schluter System LP; SGM, Inc.; Super-Tek Products, Inc.; TEC Specialty Construction Brands, Inc.; or approved equal.

2. Thin-set mortar.
 - a. Medium bed polymer-modified mortar meets ANSI A118.4 standards with installation to conform to ANSI A108.5 Dry-set Portland cement mortar or Latex-Portland cement mortar. Custom Building Material Marble and Granite fortified premium mortar
<http://www.custombuildingproducts.com/TDS/TDS-124.pdf>
3. Grout.
 - a. Polymer-modified, non-standard Portland cement dry grout meets or exceeds ANSI A118.6 used for joints up to 1/8" wide with installation to conform to ANSI A108-10 method. Custom Building Material polyblend non-sanded grout
<http://www.custombuildingproducts.com/TDS/TDS-178.pdf>

PART 3 EXECUTION

3.1 INSTALLATION

- A. Shower Floors Use System as Follows: Tile on Thinset over "Schluter" Kerdi Shower System (or approved equal), sloped to stainless steel round drain. Submit shop drawings for system for review and approval.
- B. Shower Walls & Ceilings Use System as Follows: Tile on Thinset over "Schluter" Kerdi Shower System (or approved equal), over 1/2" durarock tile backer board with joints taped and mudded over 15 lb. felt installed over 2x4 wood studs. Submit shop drawings for system for review and approval.
- C. Wainscot Walls & Backsplash Locations Use System as Follows: Tile on Thinset over 1/2" durarock tile backer board with joints taped and mudded over 15 lb. felt installed over 2x4 wood studs. Submit shop drawings for system for review and approval.
- D. Comply with Tile Council of America and ANSI Standard Specifications for Installation for substrate and installation required. Comply with manufacturer's instructions and recommendations.
- E. Install waterproof membrane in accordance with manufacturer's instructions and recommendations.
- F. Lay tile in grid pattern with alignment grids. Layout tile to provide uniform joint widths and to minimize cutting; do not use less than 1/2 tile units.
- G. Provide sealant joints where recommended by TCA and approved by Architect.
- H. Grout and cure, clean and protect.

3.2 SCHEDULE

- A. Tile Schedule: Note: Refer to drawing sheets A120, A121 & A600 sheets.

END OF SECTION

SECTION 09 91 00

PAINTING

PART 1 GENERAL

1.1 SUMMARY

- A. Provide painting and surface preparation.

1.2 SUBMITTALS

- A. Product Data: Submit manufacturer's product data and installation instructions for each material and product used.
- B. Samples: Submit two representative samples of each material specified indicating visual characteristics and finish. Include range samples if variation of finish is anticipated.
 - 1. Include manufacturer's full range of color and finish options if additional selection is required.
- C. Extra Stock: Submit 2 unopened gallons of each paint and color used in the project.

1.3 QUALITY ASSURANCE

- A. Comply with governing codes and regulations. Provide products of acceptable manufacturers which have been in satisfactory use in similar service for three years. Use experienced installers. Deliver, handle, and store materials in accordance with manufacturer's instructions.
- B. Regulations: Compliance with VOC and environmental regulations.
- C. Mock-Ups: Provide mock-up as required to demonstrate quality of workmanship.
 - 1. Provide 4 foot x 4 foot mock-ups of each type of surface.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Painting:
 - 1. Manufacturers of Regular Paints: Benjamin Moore; Sherwin-Williams; Farrow & Ball.
 - 2. Manufacturers of Multicolor Coatings: Polomyx; Zolatone; or approved equal.
 - 3. Application: Interior unfinished surfaces.
 - 4. Application: Exterior unfinished surfaces.
 - 5. Application: Exposed mechanical and electrical items.
 - 6. Application: Repainting of existing surfaces.
 - 7. Primary Coating Type: Oil based paints.
 - 8. Primary Coating Type: Latex based paints.
 - 9. Primary Coating Type: Low VOC interior paints.
 - a. Flat Paints: Less than 50 g/L.
 - b. Non-Flat Paints: Less than 150 g/L.
 - c. Paints applied to Ferrous Metals: Less than 250 g/L.
 - 10. Primary Coating Type: Zero VOC interior paints.
 - 11. Primary Paint Systems: Primer plus one finish coat.

12. Primary Paint Systems: Primer plus two finish coats.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Inspect surfaces, report unsatisfactory conditions in writing; beginning work means acceptance of substrate.
- B. Comply with manufacturer's instructions and recommendations for preparation, priming and coating work. Coordinate with work of other sections.
- C. At existing areas to be repainted, remove blistered or peeling paint to sound substrates. Remove chalk deposits and mildew and wash all surfaces with mild detergent. Perform related minor preparation including caulk and glazing compounds. Spot prime bare areas before priming and painting as specified.
- D. Match approved mock-ups for color, texture, and pattern. Re-coat or remove and replace work which does not match or shows loss of adhesion. Clean up, touch up and protect work.

3.2 PAINT SCHEDULE

- A. Entry Foyer
 - 1. Walls
 - a. Color – 'Benjamin Moore' OC-17, White Dove
 - b. Finish – Eggshell
 - 2. Ceiling
 - a. Color – 'Benjamin Moore' OC-17, White Dove
 - b. Finish – Flat
 - 3. Trim
 - a. Color – 'Benjamin Moore' OC-17, White Dove
 - b. Finish – Satin
- B. Dining
 - 1. Walls
 - a. Color – 'Benjamin Moore' OC-17, White Dove
 - b. Finish – Eggshell
 - 2. Ceiling
 - a. Color – 'Benjamin Moore' HC-173, Edgecomb Gray
 - b. Finish – Flat
 - 3. Trim
 - a. Color – 'Benjamin Moore' OC-17, White Dove
 - b. Finish – Satin
- C. Butler
 - 1. Walls, Ceiling, Trim, & Cabinets
 - a. Color – 'Benjamin Moore' HC-161, Templeton Gray
 - b. Finish – High Gloss
- D. Keeping Room
 - 1. North, South, & West Walls

- a. Color – ‘Benjamin Moore’ OC-17, White Dove
 - b. Finish – Eggshell
 - 2. East Wall
 - a. Color – ‘Benjamin Moore’ HC-161, Templeton Gray
 - b. Finish – High Gloss
 - 3. Ceiling
 - a. Color – ‘Benjamin Moore’ OC-17, White Dove
 - b. Finish – Flat
 - 4. Trim
 - a. Color – ‘Benjamin Moore’ OC-17, White Dove
 - b. Finish – Satin
- E. Great Room
- 1. Walls
 - a. Color – ‘Benjamin Moore’ OC-17, White Dove
 - b. Finish – Eggshell
 - 2. Ceiling
 - a. Color – ‘Benjamin Moore’ OC-17, White Dove
 - b. Finish – Flat
 - 3. Trim & Cabinets
 - a. Color – ‘Benjamin Moore’ OC-17, White Dove
 - b. Finish – Satin
- F. Powder Room
- 1. Walls
 - a. Color – ‘Benjamin Moore’ OC-17, White Dove
 - b. Finish – Eggshell
 - 2. Ceiling
 - a. Color – ‘Benjamin Moore’ OC-17, White Dove
 - b. Finish – Flat
 - 3. Trim
 - a. Color – ‘Benjamin Moore’ OC-17, White Dove
 - b. Finish – Satin
- G. Guest Bath
- 1. Walls
 - a. Color – ‘Benjamin Moore’ OC-17, White Dove
 - b. Finish – Eggshell
 - 2. Ceiling
 - a. Color – ‘Benjamin Moore’ OC-17, White Dove
 - b. Finish – Flat
 - 3. Trim
 - a. Color – ‘Benjamin Moore’ OC-17, White Dove
 - b. Finish – Satin
 - 4. Cabinets
 - a. Color – ‘Benjamin Moore’ OC-20, Pale Oak
 - b. Finish – Satin
- H. Study
- 1. Walls

- a. Color – ‘Benjamin Moore’ HC-163, Dunbury Gray
 - b. Finish – Eggshell
 - 2. Ceiling
 - a. Color – ‘Benjamin Moore’ HC-163, Dunbury Gray
 - b. Finish – Flat
 - 3. Trim & Cabinets
 - a. Color – ‘Benjamin Moore’ HC-163, Dunbury Gray
 - b. Finish – Satin
- I. Catering Kitchen
- 1. Walls
 - a. Color – ‘Benjamin Moore’ OC-17, White Dove
 - b. Finish – Eggshell
 - 2. Ceiling
 - a. Color – ‘Benjamin Moore’ OC-17, White Dove
 - b. Finish – Flat
 - 3. Trim
 - a. Color – ‘Benjamin Moore’ OC-17, White Dove
 - b. Finish – Satin
 - 4. Cabinets
 - a. Color – ‘Sherwin Williams’ SW6200, Link Gray
 - b. Finish – Satin
- J. Janitor Closet & Laundry
- 1. Walls
 - a. Color – ‘Benjamin Moore’ OC-17, White Dove
 - b. Finish – Eggshell
 - 2. Ceiling
 - a. Color – ‘Benjamin Moore’ OC-17, White Dove
 - b. Finish – Flat
 - 3. Trim
 - a. Color – ‘Benjamin Moore’ OC-17, White Dove
 - b. Finish – Satin
 - 4. Cabinets
 - a. Color – ‘Sherwin Williams’ SW7011, Natural Choice
 - b. Finish – Satin
- K. Drop-Off
- 1. Walls
 - a. Color – ‘Benjamin Moore’ OC-17, White Dove
 - b. Finish – Eggshell
 - 2. Ceiling
 - a. Color – ‘Benjamin Moore’ OC-17, White Dove
 - b. Finish – Flat
 - 3. Trim
 - a. Color – ‘Benjamin Moore’ OC-17, White Dove
 - b. Finish – Satin
 - 4. Cabinets
 - a. Color – ‘Sherwin Williams’ SW6200, Ink Gray

- b. Finish – Satin

L. Upstairs Living & Dining

- 1. Walls
 - a. Color – 'Benjamin Moore' OC-17, White Dove
 - b. Finish – Eggshell
- 2. Ceiling
 - a. Color – 'Benjamin Moore' OC-17, White Dove
 - b. Finish – Flat
- 3. Trim
 - a. Color – 'Benjamin Moore' OC-17, White Dove
 - b. Finish – Satin

M. Upstairs Kitchen

- 1. Walls
 - a. Color – 'Benjamin Moore' OC-17, White Dove
 - b. Finish – Eggshell
- 2. Ceiling
 - a. Color – 'Benjamin Moore' OC-17, White Dove
 - b. Finish – Flat
- 3. Trim
 - a. Color – 'Benjamin Moore' OC-17, White Dove
 - b. Finish – Satin
- 4. Cabinets
 - a. Color – 'Sherwin Williams' SW7011, Natural Choice
 - b. Finish – Satin

N. Main Bathroom

- 1. Walls
 - a. Color – 'Benjamin Moore' OC-17, White Dove
 - b. Finish – Eggshell
- 2. Ceiling
 - a. Color – 'Benjamin Moore' OC-17, White Dove
 - b. Finish – Flat
- 3. Trim
 - a. Color – 'Benjamin Moore' OC-17, White Dove
 - b. Finish – Satin
- 4. Cabinets
 - a. Color – 'Benjamin Moore' HC-172, Revere Pewter
 - b. Finish – Satin

O. Guest Bath 2

- 1. Walls
 - a. Color – 'Benjamin Moore' OC-17, White Dove
 - b. Finish – Eggshell
- 2. Ceiling
 - a. Color – 'Benjamin Moore' OC-17, White Dove
 - b. Finish – Flat

3. Trim
 - a. Color – 'Benjamin Moore' OC-17, White Dove
 - b. Finish – Satin
4. Cabinets
 - a. Color – 'Benjamin Moore' OC-20, Pale Oak
 - b. Finish – Satin

END OF SECTION

SECTION 10 28 13
TOILET ACCESSORIES

PART 1 GENERAL

1.1 SUMMARY

- A. Provide toilet, bath and laundry accessories.

1.2 SUBMITTALS

- A. Product Data: Submit manufacturer's product data and installation instructions for each material and product used.
- B. Shop Drawings: Submit shop drawings indicating material characteristics, details of construction, connections, and relationship with adjacent construction.

1.3 QUALITY ASSURANCE

- A. Comply with governing codes and regulations. Provide products of acceptable manufacturers which have been in satisfactory use in similar service for three years. Use experienced installers. Deliver, handle, and store materials in accordance with manufacturer's instructions.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Toilet and Bath Accessories for all Bathrooms except Bath 1 & Bath 2:
 - 1. Manufacturers: Delta, Brizzio, Kohler or approved equal.
 - 2. Accessory: 1 Toilet tissue dispensers, single roll – Delta Cassidy Model no. 79750-CZ.
 - 3. Accessory: 1 Towel Ring Holder – Delta Cassidy Model no. 79746-CZ.
 - 4. Accessory: 2 Double Robe Hooks – Delta Cassidy Model no. 79735-CZ.
 - 5. Finish: Polished Nickel.
- B. Toilet and Bath Accessories for Bath 1 & Bath 2:
 - 1. Manufacturers: Bobrick, Delta, Brizzio, Kohler or approved equal.
 - 2. Accessory: Paper towel dispensers – Bobrick – B-2621.
 - 3. Accessory: Toilet tissue dispensers, double roll. – Kohler Model no. 78384-CP. Polished Nickel Finish.
 - 4. Accessory: Waste receptacles. Bobrick B-221216 Floor Standing Foot-Operated Receptacle.
 - 5. Accessory: Grab bars. Bobrick B-5806 x 36 & B-5806 x 42.
 - 6. Accessory: Soap/Lotion dispensers, wall mounted. Kohler – “Purist” Model no. 14380-CP. Polished Nickel Finish.
 - 7. Accessory: Robe hooks. Kohler “Artifacts” Model no. 72572-CP. Polished Nickel Finish.
 - 8. Finish: Bobrick Items - Stainless steel with satin finish.
 - 9. Finish: Kohler Items – Polished Nickel.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Install materials and systems in accordance with manufacturer's instructions and approved submittals. Install materials and systems in proper relation with adjacent construction and with uniform appearance. Coordinate with work of other sections.
- B. Restore damaged finishes and test for proper operation. Clean and protect work from damage.

END OF SECTION

SECTION 11 31 00
RESIDENTIAL APPLIANCES

PART 1 GENERAL

1.1 SUMMARY

- A. Provide residential appliances.

1.2 SUBMITTALS

- A. Product Data: Submit manufacturer's product data and installation instructions for each material and product used.
- B. Shop Drawings: Submit shop drawings indicating material characteristics, details of construction, connections, and relationship with adjacent construction.
- C. Warranty: Submit manufacturer's standard warranty. Include labor and materials to repair or replace defective materials.
- D. Operation and Maintenance Data: Submit manufacturer's operation and maintenance data, including operating instructions, list of spare parts and maintenance schedule.

1.3 QUALITY ASSURANCE

- A. Comply with governing codes and regulations. Provide products of acceptable manufacturers which have been in satisfactory use in similar service for three years. Use experienced installers. Deliver, handle, and store materials in accordance with manufacturer's instructions.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Kitchen Appliances:
 - 1. Manufacturers: Monogram; Cove; Thermadoor; Scotsman; Perlick; U-Line; Subzero; Fisher & Paykel; Zephyr; GE; Vent-A-Hood.
 - 2. 15" ice machine: 'Scotsman' SCN60 with gravity pump
 - 3. 24" refrigerated beverage center: 'Monogram' ZIFI240HII
 - 4. 30" professional range: 'Monogram' ZGP304NTSS
 - 5. 24" dishwasher: 'Monogram' ZDT985SSNS
 - 6. 36" French door refrigerator: 'Monogram' ZIP364IIPVII
 - 7. 30" microwave oven: 'Monogram' ZSA1202PSS
 - 8. 36" wall mount hood liner insert: 'Vent-A-Hood' M34PSLDSS

PART 3 EXECUTION

3.1 INSTALLATION

- A. Install materials and systems in accordance with manufacturer's instructions and approved submittals. Install materials and systems in proper relation with adjacent construction and with uniform appearance. Coordinate with work of other sections.
- B. Restore damaged finishes and test for proper operation. Clean and protect work from damage.

END OF SECTION

**SECTION 11 40 00
FOOD SERVICE EQUIPMENT**

PART 1 – GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SCOPE

A. These specifications cover all items associated with the complete Foodservice Equipment package as hereinafter specified and shown on the drawings issued in connection with this project. The Kitchen Equipment Contractor shall have at least five years successful experience furnishing and installing foodservice equipment on projects similar in size and scope to that required for this project and be a recognized distributor for the items of equipment specified herein. The Kitchen Equipment Contractor shall have the financial resources available to handle the work in a satisfactory manner and to deliver the required items of equipment so as not to delay progress of the work. The Kitchen Equipment Contractor shall be fully capable of fulfilling the terms and conditions of the warranty provisions and, if required, capable of providing a performance bond.

B. The equipment herein specified, with the exception of manufactured or standard catalog items, shall be fabricated in a shop bearing the name of a recognized Foodservice Equipment Fabricator. This manufacturer shall be in good standing, have at least five years' experience in similar work, and NSF (National Sanitation Foundation) Certified. All custom fabrication shall be made in the same shop.

C. Provide labor and material required to deliver, uncrate, assemble, set in place, level, install, supervise and coordinate the installation of the foodservice equipment and accessories as indicated on drawings and as specified herein.

D. Unless specified otherwise under Part 4.02 of the Itemized Equipment Specifications, work NOT included in this contract shall include, but is NOT limited to:

1. All electrical, gas, water and waste services to rough-in points at fixture locations, required field/site interconnections, control wiring for exhaust and refrigeration systems, inter-wiring of the fire suppression system and building alarm systems, providing shunt trip breakers, and final utility connections to fixtures.

2. Ductwork from exhaust/supply hood collar, duct connection to the exhaust/supply hood collar, testing and balancing of the exhaust system, all switches, controls, interlocking devices, etc., necessary for complete and proper system operation.

3. Installation and calibration of faucets, vacuum breakers, quick disconnect assemblies (water & gas), drain and waste assemblies, check valves, and flow control valves as furnished with equipment.

4. Conduit and conductors from the rough-in to the equipment and between remote controls and the equipment.

5. Disconnect switches as required by the electrical code.

6. Temporary light and power required to facilitate the installation of the foodservice equipment.

1.03 DEFINITIONS AND ABBREVIATIONS

A. "Owner" – the end user or operator.

B. "Owner's Representative" – including Architect, Engineer, Construction Manager, Consultant, and Project Coordinator.

C. "Consultant" – for this section of the work is TriMark SS Kemp. The Consultant is responsible to the Architect for ascertaining that the work complies with the requirements of this section.

D. "Equipment Contractor" – Kitchen Equipment Contractor (KEC), is the person or company that will contract for the work specified in this section.

E. "Substantial Completion" – The date of substantial completion of work or designated portion thereof is the date certified by the Owner when construction is sufficiently complete, in accordance with the contract documents, so Owner can occupy or utilize the work or designated portion thereof for the use for which it is intended.

F. "Furnish" – Kitchen Equipment Contractor to Supply and Deliver to appropriate contractor for installation.

G. "Install" – Kitchen Equipment Contractor Furnish to project site and include unloading, unpacking, assembly, erecting, placing, anchoring, protecting, cleaning, and similar operations; Ready for final utility connections by appropriate contractor.

H. "Provide" – Kitchen Equipment Contractor to furnish and install complete; ready for intended use.

1.04 DISCREPANCIES

A. If, after examination of the contract documents, any discrepancies, omissions, ambiguities, or conflicts are found, or where there is doubt as to their meaning, the Architect is to be notified in the form of a written Request For Information (RFI) at the earliest possible date prior to bid submittal.

B. Such discrepancies include, but are not limited to, clarifications, drafting errors, quantity conflicts, description conflicts, utility information errors, or model number conflicts. Any written responses or addendums issued by the Architect clarifying such conditions shall become a part of the contract documents.

C. Where discrepancies in quantities or conflicts impacting cost are discovered and a written response from the Architect has not or cannot be received prior to bid submittal, the contractor is to assume the greater of quantities and/or cost for inclusion into the bid.

D. The Section 114000 contract documents shall take precedence over discrepancies arising between said documents and those of the other sections and divisions as applies to the Kitchen Equipment Contractor's scope of work.

1.05 CODES AND STANDARDS

A. All material and workmanship shall comply with all applicable codes, specifications, local ordinances, industry standards, and utility company regulations. In the event of differences between codes, specifications, state laws, federal laws, local ordinances, industry standards, utility company regulations and the contract documents, the most stringent shall govern. Kitchen Equipment Contractor shall promptly notify Owner's Representatives in writing of any such conflicts.

B. Manufacture and install equipment and accessories in strict compliance with and, as applicable, bear the seal of UL, NEMA, ASME, NSF, AGA, ANSI, SMACNA, OSHA and NFPA.

C. Non-compliance – Approval of Kitchen Equipment Contractor's submittals does not relieve the Kitchen Equipment Contractor from responsibility of complying with codes and regulations. Should Kitchen Equipment Contractor perform any work that does not comply with the requirements of the applicable building codes, state and federal laws, local ordinances, industry standards, and utility company regulations, the KEC shall bear all associated costs to correct the deficiencies and hold the Owner and its Representatives harmless from any claim or loss resulting from violations.

1.06 SUBMITTAL

A. The Kitchen Equipment Contractor shall, within fifteen (15) days after acceptance of the contract, prepare a set of submittal documents for review and approval by the Owner's Representatives. Files shall be submitted electronically (in manner acceptable to Architect) and hard copy in quantity dictated by contract, to Architect for distribution. Submittal set to consist of the following:

1. A specification book with a complete list of fixtures, devices, materials, and equipment proposed for use. Each item to have an individual cover sheet and contain quantities, illustrations, specifications, line drawings, and utility information on all brand name items (items not of custom manufacture). The specification shall also include the name, address, and phone number of the manufacturer, producer, supplier, or distributor together with the trade name, catalog number, model number or other data required for complete identification.

B. If any item is rejected by the Architect or the Consultant as not complying with the specifications, the Kitchen Equipment Contractor shall, within seven (7) days of such a rejection, submit an acceptable substitute.

C. Upon approval of submittals, the KEC shall further prepare hard copies of approved documents as requested and deliver them to the Owner's Representatives for distribution to contractors on job site.

1.07 SUBSTITUTIONS

A. All substitutions that are to be considered must be of the same size and shape, capacities, constructed of the same materials, have the same features, finishes and specific accessories, and meet or exceed the performance of the primary named specifications.

B. See Section 01 25 00 for Substitution Procedures

PART 2 – PRODUCTS

2.01 MATERIALS, GENERAL

A. The materials used throughout shall be those of reputable manufactures and shall be new and best of their respective kinds. Equipment, fixtures, and materials of similar types shall be of the same manufacturer, except where specifically indicated otherwise. All work shall be installed in a neat and workmanlike manner in accordance with the best trade practices and by workmen skilled in each particular branch of the work assigned to them.

B. In all cases where equipment and material are specified in the singular or plural number, it is intended that such reference shall apply to as many such items as are required to complete the installation.

C. Unless specified otherwise under Part 4.02 of the Itemized Equipment Specifications, the basis for all materials provided under this scope shall be defined as follows:

1. Stainless steel sheets or shapes: When specified to be 18-8, Type 304, polished to No. 4 finish.

2. Galvanized Iron Sheets: When specified to be zinc G-90 coating.

3. Tubing: When specified to be seamless stainless steel, 16 gauge, 18-8, Type 304, polished to a No. 4 finish, 1-5/8" diameter.

4. Sealant: ASTM C920; Type S, Grade NS, Class 25, Use NT. Provide elastomeric sealant NSF certified for end-use application that, when cured and washed, meets requirements of Food and Drug Administration's Title 21 CFR, Section 177.2600 for use in areas that come in contact with food.

5. Paint and Coatings: Provide the types of painting and coating material which, after drying and curing, are suitable for use in conjunction with foodservice and which are durable, non-toxic, non-flaking, mildew-resistant, and comply with foodservice regulations.

6. Gaskets: NSF certified for end-use application indicated; of rubber, neoprene, or PVC that is nontoxic, stable, odorless, nonabsorbent and unaffected by exposure to foods and cleaning compounds.

7. Casters: NSF certified, 4" or 5" diameter, rubber, neoprene or polyurethane tires as specified with 1" tread width, sealed, self-lubricating, non-marking swivel type with a minimum load capacity 200 lbs. Each having double bearing raceways and sleeve-bearing axles. Equipment specified with casters shall have no less than two (2) with toe brakes.

2.02 PLUMBING REQUIREMENTS

A. Special valves, regulators, strainers, pressure reducing valves, control valves, thermometers, pressure gauges, keyed water flow restrictors and accessories shall be supplied and installed by the Plumbing Contractor where required by code or necessary for the operation of the equipment.

2.03 ELECTRICAL REQUIREMENTS

A. All cord-connected items must be furnished with cord sets in accordance with authorities having jurisdiction and not exceeding the length of their U.L. listing. All cord sets are to contain an equipment grounding conductor and be furnished with caps or plugs listed or recognized by Underwriters Laboratories, Inc. Cords shall be type SO or SJO and listed by Underwriters Laboratories, Inc.

PART 3 - EXECUTION

3.01 COORDINATION OF WORK

- A. Kitchen Equipment Contractor shall coordinate any and all work schedules respective to this contract with the Owner, participate in required scheduling meetings, and co-sign the schedule agreed to by the Prime Contractors.
- B. Field inspect conditions at site and verify that the wall dimensions and rough-ins were properly installed. Notify the Architect in writing of discrepancies between the contract documents and the actual conditions on the jobsite prior to equipment fabrication. Check all door openings, passageways, elevators, etc., to be sure that equipment can be conveyed into its proper location within the building. If necessary, check with the contractor regarding the possibility of holding wall erection, placement of doorjambes, windows, etc. for the purpose of moving the equipment into its proper location.
- C. Kitchen Equipment Contractor shall provide a competent foreman or superintendent to supervise the installation of equipment furnished under this contract. The Kitchen Equipment Contractor's superintendent shall coordinate all information necessary for the satisfactory execution and timely installation of the kitchen equipment with all other trades.
- D. Slots, chases, openings, and recesses through walls, floors, ceilings, and roofs in construction shall be provided by the other trades in respect to their materials. Refer to Part 3.03 Openings.
- E. Locations of pipes, conduits, ducts, panels, equipment, fixtures, etc., shall be adjusted to accommodate anticipated or encountered conflicts. Kitchen Equipment Contractor shall determine the exact route and location of each pipe, conduit, and duct prior to fabrication.
- F. Kitchen Equipment Contractor shall coordinate requirements and locations for wall reinforcement and special ceiling or structural supports as designated on the foodservice special conditions drawings and required for proper installation of foodservice equipment.

3.02 INSTALLATION REQUIREMENTS AND CLEARANCES

- A. Installation of the foodservice equipment shall be by the Kitchen Equipment Contractor and installed level and plumb, according to manufacturer's written instructions, original design, and referenced standards. This installation does not include final connection to utility services.
- B. Establish all heights and grades required for installation.
- C. Deliver foodservice equipment as factory-assembled units with protective crating and covering.
- D. Store foodservice equipment in original protective crating and covering in a dry location. Immediately repair or replace damaged or lost equipment.
- E. Assist in moving equipment to allow other trades to make final connections and be readily available to level and adjust equipment as the last connection is made. Advise the trades during installation on connection requirements for the various items of equipment.
- F. It shall be the Kitchen Equipment Contractor's responsibility to provide necessary means to protect all work and materials within this scope throughout the duration of construction. Equipment shall not be used as storage or work surface. Damage or theft to equipment on site shall be repaired or replaced at the KEC's expense.

3.03 OPENINGS

A. Openings in walls, floors, ceilings, and other construction to receive pipe lines, risers, duct work, and other equipment shall be provided by other trades. All openings shall be drilled, core bored, or cut in the approved locations and coordinated with an approved schedule to the satisfactory of the Owner's Representatives. Materials damaged under this contract shall be patched or replaced as directed by the Owner's Representatives.

B. Firestop shall be provided at all building penetrations as required and must adhere to Section 078400 Fire- stopping and the regulations of local agencies having jurisdiction. The KEC shall be responsible for fire-stopping where equipment furnished under this scope penetrates fire-rated assemblies, building openings, or shafts.

3.06 CLEANING

A. Stack and remove all waste material, crating, packaging, etc. resulting from work and keep premises in a satisfactory condition at all times. Refer to General Conditions section for coordination of on-site waste removal responsibilities.

B. All equipment furnished under this scope to be "Construction Clean" prior to project turn over. Remove any temporary protection from equipment and leave ready for use. Refer to General Conditions section for coordination of final cleaning responsibilities.

3.07 TESTS, INSPECTIONS, START-UPS, & PERFORMANCE CHECKS

A. Kitchen Equipment Contractor shall provide all required notices, and pay all deposits and fees necessary for the installation, test, and inspection of all work under this scope. Tests shall adhere to the regulations of local and state authorities and other agencies having jurisdiction.

B. Turn on all mechanical equipment, test for leaks, poor connections, inadequate or faulty performance, and correct as necessary.

C. The Kitchen Equipment Contractor shall coordinate equipment start-ups, performance checks, and adjustments. Equipment start-ups and performance checks must be provided by an authorized Service Company on all equipment that includes them as standard, requires them for proper activation of the warranty under the manufacturer, or as specified under Part 4.02 of the Itemized Equipment Specifications.

3.08 WARRANTY

A. The Kitchen Equipment Contractor shall warranty in writing all workmanship, material, and equipment under this scope for a minimum period of one (1) year from date of substantial completion of the project. During this period, the Kitchen Equipment Contractor shall agree to repair and make good, in a timely manner and at its own expense, any and all defects, which, in the judgment of the Owner and its Representatives, arise from defective or faulty workmanship and/or imperfect or inferior material.

B. The above shall in no way void or abolish the equipment manufacturer's guarantee or warranty on equipment. All guarantees or warranty certificates shall be delivered to the Owner.

C. Kitchen Equipment Contractor shall provide an additional warranty on all refrigeration system compressors (remote and self-contained) extending not less than a period of five (5) years from the date of substantial completion.

D. Additional or extended warranties shall be provided as specified under Part 4.02 of the Itemized Equipment Specifications.

3.09 OPERATING MAINTENANCE MANUALS

A. Three (3) complete hard copies and one (1) electronic copy of the Maintenance Manual labeled as described herein shall be submitted to Architect for approval. The manuals shall be spiral bound.

B. The manuals shall be typewritten and include a table of contents. The information shall be arranged in logical order for use by the Owner's personnel in maintaining the completed project.

C. The Manuals shall include, but not limited to, the following:

1. Table of Contents (denoting item, manufacturer, model number, and serial number)
2. Name and phone number of applicable service agencies for equipment furnished.
3. Materials list with place of purchase.
4. List of normally replaceable items, such as filters, fuses, belts, seals, screens, etc., indicating style, rating, size, etc., and place of purchase.

D. Equipment manuals shall be furnished a minimum of two weeks prior to any live instruction or demonstration to Owner's personnel.

3.10 INSTRUCTION/DEMONSTRATION

A. At a time and date selected by the Owner, the Kitchen Equipment Contractor shall arrange for live and on premise instruction and demonstration conducted by representatives of the equipment manufacturers to those employees who will have charge, care, adjustment, and operation of all parts of the equipment and systems.

B. A representative of the Kitchen Equipment Contractor shall prepare an itinerary and must be present at the facility during the demonstrations by the appropriate equipment manufacturer's representatives. One training session per manufacturer shall be available during normal business hours. Additional sessions shall be provided at the Owner's expense.

C. After instructions, prepare a letter stating that the equipment was demonstrated and personally checked by the manufacturer's representative and found to be operating properly. Acceptance of the installation will not be completed until the letter is signed by the Owner and received.

PART 4 – SCHEDULE OF EQUIPMENT

4.01 EXISTING EQUIPMENT

A. Non-Reused Equipment – Existing equipment that is not to be re-used in the renovated areas, shall be disconnected by the various trades and removed by others.

4.02 ITEMIZED EQUIPMENT SPECIFICATION

A. The following equipment schedule/specifications refer to various items of food service equipment shown on the Contract Drawings. The Contract Drawings and notes, in addition to these specifications, shall be as binding as if written herein.

B. Parts 1-3 of this document serve as the basis of design for the Kitchen Equipment Contractor's scope of work. Any deviation within the itemized equipment specification portion below shall, however, supersede and take precedence over the previous sections of this document only for the specific item with which the deviation exists.

FOODSERVICE EQUIPMENT LIST

ITEM # 1 RANGE, 60" RESTAURANT, GAS

Quantity: **One (1)**
Manufacturer: **Viking (Middleby)**
Model: **VGR560**

One (1)
(ACCEPTABLE ALTERNATES: WOLFE AND/OR HESTAN MEET OR EXCEED
MANUFACTURER'S SELECTED SPECIFICATION)

ITEM # 2 EXHAUST HOOD

Quantity: **One (1)**
Manufacturer: **Viking (Middleby)**
Model: **VCWH**

One (1)
(ACCEPTABLE ALTERNATES: WOLFE AND/OR HESTAN MEET OR EXCEED
MANUFACTURER'S SELECTED SPECIFICATION)

ITEM # 3 DISHWASHER, UNDERCOUNTER

Quantity: **One (1)**
Manufacturer: **Hobart**
Model: **CUH-1**

One (1) Centerline Dishwasher, undercounter, 22 11/16"W x 24"D x 32 5/16"H, high temperature sanitizing, (24) racks/hr, fresh water rinse, .84 gal/rack, Delime Notification with Cycle, service diagnostics with error notifications, soft start, detergent & rinse aid pumps, 208-240v/60/1-ph, 24.2-27.5 amps, ships with (1) peg rack and (1) combo rack, cULus, NSF, ENERGY STAR® (Pricing options available, please contact your local rep for more information) (NET price shown) Factory Startup - Free for installations within 100 miles (accessible by public roadway) of a Hobart Service Office during normal business hours with appropriate notice; Installation beyond 100 miles or those not accessible by public roadway will be quoted by Service.

One (1) Standard warranty - 1-Year parts, labor & travel time during normal working hours within the USA
 One (1) Power Cord Kit, 208-240v/60/1-ph, NEMA 6-30P plug included (net)
 One (1) Water Softening System, 2,527 grains/lb capacity, 5 gallons regeneration volume, & salt alarm, holds 1 bag of salt, pricing DOES NOT include standard installation. INSTALLATION BY AUTHORIZED HOBART SERVICE OFFICE IS RECOMMENDED (NET)
 One (1) Drain water tempering kit for Centerline CUH (net)
 One (1) Installation of DWT kit only (NET)
 One (1) Combination Rack

(ACCEPTABLE ALTERNATES: CHAMPION AND/OR MEIKO MEET OR EXCEED MANUFACTURER'S SELECTED SPECIFICATION)

ITEM # 4 MICROWAVE OVEN

Quantity: One (1)
Manufacturer: Viking (Middleby)
Model: VMOS

One (1)
 (ACCEPTABLE ALTERNATES: WOLFE AND/OR HESTAN MEET OR EXCEED MANUFACTURER'S SELECTED SPECIFICATION)

ITEM # 5 WARMING DRAWER, BUILT-IN

Quantity: One (1)
Manufacturer: Wells (Middleby)
Model: RWN-26

One (1) Food Warming Drawer Unit, built-in, two drawers, capacity approximately 8 dozen rolls/drawer, humidity and thermostat controls, stainless steel construction, cULus
 One (1) 1 year parts & labor warranty, standard
 One (1) Note: Must specify voltage and phase
 One (1) 120v/60/1-ph, 900 watts, 7.5 amps, direct
 (ACCEPTABLE ALTERNATES: HATCO AND/OR SOUTHBEND MEET OR EXCEED MANUFACTURER'S SELECTED SPECIFICATION)

ITEM # 6 REACH-IN REFRIGERATOR

Quantity: One (1)
Manufacturer: Victory Refrigeration
Model: RS-2D-S1-EW-HC

One (1) UltraSpec™ Series Refrigerator, Powered by V-Core™, Reach-in, two-section, self-contained refrigeration, 49.02 cu. ft. capacity, (2) wide full height solid hinged doors, (6) silver freeze (chrome-style) shelves, stainless steel exterior & interior, standard depth cabinet, TOUCH

POINT™ electronic temperature control/indicator, LED lighting, expansion valve technology, Santoprene door gaskets with 2 year warranty, stainless steel breakers, R290 Hydrocarbon refrigerant, 1/3 HP, cULus, UL EPH Classified, UL-Sanitation, MADE IN USA
 One (1) 7 year parts & labor and 7 year compressor warranty (excludes maintenance items)
 One (1) 115v/60/1-ph, 6.5 amps, with cord & NEMA 5-15P
 One (1) Door hinging: left door hinged on left, right door hinged on right standard
 One (1) Legs, set of 4, 6" high adjustable stainless steel, standard
 (ACCEPTABLE ALTERNATES: TRUE AND/OR HOSHIZAKI MEET OR EXCEED MANUFACTURER'S SELECTED SPECIFICATION)

ITEM # 7 REACH-IN FREEZER

Quantity: One (1)
Manufacturer: Victory Refrigeration
Model: FS-1D-S1-EW-HC

One (1) UltraSpec™ Series Freezer, Powered by V-Core™, Reach-in, one-section, self-contained refrigeration, 24.08 cu. ft. capacity, (1) wide full height solid hinged door, (3) silver freeze (chrome-style) shelves, stainless exterior & interior, standard depth cabinet, TOUCH POINT™ electronic temperature control/indicator, LED lighting, expansion valve technology, Santoprene door gaskets with 2 year warranty, stainless steel breakers, R290 Hydrocarbon refrigerant, 3/4 HP, cULus, UL EPH Classified, UL-Sanitation, MADE IN USA
 One (1) 7 year parts & labor and 7 year compressor warranty (excludes maintenance items)
 One (1) 115v/60/1-ph, 9.1 amps, with cord & NEMA 5-15P
 One (1) Door hinging: standard on right
 One (1) Legs, set of 4, 6" high adjustable stainless steel, standard
 (ACCEPTABLE ALTERNATES: TRUE AND/OR HOSHIZAKI MEET OR EXCEED MANUFACTURER'S SELECTED SPECIFICATION)

ITEM # 8 HEATED HOLDING PROOFING CABINET, MOBILE <By Owner>

Quantity: Two (2)
Manufacturer: Carter-Hoffmann (Middleby)
Model: HL4-18

Two (2) hotLOGIX Humidified Holding Cabinet/Heater Proofer-HL4 Series, one compartment, full height, insulated, (36) 12" x 20" or (18) 18" x 26" pan capacity, 3" fixed wire universal slides, (1) single pane tempered glass door, bottom-mount forced air heat with water reservoir, mechanical controls, aluminum construction, (4) 5" swivel casters (2 with brakes), ETL, ETL-Sanitation (RapidShip)
 Two (2) 3 Year parts & labor warranty, standard
 Two (2) 120v/60/1-ph, 2100 watts, 17.5 amps, 8 ft cord with NEMA 5-20P, standard
 Two (2) Single pane tempered glass door in extruded aluminum, standard
 (ACCEPTABLE ALTERNATES: METRO AND/OR ALTO-SHAAM MEET OR EXCEED MANUFACTURER'S SELECTED SPECIFICATION)

ITEM # 9 OUTDOOR 2 BURNER RANGE

Quantity: **One (1)**
Manufacturer: **Viking (Middleby)**
Model: **VQGSB5131SS**

One (1) VIKING 5 SERIES – VQGSB
(ACCEPTABLE ALTERNATES: WOLFE AND/OR HESTAN MEET OR EXCEED
MANUFACTURER'S SELECTED SPECIFICATION)

ITEM # 10 OUTDOOR GRILL

Quantity: **One (1)**
Manufacturer: **Viking (Middleby)**
Model: **VQGI5301SS**

One (1) 30" WIDE GAS GRILL - VIKING 5 SERIES – VQGI
(ACCEPTABLE ALTERNATES: WOLFE AND/OR HESTAN MEET OR EXCEED
MANUFACTURER'S SELECTED SPECIFICATION)

ITEM # 11 OUTDOOR REFRIGERATOR - UNDERCOUNTER

Quantity:
Manufacturer: **Viking (Middleby)**
Model: **VDUO5241DSS**

VIKING 5 SERIES – VDUO
(ACCEPTABLE ALTERNATES: WOLFE AND/OR HESTAN MEET OR EXCEED
MANUFACTURER'S SELECTED SPECIFICATION)

ITEM # 12 SPARE NO. <Spare No.>

ITEM # 13 ICE MACHINE AND BIN

Quantity: **One (1)**
Manufacturer: **Scotsman**
Model: **SCCG50MB-1SU**

One (1) 50# GOURMET CLEAR ICE MACHINE - BRILLIANCE UNDERCOUNTER UNIT
(ACCEPTABLE ALTERNATES: MANITOWOC AND/OR HOSHIZAKI MEET OR EXCEED
MANUFACTURER'S SELECTED SPECIFICATION)

ITEM # P-1 DROP-IN SINK

Quantity: One (1)
Manufacturer: Advance Tabco
Model: SS-2-4521-10

One (1) Smart Series™ Drop-In Sink, 2-compartment, self-rim design, 20"W x 16" front-to-back x 10" deep bowls, 8" OC faucet holes (1-1/4" diameter hot & cold water, 1" diameter center hole), 18/304 stainless steel, includes: 3-1/2" basket drains & mounting clips
One (1) T&S Brass EasyInstall Lavatory Faucet, 8" swing nozzle, 2.2 gpm, 8" center, VR laminar flow, quarter-turn Eterna cartridges with spring checks, lever handles with VR screws, concealed body, ADA Compliant
(ACCEPTABLE ALTERNATES: JOHN BOOS AND/OR EAGLE MEET OR EXCEED MANUFACTURER'S SELECTED SPECIFICATION)

ITEM # P-2 DROP-IN SINK

Quantity: One (1)
Manufacturer: Advance Tabco
Model: SS-1-1719-7

One (1) Smart Series™ Drop-In Sink, 1-compartment, self-rim design, 14"W x 14" front-to-back x 7-1/2" deep bowl, 8" OC faucet holes (1-1/4" diameter hot & cold water, 1" diameter center hole), 18/304 stainless steel, includes: 3-1/2" basket drain & mounting clips
One (1) Faucet, (3) hole deck mounted, 8" OC, fixed 5-1/2" gooseneck spout, chrome plated wedge handles with hot & cold indexes, brass chrome plated body & spout, lead free
(ACCEPTABLE ALTERNATES: JOHN BOOS AND/OR EAGLE MEET OR EXCEED MANUFACTURER'S SELECTED SPECIFICATION)

END OF SECTION

SECTION 20 0100 - GENERAL MECHANICAL & PLUMBING PROVISIONS

PART 1 GENERAL

1.01 GENERAL

- A. The general provisions of the Contract, including General and Supplementary Conditions and General Requirements apply to the work specified in this section.
- B. The division of the specification into divisions 20, 22 and 23 is for contractor convenience only and is not intended to establish limits of work. This contractor is responsible for any and all references to their work that may be located within a different section of the specifications.
- C. The architectural features shown on these drawings upon which the contract documents are based may be inaccurate or incomplete. The contractor shall coordinate all installation requirements with the most current to date sealed architectural contract documents and modify as required.
- D. The contractor is responsible for including in bid a complete and working system in accordance with the most current to date sealed architectural contract documents.
- E. Specifications throughout all Divisions of the Project Manual are directly applicable to this Section, and this Section is directly applicable to them.

1.02 DESCRIPTION

- A. Perform all work under this heading, including the furnishing of labor, materials, equipment, and service necessary for and reasonably incidental to the proper completion of all mechanical work as shown on the drawings and herein specified.
- B. Visit and examine the job and confer with all authorities concerned in order to become familiar with all existing conditions pertinent to the work to be performed. No additional compensation will be allowed for failure to be so informed.
- C. Materials and equipment shall be new, except where otherwise indicated, of the best quality, with same brand or manufacturer for all similar material.
- D. Perform all work in a neat and workmanship manner.
- E. In general, provide the installation of plumbing systems, and heating, air conditioning and ventilating systems complete with piping, fittings, fixtures, equipment, etc.
- F. Regardless of titles and subdivisions herein employed, consider these specifications as a complete document with General Sections applying to all other sections. All bidders are cautioned to read entire specifications and to thoroughly familiarize themselves with all requirements thereto.
- G. Check all specifications and all drawings and bring to attention any conflicts or variations as soon as noted.
- H. Specifications and accompanying drawings apply to all contracts or sub-contracts entered into for supplying material or labor for construction of work specified herein and shown on the drawings.
- I. The drawings and specifications are complementary and what is shown and/or called for on one shall be furnished and installed the same as if shown and/or called for in the other.
- J. In case of discrepancies and/or ambiguities in the drawings and/or in the specifications, consult Architect prior to submission of a proposal. Failure to do so on the part of the successful bidder shall be construed as explicit agreement on his part to abide by the Architect's decision in such matters.
- K. The word "Provide" as used in these specifications and on the drawings shall be termed to mean "furnish and install".

1.03 QUALITY ASSURANCE

- A. The Contractor bidding on this portion of the work must be fully experienced in the installation of equal size, complexity, and quality, and must be licensed to perform such work as required by the Rules and Regulations Promulgated by the State Licensing Board for Contractors.
- B. In bidding he acknowledges that he fully understands the scope of the work and design, and has the ability for the contract price to assemble and install the equipment, piping, ductwork, etc., as shown and specified, so as to mold same into a satisfactory workable system and arrangement.
- C. Contractor shall recognize that a fault or error in his work remains his responsibility regardless of whether such difficulty was discovered after the work had progressed, and shall make corrections at no cost to Owner.
- D. Provide adequate and competent constant supervision to assure that work is done in accordance with good standard practice and workmanship and with intent of drawings and specifications.
- E. Install all work in strict accordance, with all local and state codes and ordinances, with National Board of Fire Underwriters, and in accordance with all O.S.H.A. Standards.
- F. Secure all permits and inspections and pay all legal fees and taxes and provide Owner with a certificate of approval from agencies having jurisdiction over various phases of the work.

1.04 SUBMITTALS

- A. Shop Drawings and Submittal Data Required
 - 1. Submit to the Architect for review, immediately after award of contract, six (6) copies of complete descriptive information and dimensional data on all items of equipment, materials and accessories. Submit all shop drawings at one time. Piece meal submission shall not be acceptable.
 - 2. Shop drawings and submittal data shall be considered to be instruments to service only and submitted for the sole purpose of convenience to the Contractor to assist him in the performance of the contract. The Architect's review of the shop drawings and submittal data shall not supersede these specifications, the accompanying drawings or the contract terms, unless specifically covered by a properly executed change order, and then only to the extent specifically and explicitly stipulated therein.
 - 3. Coordination with electrical: Contractor to submit copy of any & all shop drawings that indicate electrical requirements to the project electrical engineer for electrical service & electrical load verification. Applicable to all mechanical items.
 - 4. Any and all changes within to the contract documents in submittals shall be highlighted in yellow on the submittals (dimension, size, electrical requirements, material, color, etc.).
 - 5. The contractor shall provide a copy of the respective Mechanical Equipment Schedule of the equipment that is being submitted with the information/data of the submitted equipment within the schedule. This is required to be able to compare the specified equipment with the submitted equipment on an exact format basis. Failure to submit custom mechanical equipment schedule with submittal may result in a rejected submittal.
 - 6. The contractor shall submit to the mechanical engineer, as soon as feasible after award of the contract, equipment room layouts at a scale not less than 1/4" = 1'-0" showing the layout of the actual equipment to be used and all necessary clearances. This drawing is to be comprehensive of all trades as to eliminate conflicts. The contractor will be responsible to verify all access for maintenance as required by the manufacturer.
 - 7. Well in advance of preparing the project shop drawings and well in advance of ordering any project equipment, and as part of the requirements and work of this project division:
 - 1. Employ, coordinate directly with, and pay (if such payment is required) the respective suppliers/vendors of all project equipment and/or the respective project subcontractors who are providing all project equipment, as respectively applicable:

- a. To review all respective equipment performance, electrical characteristics and requirements which are indicated and/or given on any of the project drawings and/or in any of the project specifications; and
- b. To determine whether or not each bit of the information that is relevant to such indicated equipment performance, electrical characteristics and requirements is accurate for the exact respective equipment which is being furnished for the project;
2. Have such suppliers/vendors and/or subcontractors, as respectively applicable:
 - a. Verify, in no uncertain terms, with proper documentation, which bits of the information that is relevant to such indicated equipment performance, electrical characteristics and requirements are indeed so accurate; and
 - b. Furnish the respective, properly-corrected, equipment performance, electrical characteristics and requirements for all indicated equipment electrical characteristics and requirements which are not so accurate;
3. Submit all such verifying and/or correcting documentation to the architect, in a timely manner, in the same formats in which the respective equipment performance, electrical characteristics and requirements were originally indicated and/or given. For example:
 - a. For all equipment performance, electrical characteristics and requirements which were originally indicated and/or given in the form of equipment schedules, submit the respective, properly-corrected, equipment performance, electrical characteristics and requirements in the form of corrected, similar, equipment schedules;
 - b. For all equipment performance, electrical characteristics and requirements which were originally indicated and/or given in the form of equipment notes (plan keynotes), submit the respective, properly-corrected, equipment performance electrical characteristics and requirements in the form of corrected, similar, equipment notes;
 - c. For all equipment performance, electrical characteristics and requirements which were originally indicated and/or given in the form of specification verbiage, submit the respective, properly-corrected, equipment performance, electrical characteristics and requirements in the form of corrected, similar, specification verbiage; and so on."

B. Record Drawings

1. The contractor shall be furnished with one (1) set of blue line prints, on which Contractor shall show any changes in the work caused by unforeseen circumstances and these drawings shall be turned over to the Architect in good order prior to final acceptance of the building. Architect in turn shall prepare record drawings from information furnished by contractor.

C. Parts Catalogs and Operating Instructions

1. Furnish to the Architect for the Owner, three (3) complete sets of parts catalogs and operating instructions bound in large binders for his use. Each set shall contain:
 - a. Complete wiring and control diagrams
 - b. Routine maintenance operations

- c. Detailed operating instructions and instructions for making minor adjustments
 - d. Manufacturer's catalog data, pump curves, service instructions, and part list of each piece of operating equipment
- 2. One additional copy of the first item above shall be framed under glass and installed in each equipment room where applicable.
- 3. Instruct Owner's operator in the proper care, operation, lubrication, and maintenance of mechanical equipment installed.
- D. Substitution
 - 1. All material, equipment, methods and accessories entering into the work under this section of contract are subject to approval or disapproval of the Architect. Approval of any manufacture or vender, any material, or product, shall not constitute a waiver of Architect's right to demand full compliance with contract requirements, including shape, size, quality and performance.
 - 2. Equality of materials is that established by opinion of Architect. Decision of Architect is final.
 - 3. Whenever a material or article of equipment is specified by use of a proprietary name, or by naming the manufacturer or vendor, any material or article which will perform adequately the duties imposed by the design will be considered for substitution, providing it is of equal substance, and function, meets specifications, and is aesthetically acceptable to the Architect, and that requests for approval along with all literature and technical data on proposed substitution is submitted in writing so as to be received in Office of Architect not less than seven (7) calendar days prior to opening of bids.
 - 4. Literature, technical data, etc., includes complete data (including catalog names and model numbers) and samples if necessary, with submissions for substitutions. Burden of proof that material offered for substitution is equal, or superior, in construction and efficiency to that named, rests on Contractor, and unless proof is satisfactory to Architect, substitutions will not be approved.

1.05 PRODUCT, DELIVERY, STORAGE AND HANDLING

- A. Take necessary precautions to protect all material, equipment, apparatus and work from damage. Failure to do so to the satisfaction of the Architect will be sufficient cause for the rejection of the material, equipment or work in question. Contractor is responsible for the safety and the good condition of the materials installed until final acceptance by the Owner.

1.06 JOB CONDITIONS

- A. Accompanying drawings, including plans, details, diagrams, notes, etc., are shown to limit and explain structural conditions, construction requirements, sizes, capacities, and method of installation and erection. Structural and other conditions may require certain modifications and adjustments from conditions shown. Such deviations are permissible; however specific sizes, capacities, and requirements affecting the satisfactory performance and operation of the installation shall remain unchanged. Make allowances for normal job conditions and interferences.
- B. Whenever it becomes necessary to shift ducts or pipes or to change shape of ducts, such changes shall be referred to the Architect for approval.
- C. Ask for details whenever uncertain about method of installation. Lack of details not requested shall not excuse improper installation and correction shall be responsibility of Contractor.
- D. Furnish detailed ductwork shop drawings and large scale equipment room layouts base on field measurements, actual job conditions, and actual equipment to be installed on project.
- E. Schedule and perform all mechanical work to avoid delays.
- F. All piping, cleanouts and covers, and other mechanical items in way of construction or remodeling, shall be rerouted, relocated or otherwise adjusted to work out with such construction or changes shown or specified in any or all of various sections of specifications.

- G. Refer unknown site or job conditions that are encountered immediately to Architect for method of disposition before continuation of work.

1.07 GUARANTEE AND SERVICE

- A. Guarantee all equipment, materials and workmanship for a period of one (1) year following date of acceptance.
- B. During the period of guarantee and defects in equipment, materials or workmanship shall be promptly corrected without cost to Owner.
- C. Guarantee includes equipment capacity and performance ratings specified with excessive noise levels. Any deficiencies in equipment capacity specified shall be promptly corrected.
- D. Guarantee does not include normal maintenance items.
- E. Warranty period begins at date of substantial completion, not when contractor starts equipment. Figure in bid extending warranty to accomplish this.

1.08 COORDINATION DRAWINGS

- A. The contractor shall coordinate work of all various sections having interdependent responsibilities for installing, connection to, and placing such equipment. At the contractor's expense, all (including but not limited to, mechanical, plumbing, electrical system) necessary offsets, bends, duct size/configurations, crossing/cross-overs shall be provided and installed as necessary to integrate within the structural system and the architectural features (ceilings and walls, etc.).
- B. Coordination Drawings: the purpose of the coordination drawings is to assure proper forethought and coordination of integrating all systems of the building within the structural framework, architectural ceilings, floors, and walls of the building. The contractor shall provide coordination drawings prior to the submittal of all system shop drawings. The coordination drawings shall include ductwork and all mechanical HVAC piping and associated items, plumbing verticals and sprinkler piping, chases, electrical conduit, and shall indicate sizes of these items and the structural members.
- C. The contractor shall submit the coordination drawings (four (4) complete sets) to the architect for the architect's approval no later than one month after the work has commenced on the project site. The contractor shall revise and re-submit the drawings as the architect may require. Provide a DVD/CD with each hard copy with PDF's of coordination drawings.
- D. The coordination drawings shall include, but is not limited to, the following:
 - 1. Plan drawings for each floor indicating structural member sizes, HVAC components/sizes/routes/locations, major electrical conduit grouping/routes, vertical chases/openings, and all other items as necessary to comply with the requirements of 1.08.A and 1.08.B of this section.
 - 2. Section drawings through major pathways for systems (such as corridors, if appropriate), and exemplary rooms.
 - 3. Prior to the commencement of preparing the drawings, the contractor shall confirm the proposed listing of drawings to be submitted.
 - 4. Any and all other drawings, schedules, and information necessary to illustrate the contractor's understanding of the architectural design intent of the critical ceiling heights, wall locations, and all other design parameters and how they are accommodated upon the contractor's proposed integration of the systems noted in the contract documents.
- E. During the course of construction, the contractor shall update the coordination drawings in a clean, clear, and legible manner and have the drawings readily available on-site for the architect's access. Upon substantial completion, the contractor shall submit the updated coordination drawings to the architect for the owner's future use and shall be the property of the owner.
- F. The General Contractor is to coordinate with all sub-contractors as to provide the coordination drawings. All contractors are to be responsible for coordinating their applicable work. The

General Contractor and all sub-contractors shall work cohesively in a timely manner as to provide the coordination drawings.

1.09 ELECTRICAL COORDINATION WITH BUILDING AND AUTOMATIC TEMPERATURE CONTROLS PRIOR TO BID COORDINATION DRAWINGS

- A. The contractor shall coordinate/provide the following: Given the nature of the evolving technology in the field of Building & Automatic Temperature Controls (and the differences between various manufacturers), various Temperature Control Devices have been specified at various voltages (120-1-60, 24V, etc., Refer to Specification 230900). It is the responsibility of the General Contractor, Electrical Contractor, Mechanical Contractor, & Temperature Controls contractor to coordinate prior to bid as to ensure all electrical provisions for all Temperature Control Devices are accounted for (material, equipment, conduit, breakers, wiring, devices, installation, labor, etc.) as to provide a complete and working Temperature Controls System. Should the Contractor (and subcontractors) fail to coordinate all electrical provisions prior to bid, then the cost to provide such electrical provisions shall be solely borne by the Contractor (and subcontractors). No additional cost to be provided by the owner to the Contractor for failure to coordinate prior to bid. Refer to specification 230900 for Building and Automatic Temperature Controls sequences of operation, EMS point list, product data, etc.

1.10 FEES AND DEPOSITS

- A. Arrange for and pay regulatory inspection and service connection fees (sewer, drainage, water and gas) including the cost of any main extensions. Pay meter deposits for utility services. After substantial completion of the project, the meter registration shall be transferred to the User/Owner.

1.11 VISITING SITE

- A. The Bidder shall visit the site of proposed work so that he may understand the facilities, difficulties and restrictions attending the execution of the contract. No additional compensation will be allowed for failure to be so informed.

1.12 UTILITY CONNECTIONS

- A. Coordination of utilities which are work of this contract to utilities installed as work of other divisions prior to starting any work. Verify connection points, inverts, valving, etc., prior to commencing any work. No additional compensation will be allowed for conflicts that occur due to lack of coordination.

1.13 NEW EQUIPMENT INSTALLATION

- A. New equipment installed under this project specified by other sections of these specifications which requires discipline specific connections shall be coordinated & installed by the contractor. These connection points are based on the manufacturer specified and laid out by the contractor. Should the contractor utilize another manufacturer, it is the contractor's responsibility to verify all new connections (mechanical, plumbing, electrical, etc.) and modify required services as necessary to place new piece of equipment into operation.

1.14 SPECIAL CONDITIONS

- A. No piping, ducts or other mechanical equipment foreign to the electrical equipment shall pass through or above the spaces dedicated to electrical panel boards, electrical distribution panels, electrical switchboards and motor control centers. Work shall conform with NFPA 70. Working clearances and dedicated spaces at electrical equipment shall be maintained per NFPA 70.

1.15 WORK IN OTHER DIVISIONS

- A. Prior to bidding, the Contractor shall coordinate items of work referred to as “work of other Divisions” to insure items are not omitted or duplicated.
1. Utility Connections - sewer, natural gas, storm drainage and water unless otherwise noted on the drawings.
 2. Electrical work (wiring, raceways and disconnect switches), fire alarm work (wiring, raceways, equipment and devices) associated with work of this division and not specified as work of Division 26 - Electrical, shall be work of this division.
 3. Supports for work of this Division, except supports specifically indicated to be provided under other Divisions, shall be provided as work of this Division. Supports provided under other Divisions shall be checked and coordinated under this Division to ensure that they suit the work to be installed.
 4. Painting, including painting of exposed insulation, exposed piping and exposed ductwork not specified as work of DIVISION 9 - FINISHES, shall be work of this Division. Damaged surfaces of factory finished items shall be repaired to the satisfaction of the Architect/Engineer as the work of this Division. Nameplates shall be protected until painting has been accomplished. Protection shall be removed and nameplates cleaned prior to acceptance of equipment.

1.16 MANUFACTURER'S RECOMMENDATIONS

- A. Equipment and materials provided under this Division of the specifications shall be installed according to manufacturer's recommendations. Each manufacturer's application and installation instructions shall be reviewed prior to ordering equipment or commencing with the work. If the drawings or specifications show or describe any deviations from the manufacturer's recommendations the Contractor shall request clarification, from the Architect/Engineer and provide as directed at no additional cost to the User Agency. Where the respective manufacturer's recommended installation required equipment/material not shown within the contract documents, the contractor shall provide & figure the cost of these additional equipment/material in their bid. The contractor shall provide a complete and working system.

PART 2 PRODUCTS

2.01 TOOLS AND SCAFFOLDING

- A. Furnish all tools, equipment, scaffolding and other facilities required to properly and expeditiously perform the work.

2.02 BUCKS, GROUNDS AND CHASES

- A. All bucks, grounds, lintels, blockouts, chases and grouting for work under this Division shall be done by the General Contractor.
- B. This Division shall be responsible for proper location and sizes or for any errors of omission in placing same.

2.03 FOUNDATIONS AND SUPPORTS

- A. Provide foundation and supports of concrete or steel shapes for equipment requiring same.
- B. Mount all floor mounted mechanical equipment on nominal four (4) inch high concrete housekeeping pads.

2.04 ACCESS PANELS

- A. Factory made access doors and frames, prime coat finish, screwdriver latch(s) of suitable size as required.

- B. Access panels in rated ceiling to have same rating as ceiling. Where access panels are required in fire rated ceiling then the access panel shall be fire rated.
- C. Access panels in lined ductwork to be double wall type with insulation sandwiched in between, same insulation value as adjacent ductwork.
- D. Where valves (domestic water valves, etc.), dampers, controls, etc., are concealed in walls or non-accessible ceilings, install factory made access doors and frames. Contractor shall refer to drawings for locations of items in need of access panels. Panels to be sized as to properly access equipment. Minimum access panel size to be 24x24.
- E. Paint all exposed access panels to match finish of respective wall and/or ceiling.

2.05 FLOOR AND CEILING PLATES (ESCUTCHEONS)

- A. Where any pipe or risers pass exposed through walls, partitions, floors or ceiling, use chrome-plated floor and ceiling plates.
- B. Plates shall be large enough to completely close the hole around the pipes and shall be round with the least dimension not less than 1-1/2" larger than the diameter of the pipe. Plates shall be secured in an approved manner.

2.06 SIPHON PREVENTORS

- A. Furnish and install approved type siphon preventers on all equipment and fixtures in such a manner as to prevent water being siphoned back into the water supply in the event the water supply is shut off.

2.07 FLAME SPREAD PROPERTIES OF MATERIALS

- A. All materials and adhesives used for acoustical linings, jackets and insulation shall comply with requirements of NFPA 90A and 90B and UL guide no. 40 V.8.15. Products exceeding a flame spread rating of 25, or a smoke developed rating of 50, as determined by ASTM Test Method E-84 are prohibited. Adhesives and sealers shall be fire retardant and fire resistant when dry. Flame proofing treatments which are subject to decomposition, deterioration, or the effects of moisture are prohibited.

2.08 SCAFFOLDING, RIGGING AND HOISTING

- A. Each contractor shall furnish all scaffolding as required for the installation of his work. He shall either arrange with the General Contractor for servicing in connection with any rigging and hoisting required or provide his own equipment to hoist apparatus to be installed by him into place. Each contractor shall see that any equipment too large to permit passage through normal doorways and access ways is brought to the job and set in place before the mechanical spaces are enclosed. All apparatus not delivered in this manner shall be disassembled and reassembled in the proper location. Equipment specified to be factory assembled and tested prior to shipment shall not be disassembled for shipment to an installation into the building.

2.09 VIBRATION ISOLATION

- A. Transmission of vibration or structural borne noise to occupied areas by equipment installed under this contractor will not be permitted. Contractor shall furnish for approval, data showing disturbing frequency, supported weight, static deflection, efficiency and calculations supporting same for each isolator he proposes to use.
- B. All isolators shall be selected and certified, using published data, to limit vibration transmission to 10% for equipment located on floors in direct contact with grade and 5% for equipment located other than the above. Should any noise or vibrations be objectionable to the Architect and/or Owner, field instrumentation tests and measurements shall be made by the isolator manufacturer or his representative to determine the source and cause of such disturbance. Any non-compliance with these specifications shall be corrected by the contractor in a manner satisfactory to the Architect at no additional cost to the Owner.

2.10 UNDERGROUND PIPING WARNING TAPE

- A. All underground piping shall have warning tape installed directly above underground piping (beyond building slab). Tape shall be installed 12 to 18 inches below finished grade. Warning

tape shall be metallic detectable type consisting of 0.35 mils thick solid core encased in a protective plastic jacket that is resistant to alkalis, acids and other destructive elements found in the soil. The lamination bond shall be strong enough that the layers cannot be separated by hand. Total composite thickness to be 5.0 mils. Foil core to be visible from unprinted side to ensure continuity. Warning tape for metallic piping may be 0.4 mils polyethylene film without metallic laminate.

- B. Warning tape shall have a continuous warning message repeated every 18 to 36 inches shall be imprinted on the tape surface. The tape shall contain an opaque color concentrate designating the color code appropriate to the line being buried. Tape shall be minimum 3" wide.
- C. All PE piping shall be traced with copper wire when bored (single solid conductor insulated, not stranded, wire, 12-gauge for 2" and smaller, 8-gauge for lines larger than 2", any connection to T-splice shall be made using multi-cable connector block (Polaris block) with silicone for underground/wet locations). Provide underground warning tape installed above underground piping. Underground warning tape shall read "Caution Gas Line Buried Below".
- D. An additional #10 copper wire shall be adhered to all underground nonconductive piping and fastened with plastic zip ties every 4'-0" on center. Provide a long tail tracer wire at valve with ring and cover.

2.11 MATERIALS IN AIR DUCTS AND PLENUMS

- A. No plastic or other non-metallic materials as defined by NFPA 90A shall be used in air ducts or plenums unless specifically rated for such service.

2.12 FLASHING

- A. Metal flashing: 26 gauge galvanized steel.
- B. Lead flashing: 5 lb/sq ft sheet lead for waterproofing.
- C. Flexible flashing: 47 mil thick sheet butyl; compatible with roofing.
- D. Caps: Steel, 22 gauge minimum; 16 gauge at fire resistant elements.

2.13 EQUIPMENT IDENTIFICATION

- A. Provide labels for each starter, control switch, and all equipment. Labels to be engraved black laminated bakelite nameplates with 1/4" high which cut letters, secure to starters, switches or equipment.

2.14 FIRE RATED WOOD

- A. All wood as specified within these construction documents (mechanical, plumbing, sprinkler plans and specifications) shall be of the fire rated type. PYRO-GUARD treated wood as manufactured by HOOVER treated wood products.

2.15 CONCRETE FASTENERS

- A. Fastenings set into concrete to support pipe, air handlers and other mechanical equipment shall be steel or malleable iron expansion shields set in proper size drilled holes. Do not exceed the manufacturer's rated pull out load. The manufacturer's rated load must be based on a factor of safety of 5 or else the allowable load must be reduced to give a factor of safety of 5. Self-drilling Rawl Saber Tooth or Phillip Red Heads may be used. Anchors using lead, plastic or shields of any material other than steel or malleable iron shall not be used.
- B. Powder actuated fasteners, Hilti or Ramset, may be used for loads applied with a factor of safety of 5 but not more than 300 pounds for the largest size. The powder charge shall be found by trial and shall be the smallest charge that gives full insertion into the concrete. These fasteners may be used for ductwork and small pipe.

- C. Suitably located existing inserts which were cast into the concrete at the time of original construction may be reused.
- D. Follow manufacturer's instructions and use setting tools procured from the manufacturer of the drilled-in anchors to expand the shields.
- E. Fasteners of the type set into concrete by drilling shall be self-drilling (Rawl Saber Tooth, Phillips Red Heads, or prior approved equal).
- F. Powder actuated fasteners shall be Hilti or Ramset.

2.16 PROTECTIVE COATING FOR UNDERGROUND PIPING

- A. Underground pipe and fittings including the portion through the floor shall be protected against corrosion by application of protective coatings.
- B. Prior to coating, pipe and fittings shall be cleaned of all rust, scale, dirt, and oil.
- C. Pipes and fittings shall be given a wash coat of epoxy primer having a dry film thickness of 1.5 - 2.0 mils. Over the primer apply two coats of coal-tar base epoxy coating, each having a dry film thickness of 6 mils.
- D. Coatings shall have a holiday test using a ½" spark. Recoat any areas not passing test.
- E. Provide for all underground metal piping up from grade.
- F. 2-Part coal-tar epoxy to be Carbolite 300M or prior approved equal.

2.17 EMS CONDUIT AND BOXES (COORDINATE WITH TEMPERATURE CONTROLS CONTRACTOR)

- A. UNDERGROUND EMS CONDUIT: Rigid Nonmetallic Conduit (RNMC): Schedule 40, rigid polyvinylchloride, rated for 90 degrees C conductors, with pull string, solvent cement connectors and couplings. Nonmetallic strap hangers allowing thermal expansion movement. Conduit to meet NEMA TC-2; fittings to meet NEMA TC-3. Expansion Coupling: Nonmetallic to compensate for thermal expansion.
- B. EMS CONDUIT WITHIN BUILDING: Shall be hot dipped galvanized rigid steel conduit. All conduits shall be new and shall bear the inspection label of the Underwriter's Laboratories, Inc. Metallic conduit shall be hot-dipped galvanized. Fittings for conduit shall be an approved type specially designed and manufactured for their purpose. Rigid metal conduit fittings, bushings, and other components shall be galvanized. Setscrew connector fittings shall not be permitted. All fittings for rigid steel or aluminum conduit shall be threaded and coupled unless specifically approved otherwise by the Engineer.
- C. Pull Boxes: Communication/EMS ground mounted pull boxes shall be polymer concrete, ANSI/SCTE 77 2002 – Tier 22 rated, provide dimensions indicated on the drawing. Open bottom. Cover to be labeled "Communications". Secure cover with stainless steel standard hex head bolts. Covers shall be traffic rated. ALL PULL BOXES TO BE SIZED IN ACCORDANCE TO NEC (NATIONAL ELECTRIC CODE).

- D. Stainless Steel EMS Enclosure: NEMA 3R enclosure (UL 508A Listed). Manufactured from Type 304 16 gauge stainless steel; 16 gauge doors and 14 gauge bodies, Minimum-width body flange provides maximum body opening, Pre-cut gland plate openings in the bottom of the enclosure with a seal to ensure protection, External formed 90 degree body flange, Door opens 210 degrees, Mounting holes in back of body for direct mounting or for optional external mounting brackets, Type 316 stainless steel hinge pins, Corner-formed doors are easily removed by pulling clip-style hinge pins, Quarter-turn latches furnished with 3mm double-bit insert, Seamless foam-in-place gasket, Self-grounding latch system with double seal, Grounding stud on the body, Full-sized galvanized steel back panel included, Bonding provision on the door, Furnished hardware kit includes: gasketed gland plates and hardware, grounding hardware and sealing washers for wall-mounting holes, Three-point latching, Finish: Door and body have smooth #3 brushed finish. Hoffman medium GL66 series stainless steel wall mount enclosure.

2.18 PREPARED OPENINGS

- A. Piping and tubing installed through masonry or concrete walls, floor/ceiling assemblies and floors above grade shall be installed through pipe sleeves.
- B. Duct installed through masonry or concrete walls and non-rated concrete floors above grade shall pass through 20-gauge galvanized sheet metal sleeves. Duct sleeve shall have a 1/2" maximum annular clearance around duct. Allowances shall be made for external duct wrap (if specified). Ducts, tubing and piping installed through floors of mechanical rooms shall have a 4" high concrete curb on each side to prevent water from leaking through openings. Exposed piping installed through walls shall be fitted with chromium plated escutcheons on each side of the wall. Exposed ductwork passing through non-rated masonry or concrete walls shall be fitted with a 2" wide sheet metal flange around each side of duct on each side of the wall.
- C. Ducts installed through partitions, walls or floors which are smoke rated or have a fire rating of one hour or greater shall be installed in accordance with SMACNA standards. Piping and tubing installed through partitions, walls or floors which are smoke rated or have a fire rating of one hour or greater shall be installed through pipe sleeves.

2.19 NOT USED

2.20 SAFING MATERIAL

- A. Safing material shall be installed in annular spaces between sleeve and pipe or tubing where sleeve and pipe or tubing penetrate partitions that are designated as smoke separations. Material shall be mineral wood designed for hand packing. Material shall have an ASTM E84 rating of flame spread -10, fuel contributed -0, smoke developed -0 and shall be rated non-combustible per ASTM E 136.

2.21 TAMPER PROOF FASTENERS

- A. Where equipment is specified to have tamper proof or vandal proof fasteners, the Contractor shall coordinate and use the same type of fastener on each item. Provide User Agency with two wrenches, screw drivers, etc., for each type of fastener used on the project.

2.22 ENCLOSURES

- A. Control equipment enclosures provided by the Contractor or provided as part of a packaged piece of equipment shall meet the following minimum standards unless specifically indicated otherwise. Where indicated on the drawings or specifications, flush mounted enclosures shall be provided.

- B. Control equipment enclosure provided within the building shall be equivalent to or greater than NEMA 12 type construction. Control equipment enclosures provided outside of the building, a non-enclosed area of the building or in an accessible crawl space under a building shall be equivalent to or greater than NEMA 3R type construction with drain and breather. Control equipment enclosures provided within hazardous areas, controlling explosion-proof equipment shall be NEMA 7 or 9 type construction. Control equipment enclosures provided for cooling towers and associated equipment within 20'-0" of towers shall be NEMA 4X noncorrosive type construction.

2.23 SAFETY PANS

- A. Safety pans shall be fabricated from 16-gauge (min.) 304 stainless steel. Sides of pans shall be a minimum of 4" high with top edges hemmed. Sides longer than 6'-0" shall have additional flat bar or angle top edge bracing to prevent sagging. Joints and seams shall be watertight. Pans shall be extended at least 6" beyond the sides of the equipment it is serving. Provide a 1" stainless steel female pipe coupling in side of pan near the bottom of overflow piping connection. All joints and seems to be of welded construction. This is applicable for all auxiliary drain pans under air handling units, hot water heaters, etc.
1. Provide float switch in auxiliary drain line, HVAC unit to de-energize when float switch is tripped.
 2. Pipe safety pans to nearest floor drain or floor sink. Provide ball valve in safety pan condensate drain line (normally closed).

PART 3 EXECUTION

3.01 CUTTING AND PATCHING

- A. Cut all openings as required for the work under this section. Patching shall be done by the craft whose work is involved. Furnish and install all necessary sleeves, thimbles, hangers, inserts, etc., at such time and in such a manner so as not to delay or interfere with the work of other trades. No beams or joists shall be cut. After resurfacing has been done, any further cutting, patching and painting shall be done at the expense of the Contractor.

3.02 COORDINATION

- A. Coordinate all mechanical work with other phases of the work, including ceilings systems and tiles, electrical work, other mechanical work, etc.

3.03 PAINTING

- A. Factory painted equipment that has been scratched or marred shall be repainted to match original color.
- B. Steel equipment hangers and supports, un-insulated black steel pipe, and black steel pipe supports exposed to sight outside the building which are not provided with factory prime coat shall be cleaned of rust, grease, and scale. After cleaning hangars, supports and pipe, a field-applied prime coat and two coats of a bituminous aluminum paint shall be provided. Insulated pipe outside the building shall be cleansed of rust, grease and scale. Paint all exposed piping, insulation, grilles, fans, etc., in building or on roof, if not factory finished. Paint piping equipment, hangers, and accessories in all mechanical equipment rooms, including covering and foundations with two (2) coats of approved paint after thoroughly cleaning. Size insulation covering before painting. Equipment having factory finish, if damaged or scratched, shall be touched up and given one additional coat of machinery enamel.
- C. All painting shall conform to the requirement of the PAINTING & COATINGS Section.

3.04 CLEANING AND ADJUSTING

- A. All equipment, pipe, valves, and fittings shall be cleaned of grease, oil, paint spots, metal cuttings, sludge, and construction debris.
- B. Ducts, plenums and casings shall be cleaned of all debris and blown free of all particles of rubbish and dust before installing outlet faces.
- C. Bearings shall be lubricated as recommended by the equipment manufacturer.
- D. Temporary filters shall be provided for fans that are used during construction. At the time of starting the balancing of the air distribution system, new filters shall be installed.

3.05 PENETRATION THROUGH FIRE SEPARATIONS

- A. Pack annular space between sleeve and pipe (insulation) and / or conduit in rated construction with fire resistant putty, sealant and / or caulk. Material shall be non asbestos based and installed in accordance with manufacturers instruction for fire rating required.
- B. Penetrations of multiple items and penetrations with annular space greater than 1/2" shall be provided with approved backing material in accordance with manufacturer's instructions.
- C. Fire retardant sealer and system shall meet ASTM E-84, ASTM E-814, and UL-1479.

3.06 EXCAVATION, TRENCHING AND BACKFILLING

- A. General: The Contractor shall perform all excavation to install piping herein specified. During excavation, material for backfilling shall be piled back from the banks of the trench to avoid overloading and to prevent slides and cave-ins. All excavated materials not to be used for back filling shall be removed and disposed of by the Contractor. Grading shall be done to prevent surface water from flowing into trenches and excavations, and any water accumulating therein shall be removed by pumping. All excavation shall be made by open cut. No tunneling shall be done. Trenches shall not be cut below a plane extending at a 45 degree angle down and away from any footing.
- B. Trench Excavation. The bottom of the trenches shall be graded to provide uniform bearing and support for each section of the pipe on undisturbed soil at every point along its entire length, except for the portions of the pipe sections excavated for sealing joints. Depressions for joints shall be dug after the trench bottom has been graded. Over depths shall be backfilled with loose, granular, moist earth, tamped. Remove unstable soil that is not capable of supporting the pipe and replace with specified material for a minimum depth of 12" below invert of pipe.
- C. Backfilling. The trenches shall not be backfilled until all specified pressure tests are performed. The trenches shall be backfilled with the excavated materials approved for backfilling consisting of earth, loam, sandy clay, sand and gravel or soft shale, free from large clods of earth and stones, deposited in 6" layers and rammed until the pipe has a cover of not less than the adjacent existing ground, but not greater than 2" above existing ground. The backfilling shall be carried on simultaneously on both sides of the trench so that injurious side pressures do not occur. All trenches under pavements and all trenches within the building walls and to 5 feet outside the building walls shall be compacted in accordance with requirements specified in the EARTHWORK Section. For all trenches, the compaction of the filled trench shall be at least equal to that of the surrounding undisturbed material, except that trenches occurring in areas to be filled shall be backfilled in 6" maximum layers and each layer compacted to 95% maximum density. Settling the backfill with water will not be permitted. Re-open any trenches not meeting compaction requirements; or where settlement occurs, refill, compact, and / or restore the surface to the grade and compaction specified above, mounded over and smoothed off.

3.07 FLASHING

- A. Provide flexible flashing and metal counterflashing where piping and ductwork penetrate weather or water proofed walls, floors, and roofs.
- B. Flash vent and soil pipes projecting 3 inches minimum above finished roof surface with lead worked one inch minimum into hub, 8 inches minimum clear on sides with 24 x 24 inches sheet size. For pipes through outside walls, turn flanges back into wall and caulk, metal counterflash

- C. Flash floor drains in floors with topping over finished areas with lead, 10 inches clear on sides with minimum 36 x 36 sheet size. Fasten flashing to drain clamp device.
- D. Seal floor drains watertight to adjacent materials.
- E. Provide acoustical lead flashing around ducts and pipes penetrating equipment rooms, installed in accordance with manufacturer's instructions for sound control.
- F. Provide curbs for mechanical installations 14 inches minimum high above roofing surface. Flexible sheet flash and counterflash with sheet metal; seal watertight.

3.08 TESTING PIPE AND DUCT SYSTEMS

- A. General: Concealed piping and duct work and insulated piping and ductwork shall be tested in place before concealing or covering. Piping and ductwork located underground shall be tested before backfilling. Equipment, materials, and instruments for testing shall be furnished by the contractor without additional cost to the owner. System components not rated for the respective test pressure shall be isolated from the system during the test.
- B. Observation: The Contractor shall notify the owner's representative 7 days prior to a scheduled test. The owner's representative, at his option, has the right to witness the test.
- C. Sanitary, Waste, and Vent System
 - 1. The hydrostatic test shall be performed before installing fixtures. Water tests shall be applied to each system(s) either in its entirety or in sections. If the test is applied to the entire system, all openings in the piping shall be closed except the highest opening, and the system shall be filled with water and tested with at least a 10ft. head of water. In testing successive sections, at least the upper 10 ft. of the next preceding section shall be tested so that each joint or pipe in the building except the uppermost 10 ft. of the system has been submitted to a test of at least a 10 ft. head of water. The water shall be kept in the system or in the portion under test for at least 2 hours before the inspection starts. The system shall be tight at all joints.
 - 2. Provide notice of test to engineer/architect for witness of test. Provide engineer/architect results of test in writing on contractor letterhead.
 - 3. The final test of the completed drainage and vent system shall be visual and in sufficient detail to insure that the provisions of this section have been complied with, provided, however, that the plumbing undergo a smoke test. The smoke test shall be made by filling all traps with water and then introducing into the entire system a pungent, thick smoke produced by one or more smoke machines. When the smoke appears at stack openings on the roof (at furthest vent), they shall be closed and a pressure equivalent to a one inch water column shall be built and maintained for fifteen minutes before inspection starts.
- D. Domestic Water Systems
 - 1. The hydrostatic test shall be made upon completion of the roughing-in and before setting fixtures. The entire domestic cold water and hot water, and hot water circulation piping system shall be tested at a hydrostatic pressure of 1.5 times the working pressure of the system (but not less than 140 psig) and proved tight at this pressure for a period of not less than 2 hours in order to permit inspection of all joints. Where a portion of the water piping system is to be concealed before completion, this portion shall be tested separately in a manner described for the entire system.
 - 2. Provide notice of test to engineer/architect for witness of test. Provide engineer/architect results of test in writing on contractor letterhead.
- E. Not used.
- F. Heating and Air Conditioning Piping System
 - 1. Not used.
 - 2. Field erected refrigerant piping shall be tested with a halide leak detector.

3. No loss in pressure will be permitted. Leaks detected shall be repaired by tightening, re-welding joints, or replacing pipe and fittings. Caulking of joints will not be permitted.
4. Provide notice of test to engineer/architect for witness of test. Provide engineer/architect results of test in writing on contractor letterhead.

G. Air Distribution Systems

1. Ductwork classified and constructed as pressure class 3" W.G. and above shall be tested for leakage. Leakage test shall be as outlined in AABC for Total System Balance. Test pressure and allowable leakage rate shall be as indicated in the table below. Pressure class and test pressure shall be positive (+) on fan system discharge side and negative (-) on fan system suction side.

TABLE 1 - DUCT LEAKAGE

<u>Pressure Class</u>	<u>Test Pressure</u>	<u>Maximum Leakage</u>
(3)"	3"	1.0%
(4)"	4"	1.0%
(6)"	6"	1.0%
(10)"	10"	1.0%

2. Ductwork in pressure classes less than +3" W.G. shall be tested for leakage. Leakage test shall be as outlined in AABC for Total System Balance. Test pressure and allowable leakage rate shall be not greater than 2.0%. Pressure class and test pressure shall be positive (+) on fan system discharge side and negative (-) on fan system suction side.
3. Provide notice of test to engineer/architect for witness of test. Provide engineer/architect results of test in writing on contractor letterhead.

H. Sanitary Sewer Systems Outside the Building

1. The sanitary sewer system shall be tested for leakage by either infiltration tests or exfiltration tests, as appropriate. Prior to testing for leakage, the trench shall be backfilled up to at least the lower half of the pipe. Backfill shall be placed to prevent pipe movement during testing, leaving the joints uncovered to permit inspection. Visible leaks encountered shall be corrected regardless of leakage test results. Leakage as measured by either the infiltration test or exfiltration test shall not exceed 0.15 gallons per inch diameter per 100 feet of pipe line per hour. When leakage exceeds the maximum amount specified, satisfactory correction shall be made and retesting accomplished.
2. When the water table is 2 ft. or more above the top of the pipe at the upper end of the pipe line section to be tested, an exfiltration test shall be made by filling the line to be tested with water so that the head of at least 2 ft. is provided above the water table and the top of the pipe at the upper end of the pipe line to be tested. The filled line shall be allowed to stand until the pipe has reached its maximum absorption, but not less than 4 hours. After absorption, the head shall be re-established. The amount of water required to maintain this water level during a two-hour test period shall be measured and shall not exceed exfiltration rate specified hereinbefore.
3. Provide notice of test to engineer/architect for witness of test. Provide engineer/architect results of test in writing on contractor letterhead.

I. Natural Gas Systems

1. All piping shall be tested pneumatically and proved tight at a pressure of 100 psi for a period of not less than 4 hours. No loss in pressure will be permitted. Leaks detected shall be repaired by tightening, rewelding joints, or replacing pipe and fittings. Caulking of joints

2. Gas piping, installed within conduit under concrete slabs, and the conduit shall be tested prior to pouring of the concrete slab.
3. All gas pressure test are to be witnessed by owner's representative, no exception.

3.09 FLOOR AND CEILING PLATES (ESCUTCHEONS)

- A. Where any pipe or risers pass exposed through walls, partitions, floors or ceiling, use chrome-plated floor and ceiling plates.
- B. Plates shall be large enough to completely close the hole around the pipes and shall be round with the least dimension not less than 1-1/2" larger than the diameter of the pipe. Plates shall be secured in an approved manner.

3.10 PIPING SYSTEMS - COMMON REQUIREMENTS

- A. Install piping according to the following requirements and Division 23 Sections specifying piping systems.
- B. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.
- C. Install piping in concealed locations, unless otherwise indicated and except in equipment rooms and service areas.
- D. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.
- E. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.
- F. Install piping to permit valve servicing.
- G. Install piping at indicated slopes.
- H. Install piping free of sags and bends.
- I. Install fittings for changes in direction and branch connections.
- J. Install piping to allow application of insulation.
- K. Select system components with pressure rating equal to or greater than system operating pressure.
- L. Install escutcheons for penetrations of walls, ceilings, and floors according to the following:
 1. New Piping:
 - a. Piping with Fitting or Sleeve Protruding from Wall: One-piece, deep-pattern type.
 - b. Chrome-Plated Piping: One-piece, cast-brass type with polished chrome-plated finish.
 - c. Insulated Piping: One-piece, stamped-steel type with spring clips.
 - d. Bare Piping at Wall and Floor Penetrations in Finished Spaces: One-piece, cast-brass type with polished chrome-plated finish.
 - e. Bare Piping at Ceiling Penetrations in Finished Spaces: One-piece or Split-casting, cast-brass type with polished chrome-plated finish.
 - f. Bare Piping in Unfinished Service Spaces: One-piece, cast-brass type with polished chrome-plated finish.
 - g. Bare Piping in Unfinished Service Spaces: One-piece, stamped-steel type with concealed or exposed-rivet hinge and set screw or spring clips.
 - h. Bare Piping in Equipment Rooms: One-piece, cast-brass type.

- i. Bare Piping at Floor Penetrations in Equipment Rooms: One-piece, floor-plate type.
- 2. Existing Piping
 - A. Chrome-Plated Piping: Split-casting, cast-brass type with chrome-plated finish.
 - B. Insulated Piping: Split-plate, stamped-steel type with concealed hinge and spring clips.
 - C. Bare Piping at Wall and Floor Penetrations in Finished Spaces: Split-casting, cast-brass type with chrome-plated finish.
 - D. Bare Piping at Ceiling Penetrations in Finished Spaces: Split-casting, cast-brass type with chrome-plated finish. Bare Piping in Unfinished Service Spaces: Split-casting, cast-brass type with polished chrome-plated finish.
 - E. Bare Piping in Equipment Rooms: Split-casting, cast-brass type.
 - F. Bare Piping at Floor Penetrations in Equipment Rooms: Split-casting, floor-plate type.
- L. Install sleeves for penetrations of walls, ceilings, and floors according to the following:
 - A. Sleeves are not required for core-drilled holes.
 - B. Permanent sleeves are not required for holes formed by removable PE sleeves.
 - C. Install sleeves for pipes passing through concrete and masonry walls, gypsum-board partitions, and concrete floor and roof slabs.
 - D. Cut sleeves to length for mounting flush with both surfaces.
 - 1. Exception: Extend sleeves installed in floors of mechanical equipment areas or other wet areas 2 inches above finished floor level. Extend cast-iron sleeve fittings below floor slab as required to secure clamping ring if ring is specified.
 - E. Install sleeves in new walls and slabs as new walls and slabs are constructed.
 - F. Install sleeves that are large enough to provide 1/4-inch annular clear space between sleeve and pipe or pipe insulation. Use the following sleeve materials:
 - 1. Steel Pipe Sleeves: For pipes smaller than NPS 6.
 - 2. Steel Sheet Sleeves: For pipes NPS 6 and larger, penetrating gypsum-board partitions.
 - 3. Stack Sleeve Fittings: For pipes penetrating floors with membrane waterproofing. Secure flashing between clamping flanges. Install section of cast-iron soil pipe to extend sleeve to 2 inches above finished floor level. Refer to Division 7 Section "Sheet Metal Flashing and Trim" for flashing.
 - 4. Seal space outside of sleeve fittings with grout.
 - G. Except for underground wall penetrations, seal annular space between sleeve and pipe or pipe insulation, using joint sealants appropriate for size, depth, and location of joint. Refer to Division 7 Section "Joint Sealants" for materials and installation.
 - H. Aboveground, Exterior-Wall Pipe Penetrations: Seal penetrations using sleeves and mechanical sleeve seals. Select sleeve size to allow for 1-inch annular clear space between pipe and sleeve for installing mechanical sleeve seals.
 - I. Install steel pipe for sleeves smaller than 6 inches in diameter.
 - J. Install cast-iron "wall pipes" for sleeves 6 inches and larger in diameter
 - K. Mechanical Sleeve Seal Installation: Select type and number of sealing elements required for pipe material and size. Position pipe in center of sleeve. Assemble mechanical sleeve seals and install in annular space between pipe and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

- L. Underground, Exterior-Wall Pipe Penetrations: Install cast-iron "wall pipes" for sleeves. Seal pipe penetrations using mechanical sleeve seals. Select sleeve size to allow for 1-inch annular clear space between pipe and sleeve for installing mechanical sleeve seals.
- M. Mechanical Sleeve Seal Installation: Select type and number of sealing elements required for pipe material and size. Position pipe in center of sleeve. Assemble mechanical sleeve seals and install in annular space between pipe and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.
- N. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestop materials. Refer to Division 7 Section "Through-Penetration Firestop Systems" for materials
- O. Verify final equipment locations for roughing-in.
- P. Refer to equipment specifications in other Sections of these Specifications for roughing-in requirements.

3.11 EQUIPMENT INSTALLATION - COMMON REQUIREMENTS

- A. Install equipment to allow maximum possible headroom unless specific mounting heights are not indicated.
- B. Install equipment level and plumb, parallel and perpendicular to other building systems and components in exposed interior spaces, unless otherwise indicated.
- C. Install mechanical equipment to facilitate service, maintenance, and repair or replacement of components. Connect equipment for ease of disconnecting, with minimum interference to other installations. Extend grease fittings to accessible locations.
- D. Install equipment to allow right of way for piping installed at required slope.
- E. Installation shall meet or exceed all applicable federal, state and local requirements, referenced standards and conform to codes and ordinances of authorities having jurisdiction.
- F. All installation shall be in accordance with manufacturer's published recommendations.
- G. Piping may be run exposed in rooms typically without ceilings such as mechanical rooms, janitor's closets, tight against pan soffits in exposed "tee" structures, or storage spaces, but only where necessary. Shutoff and isolation valves shall be easily accessible.
- H. All pipe, conduits, etc., shall be cut accurately to measurements established at the building and shall be worked into place without springing or forcing. All ducts, pipes and conduits run exposed in machinery and equipment rooms shall be installed parallel to the building lines, except that piping shall be sloped to obtain the proper pitch. Piping and ducts run in furred ceilings, etc., shall be similarly installed, except as otherwise shown. All pipe openings shall be kept closed until the systems are closed with final connections.
- I. Prior to the installation of any ceiling material, gypsum, plaster or acoustical board, the Contractor shall notify Owner's Project Manager so that arrangement can be made for an inspection of the above-ceiling area about to be "sealed" off. The Contractor shall provide written notification to the Owner at least five (5) calendar days prior to the inspection.
- J. Precedence of Materials:
 - 1. The Specifications determine the nature and setting of materials and equipment. The Drawings establish quantities, dimensions and details.
 - 2. If interference is encountered, the following installation precedence of materials shall guide the Contractor to determine which trade shall be given the "Right of Way":
 - a. Building lines
 - b. Structural members
 - c. Structural support frames supporting ceiling equipment

- d. Soil and drain piping
 - e. Vent piping
 - f. Supply, return and outside air ductwork
 - g. Exhaust ductwork
 - h. HVAC
 - i. Condensate piping
 - j. Domestic water (cold and hot, softened, treated)
 - k. Refrigerant piping
 - l. Electrical conduit
3. Coordinate fire suppression, plumbing and HVAC systems with transport systems as required to maintain transport system right-of-way.

3.12 CONCRETE BASES

- A. Concrete Bases: Anchor equipment to concrete base according to equipment manufacturer's written instructions and according to seismic codes at Project.
- B. Construct concrete bases of dimensions indicated, but not less than 4 inches larger in both directions than supported unit.
- C. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch centers around the full perimeter of the base.
- D. Install epoxy-coated anchor bolts for supported equipment that extend through concrete base, and anchor into structural concrete floor.
- E. Place and secure anchorage devices. Use supported equipment manufacturer's setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
- F. Install anchor bolts to elevations required for proper attachment to supported equipment.
- G. Install anchor bolts according to anchor-bolt manufacturer's written instructions.
- H. Use 5000-psi, 28-day compressive-strength concrete and reinforcement
- I. Provide #5 rebar 12" on center each way.
- J. Refer to detail sheets for typical concrete equipment pad detail.
- K. Contractor to install 4" wide reflective acrylic self-adhesive vinyl black/yellow striped caution/warning tape on vertical rise of all concrete housekeeping pads, tape to be in compliance with manufacturing model #146, tape to meet ASTM D-4956-99, submit submittal of tape to engineer for review.

3.13 GROUTING

- A. Mix and install grout for mechanical equipment base bearing surfaces, pump and other equipment base plates, and anchors. Clean surfaces that will come into contact with grout.
- B. Provide forms as required for placement of grout.
- C. Avoid air entrapment during placement of grout.
- D. Place grout, completely filling equipment bases.
- E. Place grout on concrete bases and provide smooth bearing surface for equipment.
- F. Place grout around anchors.
- G. Cure placed grout.

3.14 ADDITIONAL CLOSE-OUT DOCUMENT REQUIREMENTS

- A. LEAD CONTENT CERTIFICATE: As part of the close-out documents, the contractor is to include a certificate stating that the lead content in the domestic water system complies with

governing code and Health Department criteria. A test shall be made at each faucet, spigot, drinking fountain, and any other fixture drinking water may be obtained.

- B. Contractor to provide a set of drawings showing valve schedule & valve location on drawings (full size set, 24"x36 drawings). Drawings to have valve type, manufacturer and model #. Also provide replacement part contact information for each valve.
- C. Contractor shall provide a minimum of three (3) sets of record documents of fire protection system. Contractor shall instruct designated owner personnel on system.

3.15 TROUBLESHOOTING

- A. By Contractor: If, during the start-up or warranty period, mechanical systems operational problems occur for which the root cause is not readily apparent, Contractor shall promptly, through a Subcontractor or other resource designated by Subcontractor, provide diagnostic and investigative services to determine the cause or causes.
- B. By Engineer:
 - 1. At Contractor's request, Engineer will provide the services necessary to determine the cause or causes of the operational problems.
 - 2. Under the provisions of the General Conditions, Engineer will also provide these services if Contractor fails to respond satisfactorily to operational problems within a reasonable time after written notice from Engineer.
 - 3. If while working at Contractor's request or under the provisions of the General Conditions, Engineer determines that the problems are due to failure of the Work to comply with the requirements of the Contract Documents, Owner will compensate Engineer for additional services and deduct the amount paid from payment or payments to Contractor.

3.16 DIVISION OF WORK

- A. In accordance with the general conditions, contractor is responsible for dividing the work among the subcontractors and suppliers and for delineating the work to be performed by specific trades. Any mention of mechanical and/or plumbing contractor, control and/or electrical contractor are suggestions as to how the work may be divided. This is not a complete list of all the work. It is the contractor's responsibility that a complete and entire system is to be installed.

3.17 FIRE RATED WOOD

- A. All wood as specified within these construction documents (mechanical, plumbing, sprinkler plans and specifications) shall be of the fire rated type. PYRO-GUARD treated wood as manufactured by HOOVER treated wood products.

3.18 ADDITIONAL TRAINING

- A. In addition to all training specified herein, the contractor shall provide the additional training services to the owner:
 - 1. An "Owner Training Coordination Meeting" shall be the first training session and it shall be conducted by the Installing Contractor. This training session shall be conducted upon completion of construction and just prior to Owner Occupancy. This session shall be approximately be one hour long and consist of a tour of the facility to show the location, type, and brands of equipment, include a basic high level description of the system. This session shall conclude with Maintenance Foreman providing a list of equipment where they want additional training. This session has two functions as follows:
 - a. First, it allows maintenance foreman to become familiar with equipment location. This coupled with their general knowledge of Systems allows them to respond to and investigate potential warranty issues before turning over the issue to the contractor.
 - b. Secondly and at the conclusion of this session, the Maintenance Foreman, after having seen the equipment installed has the opportunity to determine if they want the specified Owner training for each piece of equipment. The Maintenance Foremen shall make the decision based on staff knowledge. For example, the HVAC Crew

may not want to sit through training because their entire staff sat through 5 prior trainings in the last 2 years for a particular piece of equipment. However, they may choose to have training if they have hired new technicians since last training.

2. The traditional "Owner Training" shall be conducted during the second training session. This session shall be conducted as the Final Punch List Item. It shall be not be scheduled until all equipment is completely operational, Testing and Air Balancing Work has been completed, and the HVAC Building Automation System has been completed and commissioned. This training Session shall include the following:
 - a. Basis of Design – To be conducted, via telephone, by Designing Engineer for Mechanical Systems including items like hydronic pumping configurations, unique system components, fresh air theory, etc.
 - b. Equipment Training – To be conducted by Vendor/Manufacturer's Rep for each piece of equipment requested during the Owner Training Coordination Meeting.
 - c. HVAC Building Automation Training – To be conducted primarily by the Installing Contractor and then EMS System Integrator.
 - d. Allow at least 2 hours for each system. Total training to be at least 40 ours due to the owner.
3. The vendors will then supply brief refresher training at approximately 6 months from the date of substantial completion. Allow at least 4 hours for each system.
4. The vendor will then supply in depth training at 10 months from the date of substantial completion. This training will include all maintenance and operation requirements of each piece of equipment and system and in depth training on control systems. Allow at least 8 hours for each system.
5. All training to be videotaped and supplied to owner & architect/engineer on DVD format.

3.19 FILTERS

- A. Construction Filters - Provide MERV 13 high efficiency filters, with rolled filter media clipped over return air grilles & duct openings for course filtration. All filters to be replaced during construction as needed. Replace all filters after construction with an additional set to the owner.
 - a. The contractor is responsible for maintaining keeping the equipment, filters and ductwork clean during construction and that the mechanical system shall see minimal run time prior to owner's acceptance (for startup & testing/balancing purposes only). During construction, the contractor shall provide and maintain for the HVAC a minimum of a MERV 13 high efficiency filters with rolled filter media clipped over return air grilles for course filtration. All filters shall be replaced as needed during construction and with permanent filters upon completion of project. Condenser coils shall also be maintained as needed. If allowed to get dirty, the contractor shall clean all air handling units, condenser coils, ductwork, piping and all associated items at no cost to the Owner.
- B. Contractor to provide a complete list of permanent filters with the filter sizes, type, equipment being filtered and location of filter. Submit list to owner prior to substantial completion.

3.20 TRENCHING AND BACKFILLING OUTSIDE BUILDING SLAB

- A. Clearing and Grubbing - The Contractor shall clear and grub the surface areas and remove surface materials of whatever nature encountered, over the line of and to either side of the trenches where the piping systems are to be installed. Existing sidewalks, driveways or other cement or asphalt surfaces which are to remain and have been

damaged during excavating shall be repaired to match the adjacent work in material and finish.

B. Trenches:

1. Prior to any excavating or trenching, the Contractor shall contact the regional underground utilities notification program (Louisiana One Call) for assistance in securing the location of any underground utilities that may be affected by this work.
2. Trenches shall be dug so that pipe can be laid to the alignment, depth and slope indicated. Excavation shall be only so far in advance of the pipe laying as to reveal any obstructions, but never more than 100' in advance of the pipe installation unless specifically approved by the Architect/Engineer. Trenches shall be graded such that each section of pipe will rest upon the trench bottom for the full length of its barrel. Provide bell holes at each joint as required for this purpose.

C. Dewatering:

1. Remove any water which may be found or may accumulate in the trenches and excavations and shall perform the work necessary to keep them clear of water while the work is in progress, or as may be required for inspections. Use due vigilance and care so that no water originating on his work, or due to his work, which he is obligated to handle and dispose of under his contract, shall discharge or be discharged upon the work or into the trenches of another contract, unless by mutual agreement of parties affected. Should any dispute arise from this cause, the matter shall be referred to the Architect/Engineer for final settlement.

D. Bedding and Backfill:

1. Bedding and backfill material shall be river sand. Backfilling shall not begin until the pipe work to be covered has been inspected by the Architect/Engineer. The Architect/Engineer reserves the right to order any trench backfilled at any time after installation of pipe, if, in his opinion, the particular trench remaining open constitutes a public nuisance. Settlement of backfill in trenches excavated for work of this Division shall be the responsibility of this Division. Trenches shall be refilled as often as necessary to bring them back to required or original grades.
2. Bedding under pipe - Trenches shall be bedded by hand. A 6" layer of river sand shall be placed in the trench and compacted and graded prior to installing the pipe. After the pipe is installed, river sand shall be carefully placed in 3" layers on both sides of the pipe and compacted and graded by hand. The sand shall be deposited in the trench for its full width on each side of the pipe, fittings and appurtenances, simultaneously.
 - a. Backfilling to 1' above pipe - From the centerline of the pipe, fittings and appurtenances to a depth of 1' above the top of the barrel of the pipe, the trench shall be backfilled by hand or approved mechanical means with river sand. Use special care in placing this portion of the backfill so as to avoid injuring or moving the pipe or disturbing the pipe hangers. This part of the backfill shall be compacted by method approved by the Architect/Engineer.
 - b. Backfilling to grade - From 1' above the barrel of the pipe up to grade, the trench shall be filled with river sand. Backfill shall be compacted by methods specified in DIVISION 2 - SITEWORK or to 95% maximum density per ASTM D1557 (modified proctor). Where sheeting and bracing are removed from the trench or excavation as backfilling progresses,

care shall be taken to insure that voids left by the withdrawn timbers are carefully and thoroughly compacted and that pipe hangers are left vertical and plumb.

3.21 DISPOSAL OF EXCESS EXCAVATED MATERIAL

- A. Excess fill taken from excavations shall, unless otherwise provided in the Contract Documents, be removed as soon as possible as work of this Division.

3.22 SUB-SURFACE OBSTRUCTIONS

- A. Care must be taken not to disturb, injure or remove any pipes, cables, conduits or other underground structures or utilities that are to remain. As work of this Division, shore-up and protect underground piping, conduit structures or utilities which may be endangered during the work and maintain such structures and utilities during construction. Sub-surface obstructions shall be uncovered in advance of construction so that the method of avoiding same may be determined before pipe laying reaches the obstruction.
- B. In the event subsurface structures, pipes, cables, conduits or utilities are broken or damaged in the execution of the work, the User Agency and proper authorities shall be notified and proper repairs shall be made, as work of this Division, to the satisfaction of the Architect/Engineer and authorities involved. Damage to persons or property caused by such breaks shall also be the responsibility of this Division. The change or rearrangement of any underground structures which may interfere with the construction of the work of this Division.

3.23 SHEETING AND SHORING

- A. Sheeting and shoring shall be placed in excavations and trenches as required to suit the ground conditions and to properly and safely support the excavations and trench walls and any adjacent structures. Placement of the sheeting and shoring in the trench shall not restrict the excavation and trench width specified in other Sections. Sheeting and shoring for excavations and trenches less than five feet in depth may be of treated wood. Wood indicated to remain in excavations and trenches shall be treated type. Sheeting and shoring for excavations and trenches greater than five feet in depth shall be of steel construction.
- B. The Contractor shall employ a Civil Engineer licensed in the state of this project to design the steel sheet piling system required for excavations of five feet or greater. The Contractor shall submit one copy of the Engineer's sealed calculations and drawings to the Architect/Engineer for record and file purposes only. The Contractor shall be responsible for the design and construction of the sheet piling system.
- C. Unless otherwise instructed by the Architect/Engineer wood sheeting, shoring and bracing shall be cut-off at an elevation of 24" below finished grade. The lower portion of the sheeting and bracing below grade shall remain in the ground. If instructed by the Architect/Engineer to remove the wood or steel sheeting and shoring it shall not be removed until backfilling is completed.

3.24 RESTRAINED JOINTS

- A. Restrained joints shall be provided for underground water mains 4" and larger and sewer force mains at each change of direction 11 ¼ degrees or greater and at tees. Restrained joints shall be installed per NFPA 24.

3.25 FRICTION LOSSES, ELECTRICAL RATINGS AND SPACE REQUIREMENTS

- A. The values of air and water friction losses, electrical current ratings and space requirements for various pieces of equipment, as contained in these specifications or as scheduled, are estimated values and sizes and have been used in obtaining specifications for equipment and for sizing ducts, pipe, electrical wiring and motor controls. Any necessary changes in any of these items resulting from values other than the estimated ones shown shall be the responsibility of the Contractor and shall be subject to the approval of the Architect/Engineer. The Contractor shall pay any costs for additional labor and material required including costs of any other Contractor involved. Should substitute equipment require different requirements from that shown on the drawings, the Contractor shall be responsible for the cost of the changes. Any such changes must be approved by the Architect/Engineer.

3.26 CHANGES TO PIPING OR DUCTS

- A. Should the Contractor desire to make changes in the routing or arrangement of piping or ducts, whether for his own convenience, to avoid conflict with the work of other trades, or to conform to local codes, such changes shall not be made without the prior approval of the Architect/Engineer.

3.27 OPERATING INSTRUCTIONS

- A. Prior to the time scheduled for occupancy, the Contractor shall provide the services of a competent mechanic to instruct the User Agency in the care and operation of equipment. Before final acceptance, the Contractor shall prepare and deliver to the Architect/Engineer three bound copies of operating instructions, which shall be contained in a hard back loose leaf type binders, divided into a suitable number of volumes so as to permit easy reference and shall include:
 - 1. Description of major components of systems, including the function of major items.
 - 2. Detailed operating instructions and instructions for making routine minor adjustments.
 - 3. Routine maintenance operations.
 - 4. Manufacturer's catalog data, service instructions wiring diagrams, fabrication drawings and parts list for each piece of operating equipment.
 - 5. Copies of equipment submittals and shop drawings, including review sheet, reviewed by and acceptable to the Architect/Engineer.
 - 6. Guarantee and Warranty Information.
 - 7. Names and telephone numbers of subcontractors and suppliers.

3.28 WORK RELATED TO EQUIPMENT NOT FURNISHED AS WORK OF THIS DIVISION

- A. Unless specifically indicated otherwise, any required mechanical services for and required mechanical connections to items indicated on the drawings or in the specifications or items provided by User Agency shall be mechanically connected as work of this Division. The

Contractor shall provide piping, valves, traps, etc., as required for complete operation of each piece of equipment.

3.29 DISSIMILAR METALS

- A. Inert NSF/FDA lines dielectric nipples shall be provided between copper, bronze or brass piping material or valves and steel piping material or steel tanks. Dielectric nipples and brass or copper unions or flanges shall be provided at cast iron valves and equipment where hereinbefore specified for equipment maintenance. Dissimilar metals shall be isolated from surface contact with Each other by the use of a non-conductive material, tape, etc.

3.30 OPENINGS, GROUNDS AND CHASES

- A. Openings, grounds, chases and lintels will be provided under other Divisions, as directed by this Division, to accommodate the piping, ductwork and equipment. Sleeves and prepared openings shall be accurately located in slabs or walls before pouring of concrete. It shall be the responsibility of this Division to verify that openings and chases are properly located. Openings associated with work of this Division. Coordinate location of grease ducts through roof and arrange for roof framing to be relocated to avoid offsetting of ducts.
- B. Holes through existing concrete shall be either core drilled or saw cut. Drilled or cut holes required shall have the approval of the Architect/Engineer prior to cutting or drilling. Sleeves set in openings cut in existing masonry or concrete walls or concrete slabs shall be one pipe size smaller in outside diameter than the cored hole. The sleeve shall be grouted in place with non-shrinking waterproof grout. Where piping is installed through smoke and/or fire separations, fill annular space between sleeve and piping with safing or fire barrier material.

3.31 PROTECTION OF WORK

- A. The Contractor shall protect equipment, fixtures and work from damage. Damaged work will be rejected and replaced at the expense of the Contractor. Where possible, rooms containing new plumbing fixtures shall be kept locked until the building is turned over to the User Agency. Immediately after installation of each plumbing fixture, it shall be covered with a fixture protector.
- B. Mechanical equipment shall be protected from and from the weather. Provide adequate and proper storage facilities for items during the progress of the work.

3.32 PROJECT CLOSEOUT DOCUMENTS

- A. Prior to the final acceptance of the project the Contractor shall deliver to the Architect/Engineer for review, the following in two three-ring binders:
 - 1. Certificates of approval from local regulatory agencies.
 - 2. Extended equipment warranties.
 - 3. Signed receipts showing that keys to access doors, locked equipment, underground valve wrenches and vandal-proof screwdrivers have been delivered to the User Agency.
 - 4. Valve tag list.

5. Operating instruction manuals which shall include copies of reviewed submittals and shop drawings include review sheet.
 6. Results of potable water sterilization tests.
 7. Performance tests of backflow preventer.
 8. HVAC test and balance reports.
 9. Record drawings.
- B. Final payment will be withheld until each applicable item has been provided to and is found satisfactory by the Architect/Engineer.

END OF SECTION

4-14-25

SECTION 20 01 11 – ENVIRONMENTAL CONTROL SERVICES

PART 1 GENERAL

1.1 SUMMARY

- A. The purpose of the specification is to define the approved methods and equipment or the use of temporary dehumidification/air conditioning system during construction.
- B. The dehumidification system shall be part of the General Contract. Any extra hardware, components or accessories, i.e., duct work, temperature control, transformers, inlet/outlet transitions, etc. Shall be considered incidental with no separate payment for any of the above items.

1.2 SUBMITTALS

- A. Dehumidification supplier shall provide drawings showing equipment placement and sizes, air distribution and power cable routing.

PART 2 GENERAL

2.1 ENVIRONMENTAL CONTROLS

- A. Dehumidification / Air conditioning equipment shall be used to control the environment in the space 24 hours a day while interior finishes are being stored or installed.
- B. Pressurization, all construction areas to be in negative pressure by means of Contractors "Means and Methods". Contractor shall submit method to Engineer for approval prior to any installation.

2.2 TEMPERATURE CONTROLS

- A. Auxiliary heat, cooling and/ or insulation may be necessary to maintain the temperature at a level acceptable to the contractor performing the reconstruction inside the work space. This auxiliary equipment must be approved for use by the dehumidification/ Air conditioning equipment supplier and shall meet the following requirements.
 - 1. Heaters and refrigerant-type systems will be installed in the process air supply between the dehumidifier and the space as close to the space as possible.
 - 2. Only, electric, indirect gas fired and steam coil auxiliary heaters will be used. No direct fired space heaters will be allowed during the construction.
 - 3. Heaters will be equipped with controls that automatically turn the heater off if the airflow is interrupted or the internal temperature of the heater exceeds its designed temperature or that of the supply duct.
 - 4. Seal the area where dehumidification is introduced to allow the air to escape away from the entry point while maintaining a slight positive pressure unless dust from the operation is hazardous. The design of the filter system, if necessary, will be designed so that it does not interfere with the dehumidification equipment's ability to control the relative humidity and temperature parameters in that space. Do not re-circulate the air from the space or from filtration equipment back through the dehumidifier during reconstructions unless authorized by the dehumidification supplier.

2.3 SPECIFIED EQUIPMENT SIZE AND TYPE

- A. Style and size of equipment will be determined by the contractor. The style and size may vary depending on volume of air space needing to be controlled, time of year, containment of area, and any other requirement that may diminish the ability to control the environment.
 - 1. Basis of bid to be 250 square foot per ton of HVAC.

2.4 POWER

- A. The required electrical power will not be supplied by the owner. The necessary voltage and

amperes needed for operation will be coordinated with the general contractor. The contractor is responsible for providing temporary power necessary to energize the dehumidification/ Air conditioner system.

PART 3 EXECUTION

3.1 INSTALLATION

- A. The contractor shall install dehumidification/ Air conditioning equipment in accordance with manufacturer's written instructions and approved submittals.
- B. Dehumidification/ Air conditioning supplier will use flexible duct and temporary ducting to distribute the dry air through the controlled space. Distribution of dry air will be decided by the dehumidification supplier and the general contractor.
- C. Temporary power cord will be used to energize the dehumidifiers / Air conditioners.

END OF SECTION

4-14-25

SECTION 20 02 00 - MISCELLANEOUS MECHANICAL REQUIREMENTS

PART 1 GENERAL

1.01 GENERAL

- A. The term Contractor refers collectively to the general contractor and his subcontractors, and does not distinguish between the parties. The General or Prime contractor is solely responsible to the Owner for coordinating all work between different trades. Any required work not included in subcontractor's contract will be performed at the General or Prime Contractor's expense.
- B. Contractor shall furnish and install complete operating systems including all equipment, materials and accessories indicated on the drawings, in the specification, or as required for a complete working system.
- C. All equipment shall be stored, handled, installed, tested, calibrated and placed in operation in strict accordance with the manufacturer's recommendations.
- D. Equipment manufacturer's representative shall be on site at the time of start up for all equipment. Equipment shall not be placed in operation until manufacturer's representative confirms that all system parameters are approved for start-up.
- E. Any additional work caused by prior approved equipment substitutions shall be at the Contractor's expense.
- F. All work shall be performed in accordance with the International Building Code. Miscellaneous construction materials required to meet code requirements shall be furnished and installed by the Contractor at the Contractor's expense regardless of whether or not such items are specifically detailed on the Contract drawings. The Contract Drawings are schematic in nature and are not intended to show every detail or component required for a complete working system and complete Code conformance.
- G. Contractor shall provide any field wiring and auxiliary equipment or component required by equipment manufacturer's installation instructions and detailed wiring and control diagrams for proper interlocking and safe operation of the equipment. Contractor shall provide cooling water piping, control power supply, and any other utilities or auxiliary components required for proper operation.
- H. All equipment drain connections, etc. shall be piped full size to nearest floor or hub drain. Minimum drain line size shall be 1-1/4".
- I. Provide adequate clearances around all equipment in accordance with manufacturer's recommendations for proper service, maintenance, and operation of the equipment.
- J. Provide OSHA approved belt and coupling guards on all rotating equipment.
- K. Any modification of construction details shown on the contract drawings which are necessary to suit actual equipment certified dimensional data or field conditions shall be approved by the Architect. The Contractor will not receive any additional compensation for minor changes in construction details required to accommodate job site conditions, equipment dimensions, etc. A complete job and good workmanship are required.
- L. All openings through walls, floors and roof provided for equipment, piping or conduit shall be properly framed, caulked, and flashed to insure water tightness and weather protection. Provide fire stop sealant system in accordance with code requirements.
- M. All steel materials used for construction shall be stainless steel, painted steel, or galvanized steel. Bare steel will not be acceptable under any circumstances.
- N. Contractor shall provide fire dampers, smoke dampers, smoke detectors and firestats as shown on the drawings and as required by Code.
- O. Vibration mountings shall be installed under mechanical equipment to protect the finished installation from objectionable noise and vibration. Flexible connections shall be installed in piping and duct work systems where necessary to prevent transmission of vibrations and noise.

- P. Where there is a conflict between information shown on contract drawings, specifications Code requirements or industry standards, etc., the strictest and most conservative interpretation shall govern. In the event of a discrepancy between new and existing materials, Contractor shall assume the material to be new. If any item is indicated to be new any place on the drawings or in the specifications, the item in question shall be include in the Contractor's bid as new equipment or material.
- Q. Contractor shall not furnish, install, or utilize any equipment, products, or product components that contain any amount of asbestos material in any form.
- R. The Architect will have the authority to order minor changes in the work not involving an adjustment in the Contract Sum or the Contract Time and not inconsistent with the intent of the Contract Documents in accordance with AIA Document A201-1976.
- S. All shop drawings and product data submittals shall include a written, signed statement of total compliance with the Contract Documents. All product data shall be manufacturer's published data. Approval of shop drawings does not relieve the Contractor of responsibility to comply with the Contract Documents. NO SUBSTITUTIONS OR VARIATIONS WILL BE ACCEPTED EXCEPT AS CLARIFIED BEFORE THE BID DATE BY ADDENDUM.
- T. Coordination with electrical: Contractor to submit copy of any & all shop drawings that indicate electrical requirements to the project electrical engineer for electrical service & electrical load verification. Applicable to all mechanical items.
- U. All materials for new work shall be new and not used.
- V. All multi-blade dampers used in HVAC systems shall be U.L. listed and certified to meet U.L. Standard 555S, Class 1 leakage.
- W. Fire Rated Wood: All wood as specified & mentioned within these construction documents (mechanical, plumbing, sprinkler plans and specifications) shall be of the fire rated type. PYRO-GUARD treated wood as manufactured by HOOVER treated wood products.
- X. All exhaust and fresh air penetrations through sidewalls shall be a minimum 10'-0" above adjoining grade.
- Y. ADDITIONAL CLOSE DOCUMENTS: Contractor to provide a set of drawings showing valve schedule & valve location on drawings (full size set, 24"x36 drawings). Drawings to have valve type, manufacturer and model #. Also provide replacement part contact information for each valve.
- Z. The contractor shall submit to the mechanical engineer, as soon as feasible after award of the contract, equipment room layouts at a scale not less than 1/4" = 1'-0" showing the layout of the actual equipment to be used and all necessary clearances. This drawing is to comprehensive of all trades as to eliminate conflicts. The contractor will be responsible to verify all access for maintenance as required by the manufacturer.
- AA. Maintain a minimum 5'-0" horizontal separation between building drain or building sewer and underground water service piping per section 603.2 of International Plumbing Code (current edition). Should sewer and water pipe cross, the water pipe shall be installed above the sewer a minimum of 12".
- BB. STAINLESS STEEL PIPE HANGERS:
 - A. Provide stainless steel pipe hangers for all piping located under building slab.
 - 1. Piping up to 6" (Outer Diameter) and less shall utilize 1/4" thick stainless steel hanger rods.
 - 2. Piping greater than 6" (Outer Diameter) up to 10" (Outer Diameter) shall utilize 3/8" thick stainless steel hanger rods.
 - 3. Piping greater than 10" (Outer Diameter) shall utilize 1/2" thick stainless steel hanger rods.
 - B. Hanger rods to span two (2) steel re-bars with 90 degree bend (2" in length) at ends of

- C. Twist hanger rods tightly around top of piping two (2) complete 360 degree turns.
- D. Provide hanger rods every 4'-0", at all changes in directions, and at all fittings & joints.

CC. This Section shall apply to all work in Division 20, 22 and 23.

1.02 DRILLING FLOOR SLABS AND WALLS

- A. Holes through the concrete floor slabs and masonry walls for chilled water and drain piping shall be made with rotary masonry core bits. Diamond tip cutters are recommended, but not required.
- B. The use of a jack hammer or any other impact tool for drilling or coring is prohibited.
- C. Layout the hole locations, pipe diameters including insulation and furring around pipes before drilling any holes for the pipes. Drill a small pilot hole and check the floor slab from the bottom to be sure that the pipes will miss all beams and joists.
- D. Water pipe insulation shall be continuous through the holes. Heating water and drain pipe insulation shall be interrupted at the holes to permit minimum size holes through the floor slabs.
- E. The annular space around floor penetrations shall be packed with rated fire proofing material.

1.03 CONCRETE FASTENERS

- A. Fastenings set into concrete to support pipe, air handlers and other mechanical equipment shall be steel or malleable iron expansion shields set in proper size drilled holes. Do not exceed the manufacturer's rated pull out load. The manufacturer's rated load must be based on a factor of safety of 5 or else the allowable load must be reduced to give a factor of safety of 5. Self drilling Rawl Saber Tooth or Phillip Red Heads may be used. Anchors using lead, plastic or shields of any material other than steel or malleable iron shall not be used.
- B. Powder actuated fasteners, Hilti or Ramset, may be used for loads applied with a factor of safety of 5 but not more than 300 pounds for the largest size. The powder charge shall be found by trial and shall be the smallest charge that gives full insertion into the concrete. These fasteners may be used for ductwork and small pipe.
- C. Suitably located existing inserts which were cast into the concrete at the time of construction may be reused.

1.04 PROTECTIVE COATING FOR UNDERGROUND PIPING

- A. Underground pipe and fittings including the portion through the floor shall be protected against corrosion by application of protective coatings.
- B. Prior to coating, pipe and fittings shall be cleaned of all rust, scale, dirt, and oil.
- C. Pipes and fittings shall be given a wash coat of epoxy primer having a dry film thickness of 1.5 - 2.0 mils. Over the primer apply two coats of coal-tar base epoxy coating, each having a dry film thickness of 6 mils.
- D. Coatings shall have a holiday test using a ½" spark. Recoat any areas not passing test.
- E. Provide for all underground metal piping up from grade.
- F. 2-Part coal-tar epoxy to be Carboline 300M or prior approved equal.

1.05 EMS (TEMPERATURE CONTROLS) CONDUIT AND BOXES

- A. UNDERGROUND EMS CONDUIT: Rigid Nonmetallic Conduit (RNMC): Schedule 40, rigid polyvinylchloride, rated for 90 degrees C conductors, with pull string, solvent cement connectors and couplings. Nonmetallic strap hangers allowing thermal expansion movement. Conduit to meet NEMA TC-2; fittings to meet NEMA TC-3. Expansion Coupling: Nonmetallic to compensate for thermal expansion.
- B. EMS CONDUIT WITHIN BUILDING: Shall be hot dipped galvanized rigid steel conduit. All conduits shall be new and shall bear the inspection label of the Underwriter's Laboratories, Inc. Metallic conduit shall be hot-dipped galvanized. Fittings for conduit shall be an approved type specially designed and manufactured for their purpose. Rigid metal conduit fittings, bushings, and other components shall be galvanized. Setscrew connector fittings shall not be permitted.

All fittings for rigid steel or aluminum conduit shall be threaded and coupled unless specifically approved otherwise by the Engineer.

- C. Pull Boxes: Communication/EMS ground mounted pull boxes shall be polymer concrete, ANSI/SCTE 77 2002 – Tier 22 rated, provide dimensions indicated on the drawing. Open bottom. Cover to be labeled “Communications”. Secure cover with stainless steel standard hex head bolts. Covers shall be traffic rated. ALL PULL BOXES TO BE SIZED IN ACCORDANCE TO NEC (NATIONAL ELECTRIC CODE).
- D. Stainless Steel EMS Enclosure: NEMA 3R enclosure (UL 508A Listed). Manufactured from Type 304 16 gauge stainless steel; 16 gauge doors and 14 gauge bodies, Minimum-width body flange provides maximum body opening, Pre-cut gland plate openings in the bottom of the enclosure with a seal to ensure protection, External formed 90 degree body flange, Door opens 210 degrees, Mounting holes in back of body for direct mounting or for optional external mounting brackets, Type 316 stainless steel hinge pins, Corner-formed doors are easily removed by pulling clip-style hinge pins, Quarter-turn latches furnished with 3mm double-bit insert, Seamless foam-in-place gasket, Self-grounding latch system with double seal, Grounding stud on the body, Full-sized galvanized steel back panel included, Bonding provision on the door, Furnished hardware kit includes: gasketed gland plates and hardware, grounding hardware and sealing washers for wall-mounting holes, Three-point latching, Finish: Door and body have smooth #3 brushed finish. Hoffman medium GL66 series stainless steel wall mount enclosure.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Fasteners of the type set into concrete by drilling shall be self-drilling (Rawl Saber Tooth, Phillips Red Heads, or prior approved equal).
- B. Powder actuated fasteners shall be Hilti or Ramset.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Follow manufacturer's instructions and use setting tools procured from the manufacturer of the drilled-in anchors to expand the shields.
- B. Underground EMS conduit to be installed in strict accordance with National Electric Code with pull boxes at every fourth bend, no more than three (3) turns without installation of pull box. Provide pull boxes at every 200' and at all changes of direction.

END OF SECTION

4-14-25

SECTION 20 0213 - BASIC PIPING

PART 1 GENERAL

1.01 GENERAL

- A. Scope
 - 1. This section covers the minimum basic requirements of above ground piping systems. For details refer to APPLICABLE SECTIONS below.
- B. Codes
 - 1. The work performed shall comply with the applicable codes of ANSI, NFPA and the current edition International Plumbing Code.

PART 2 PRODUCTS

2.01 PIPING, FITTINGS AND VALVES

- A. Materials shall be in accordance with the Line Specifications appended to the APPLICABLE SECTIONS of these specifications.

2.02 HANGERS

- A. Refer to Section 20 05 29: HANGERS AND SUPPORT DEVICES.

PART 3 EXECUTION

3.01 GENERAL

- A. Connections, re-routing, and tie-ins to existing utilities shall be approved by and scheduled with the proper authorities to assure uninterrupted service throughout the facility. The Contractor shall be responsible for locating existing utility lines and will plan the relocation work so that service interruptions shall be of minimum duration.
- B. Pipe shall be accurately cut to insure square ends and to measurements established at the site and shall be worked into place without springing or forcing, properly clearing all openings and equipment.
- C. High points of the systems, other than refrigerant, shall be vented and low points provided with plugged drains, one-half inch (1/2") in size.
- D. Fittings shall be used for all changes of direction or branch take-offs in the piping system except where specifically shown otherwise on the drawings. Mitering pipe to form elbows, cutting into straight runs to form tees, or any similar construction, is not permitted.
- E. Dielectric joints shall be installed at all joining of dissimilar metals except valves.
- F. Bushings for changes in line size shall not be permitted unless specifically indicated on the drawings.
- G. Cutting or other weakening of structural members to facilitate piping installation will not be permitted unless approved by the Architect.
- H. Piping shall not be used to support equipment, connected or otherwise, unless the plans and specification require such installation. When necessary, adequate temporary supports shall be installed during erection so as not to over-stress piping, or equipment to which piping is connected. Except as indicated on drawing details or required by other limiting conditions, all piping and equipment within buildings shall be entirely out of the way of equipment, lighting fixtures, doors, windows and other openings. Overhead piping in buildings shall be run in the most inconspicuous positions and parallel to the walls of the structures unless otherwise indicated on the drawing.
- I. Adequate clearances shall be provided from walls, ceilings and floors to permit the assembly of joints. All control valves shall have ample clearance for disassembly without disturbing equipment or other piping.

- J. Pipe sleeves shall be provided where pipes pass through masonry or concrete walls, roofs and partitions. Sleeves in outside walls in floor and roof slabs, shall be zinc-coated steel pipe unless otherwise specified. Sleeves in partitions shall be sheet steel of 26 gage minimum. Space between pipe, or insulation and sleeve shall not be less than 1/4 inch. Sleeves shall be held securely in proper position and location. All sleeves shall be of sufficient length to pass through entire thickness of walls, partitions or slabs.
- K. Take down joints shall be installed at all connections to equipment and fixtures; at all points where it is necessary to disconnect piping for repairs or maintenance; and on the control side of valves on branches and risers.
- L. Start-up strainers shall be installed up stream and adjacent to all items of equipment. They shall be in service and cleaned periodically for ten full days of operation and then permanently removed from the system.
- M. Painting and identification of piping, valves, hangers and supports shall be in accordance with SECTION 20 01 00 - GENERAL PROVISIONS. All exposed piping shall be painted and only black steel piping in concealed spaces shall be painted.

3.02 HANDLING AND STORAGE

- A. Pipe and fittings shall be handled in such a manner as to prevent damage such as bending of metal pipes or cracking and breaking of plastic pipes. Care shall also be taken to keep both inside and outside free from dirt.
- B. Plastic pipe shall be stored on racks with a minimum support spacing of three feet if delivered loose and if delivered in lifts, the lifts shall not be stacked more than three high
- C. Fittings shall be kept free from dirt and stored indoors.
- D. Solvents cements and primers for plastic pipe shall be handled and stored and the empty containers disposed of in a manner that provides the maximum safety to personnel and property.

3.03 INITIAL CLEANING

- A. Minimum requirements for internally cleaning of piping systems shall consist of removing "loose" foreign materials such as scale, sand, weld spatter particles, cuttings, chips, etc. from inside of assembly by any suitable means such as a mechanically driven rotary cleaning tool or wire brush, etc; blowing out all loosened particles with dry compressed air; and inspecting the inside of pipe assembly for cleanliness.

3.04 SOLDERED JOINTS

- A. The outside surface of the pipe where engaged in the fitting and the inside surface of the fitting in contact with the pipe shall be cleaned to a bright surface with an abrasive material before soldering. Apply a thin coating of flux to both the pipe and interior of the fitting before telescoping the two parts together.
- B. Care shall be taken in the heating of the joints so that the solder will flash and provide a full solid joint.

3.05 THREADED JOINTS

- A. Threaded joints shall be the American Standard Taper Pipe Thread (NPT), and shall conform to ANSI B 2.1. Pipe threads shall be cut sharp and smooth, and threading dies and taps shall have a threading stop to prevent overcutting the thread length. Power threading equipment dies shall have a 5 negative front rake when set on plastic pipe. Hand threading dies for plastic pipe shall have a 5 to 10 negative front rake.
- B. In threading plastic pipe a tapered plug shall be inserted in the end of the pipe to provide support and prevent distortion to the pipe in the threaded areas. The liberal use of an external lubricant shall be used while threading.
- C. After cutting and threading, the pipe shall be end-reamed to full internal pipe diameter. Before applying sealant, thread shall be wiped clean of cuttings and grit.

- D. Thread tape sealant shall be used, applied on male threads only, and shall be PTFE type, Caulking of threaded joints to stop or prevent leaks shall not be permitted.
- E. Where galvanized pipe has been threaded and connected, the exposed threads at couplings, fittings and appurtenances w\shall have a coat of corrosion resistant paint applied.

3.06 SOLVENT CEMENTED - PLASTIC

- A. Apply primer to the pipe and freely in the socket keeping surface wet and applicator wet and in motion 5 to 15 seconds. Avoid puddling in the socket. Apply primer a second time to the fitting socket.
- B. For checking penetration, scratch or scrape a few thousandths of the primed surfaces away. Repeated applications to either or both surfaces may be necessary. Weather conditions affect priming action. In cold weather more time is required for proper penetration.
- C. Apply a full even layer of cement on the pipe O.D. for a distance slightly greater than the depth of the socket of the fitting. Coat the fitting socket with a medium layer, avoiding puddling. On belled end pipe, do not coat beyond the socket depth or allow cement to run beyond the bell. Put a second full even layer of cement on the pipe O.D. Cement layers must be without void and sufficient to fill any gap in the joints.
- D. Immediately upon finishing cement application and before it starts to set, insert the pipe to the full socket depth while rotating the pipe or fitting a 1/4 turn to insure complete and even distribution of the cement. Hold joint together for a minimum of 10 to 15 seconds to make sure that pipe does not move or back out of the socket.
- E. For pipe sized 6" and larger, a joining crew consisting of two men is required and the following additional steps necessary:
 - 1. Rotation of the pipe in the fitting may be omitted.
 - 2. Hold joint together for 1 to 3 minutes depending on pipe size.
 - 3. As an aid for joining in these larger sizes, it is recommended that a come-along or pipe joining tool be used.
- F. Immediately, after joining and before joint is set, gently place it back onto a level surface, wipe off all excess cement from the circumferences of the pipe and fitting.
- G. When the atmospheric temperature is above 90 F to avoid excessive evaporation of the solvent from the cement just prior to joining use one or a combination of the following:
 - 1. Shade or shelter the joint surfaces from direct exposure to the sun's rays for at least one hour prior to joining and during the joining process.
 - 2. Make cement joints during early morning hours.
 - 3. Apply cement quickly. On 6" and larger pipe, it is recommended that two men apply cement to pipe surface while the third applies it to the fitting socket.
 - 4. Join pipe to fittings as quickly as possible after applying cement.
- H. All potable water pipes, pipe related products, and materials that join or seal pipes conform to ANSI/NSF 61.
- I. All solvent cements and primers used to join and seal PVC materials shall comply with the requirements of ANSI/NSF 14.

3.07 PIPE SUPPORTS

- A. Refer to Section 20 05 29: Hangers and Support Devices

3.08 ORDINARY CLEANING

- A. Before cleaning a system such items as safety valves, level controls, orifice plates, strainers, rupture discs, all instruments not tagged or marked with a test pressure and all other items which may be damaged by the cleaning-flushing operation, shall be removed from the line.
- B. Prior to testing all piping systems shall be cleaned and purged to the satisfaction of the Architect. The purge point for liquid and gas piping systems shall be lowest and highest points respectively in the system unless otherwise specified. The Contractor shall exercise due care

in filling, flushing, purging, venting and draining piping systems. The Contractor shall be responsible for damage resulting from excess vacuums when draining piping systems.

- C. All piping systems shall first be purged with compressed air at a pressure not greater than half of the system operating pressure. Purge duration shall continue until there is no visible discharges from openings or 10 minutes, whichever is greater.
- D. All piping systems shall secondly be purged with the flow medium of the system. Flushing shall continue for 5 minutes or until the discharge is free of particulate matter, whichever is greater.

3.09 TESTING

- E. The contractor shall furnish all test gauges, accurate relief valves to prevent over test-pressuring, the test medium, piping of the test medium, and where required, the necessary pumping device to develop and maintain the proper test pressure. Test gauges shall be supplied by the contractor and shall have dial diameters of at least 6 inches with scale capacity for test pressures. The gauge used on any test shall have a scale capacity of as close as possible to twice the specified test pressure using standard dials. All test gauges shall be checked on a dead-weight tester or shall be compared against a certified master gauge.
- F. The Contractor shall be responsible for the removal of water used in testing from all piping systems including attached vessels. Where ditches or temporary lines to ditches are necessary, the Contractor shall provide same, and after use, such ditches or lines shall be removed, leaving the area in its original or equal condition as determined by the Engineer.
- G. During hydrostatic testing, provision shall be made for the venting of trapped air at all high points and other places in the system where air pockets may occur.
- H. A safety or relief valve may be used at the pressure source to protect systems under test. Pressure applied on any system shall not exceed the specified test pressure by any amount and any damage resulting from neglect of this requirement shall be the responsibility of the Contractor.
- I. All the piping of the plumbing system shall be tested with water or air. After the plumbing fixtures have been set and their traps filled with water, the entire drainage system shall be submitted to final tests. The pressure has reached all parts of the system.
- J. The water test for the plumbing system shall be applied to the drainage system either in its entirety or in sections. If applied to the entire system, all openings in the piping shall be tightly closed, except the highest openings and the system filled with water to point of overflow. If the system is tested in sections, each opening shall be tightly plugged except the highest openings of the section under test, and each section be filled with water, but no section shall be tested with less than a ten foot head of water. In testing successive sections at least the upper ten feet of the next preceding section shall be tested, so that no joint or pipe in the building (except the uppermost 10 feet of the system) shall have been submitted to a test of less than a ten foot head of water. The water shall be kept in the system, or in the portion under test for at least fifteen minutes before inspection starts; the system shall then be tight at all points.
- K. The air test for the plumbing system shall be made by attaching an air compressor or testing apparatus to any suitable opening and after closing all other inlets and outlets to the system, forcing air into the system until there is a uniform gauge pressure of five pounds per square inch or sufficient to balance a column of mercury ten inches in height. This pressure shall be held without introduction of additional air for a period of at least fifteen minutes.
- L. The potable water system in its entirety or sections shall be tested in strict provisions of the International Plumbing Code, Current Edition.
- M. SMOKE TEST - Contractor to smoke test all sewer vent piping prior to wall being closed up. For all CMU block walls smoke test to be performed when walls are 50% formed up.
 - 1. When smoke testing a sanitary sewer system it is helpful to partially block off the section of sewer to be tested from the city main service line. This can be done by using a pneumatic sewer plug or rubber balloon for sealing off the building connections from main lines. Completely blocking the line can cause water to back up and prevent smoke from

escaping through defects. Smoke testing may not be done after rain or when ground water is unusually high as this may also prevent detection of defects.

2. Smoke is created using either a smoke bomb or liquid smoke. Smoke bombs are lit and placed on a grate or in a holder on top of each fan, while liquid smoke is injected into the fan via a heating chamber. The fans create a pressure differential that forces the smoke into the sewer at a pressure just above atmospheric. With properly installed plumbing, the traps will prevent the smoke from entering the building and redirect it out the plumbing vents. Defective plumbing systems or dry traps will allow smoke to enter the inside of the building.
3. The area around the section being tested is searched for smoke plumes. Plumes coming from plumbing vents or the interface between the fan shroud and cleanout rim are normal; however, smoke plumes outside of the cleanout rim are not. Plumes are marked, usually with flags, and defects are noted using measurements from stationary landmarks like the corners of the building. The plumes or markers may also be photographed.
4. Procedure: Equipment Required for building connections and laterals:
 - a. Smoke bomb cartridges
 - b. Electric blower producing 180 CFM @ 1.3 static pressure is recommended.
 - c. Pneumatic sewer plug or rubber balloon for sealing off the building connections from main lines.
 - d. Vent cap with open center hole to restrict the flow of air and smoke.
5. Building Connections
 - a. It is not absolutely necessary to have the building line blocked off from the main, but doing so will increase test efficiency. In most cases there is a cleanout opening through which a plug or balloon can be inserted between the opening and the main, and then inflated. A length of windshield hose or similar type tubing can be attached to the balloon to facilitate inflation. Vents can be partially blocked allowing the air/smoke mixture to flow through the plumbing system.
 - b. Connect the blower to the line at a cleanout and start introducing the smoke through the intake side. NOTE: A properly sized blower is important. Use of a blower with lesser capacity will not generate sufficient pressure to disclose all faults in a line and a blower with too great a capacity may blow water from traps.
 - c. Check the interior of the building for smoke. Any smoke should be quickly ventilated by opening doors and windows. Notations should be made of leak locations. Next the yard should be checked for smoke and the location of any smoke marked for later correction of faults.
 - d. Smoke will leave no visible residue to damage interior of buildings. It is irritating to breathe, but any irritation will quickly disappear once exposure has ceased. Of course special precautions should be taken with persons having respiratory problems of any kind.
 - e. All buildings connected to the lines being tested should be checked for smoke. If a concentration of smoke is present, occupants should be evacuated and the building ventilated. If unvented, smoke will settle out of the air without leaving residue.

END OF SECTION

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SECTION 20 0413 - ELECTRICAL PROVISIONS FOR MECHANICAL WORK

PART 1 GENERAL

1.01 SCOPE

- A. Extent of electrical provisions to be provided as mechanical work is indicated in other Division-23 sections, on drawings, and as further specified in this section.
- B. Types of work normally recognized as electrical but provided as mechanical, specified or partially specified in this section, include but are not necessarily limited to the following:
 - 1. Motors for mechanical equipment.
 - 2. Starters for motors of mechanical equipment.
- C. Refer to Division 23 sections for specific individual mechanical equipment.
- D. Refer to other Division 23 sections for specific individual mechanical equipment electrical requirements.
- E. Refer to Division 26 sections for junction boxes and disconnect switches required for motors and other electrical units of mechanical equipment.

1.02 QUALITY ASSURANCE

- A. Wherever possible, match elements of electrical provisions of mechanical work with similar elements of electrical work specified in Division 26 sections. Comply with applicable requirements of Division 26 sections for electrical work of this section which is not otherwise specified.
- B. For electrical equipment and products, comply with applicable NEMA standards, and refer to NEMA standards for definitions of terminology herein. Comply with National Electrical Code (NFPA 70) for workmanship and installation requirements.

1.03 SUBMITTALS

- A. Concurrently, with submittal of mechanical products listing submit separate listing showing rating, power characteristics, application and general location of every motor to be provided with mechanical work. Submit updated information promptly when and if initial data is revised.
- B. Coordination with electrical: Contractor to submit copy of any & all shop drawings that indicate electrical requirements to the project electrical engineer for electrical service & electrical load verification. Applicable to all mechanical items.

PART 2 PRODUCTS

2.01 GENERAL - DIVISION OF WORK

- A. In accordance with the general conditions, contractor is responsible for dividing the work among the subcontractors and suppliers and for delineating the work to be performed by specific trades. The following are suggestions as to how the work may be divided. It is the responsibility of the contractor to ensure a complete and working system. This is not a complete list of all the work:
 - 1. GENERAL: The Mechanical Contractor shall furnish to the Electrical Contractor for installation, all the motors, motor starters, start-stop switches, pilot lights, etc., for each piece of motor driven equipment unless shown otherwise.
 - 2. The Electrical Contractor shall install all motor starters, start-stop switches and pilot lights as furnished by the Mechanical Contractor. The Electrical Contractor shall also do all power wiring, and electrical termination's required for the installation of such mechanical equipment. Control Contractor shall be responsible for providing all control wiring.
 - 3. The Electrical Contractor shall furnish and install all equipment interlocking power wiring and the control contractor shall be responsible for installing control wiring as described in the control section. The Mechanical & General Contractor shall be responsible for coordinating and checking out all work to provide a complete system in working order, coordination to occur prior to bid.
 - 4. All electrical equipment shall have the UL label and shall meet the standards of the National Electrical Code and NEMA Rated, I.E.C. is not acceptable.

- A. Motors shall be provided to meet the requirements of the driven equipment. Motors shall be selected to be non-overloading and capable of normal scheduled operation without operating in the service factor range. Unless required otherwise, three phase motors shall be squirrel-cage induction type, with copper windings, designed for a 40 C rise from 40 C ambient, have minimum Class B insulation and unless required otherwise, have NEMA design B normal starting torque. Motors are to be open drip-proof for indoor applications and totally enclosed fan cooled for outdoor or wet applications.
1. Provide shaft grounding rings for all motors that are to be used with variable frequency drives.
- B. All motors shall be high power factor, premium energy efficient type with a minimum 1.15 service factor and minimum 0.85 full load power factor. Motor efficient shall meet or exceed that values listed in the attached table when tested in accordance with NEMA test standards MG112.53a, IEE Test Procedure 112, Method B, using accuracy improved by segregated loss measurements
- C. Motors controlled by VFD's shall comply with NEMA MG1, Part 31, Definite Purpose Inverter Fed Motors. (Withstand repeated voltage peaks of 1600V with rise times of 0.1 microseconds and greater).
- D. Starters for single phase motors which are not automatically started shall be manual type with melting alloy thermal overload protection and pilot light. Starters for automatically controlled single phase motors shall be magnetic type with NEMA rated AC magnetic contractor, melting alloy thermal overloads and pilot light.
- E. Starters for three phase motors 15 horsepower and below shall be combination type starter/disconnect, full voltage non reversing (FVNR), with magnetic NEMA rated contractors rated for horsepower of motor served, adjustable trip magnetic circuit breaker disconnect (motor circuit protector) capable of being padlocked in the open position, 10K AIC minimum fault rating with higher rating when necessary, due to available fault levels. Starters shall have a fused 100VA minimum control transformer (120V, unless required otherwise), HOA switch, push to test operating pilot light, solid state overload relays set for actual motor nameplate full load amps, phase failure and phase reversal protection relay, minimum two N.O. and two N.C. auxiliary contacts and terminal blocks factory prewired for field wiring. Starter shall be housed in a NEMA 1 enclosure for indoor locations and NEMA 3R enclosure for outdoor or wet locations.
- F. Starters for motors 20 horsepower and above shall be soft start type or variable frequency drives.

Motor Efficiency at full load

HP	Nominal	Nominal	Nominal
1	82.5	82.5	80.0
1 ½	84.0	84.0	87.5
2	84.0	84.0	87.5
3	86.5	90.2	89.5
5	89.5	89.5	89.5
7 ½	89.5	91.7	91.7
10	90.2	91.7	91.7
15	91.0	93.0	92.4
20	92.4	93.6	92.4
25	93.0	94.1	93.6
30	93.6	94.1	93.6
40	93.6	94.5	94.1
50	93.0	94.5	94.1
60	93.6	95.4	95.0
75	94.5	95.4	95.9
100	94.5	96.2	95.4
125	95.0	95.4	95.4

150	94.5	96.2	95.8
200	95.0	96.2	95.4

2.03 SOFT START STARTERS

- A. Refer to 23 04 14 MOTOR STARTERS Specification.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install motors on motor mounting systems in accordance with motor manufacturer's instructions, securely anchored to resist torque, drive thrusts, and other external forces inherent in mechanical work. Secure sheaves and other drive units to motor shafts with keys and Allen set screws, except motors of 1/3 HP and less may be secured with Allen set screws on flat surface of shaft. Unless otherwise indicated, set motor shafts parallel with machine shafts.
- B. Deliver starters and wiring devices which have not been factory-in-stalled on equipment unit to electrical Installer for installation.
- C. Install power and control connections for motors to comply with NEC and applicable provisions of Division 26 sections. Install grounding where non-grounded isolation of motor is indicated.

END OF SECTION

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SECTION 20 05 29 - HANGERS AND SUPPORT DEVICES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this section.

1.2 SUMMARY

- A. Work Included
 - 1. Hangers and supporting devices for all mechanical piping.

1.3 SUBMITTALS

- A. General: All submittals comply with the requirements of Division 20 Section 200100 - GENERAL PROVISIONS
- B. Product Data: Data shall be submitted on the following items:
 - 1. Hangers and supporting devices to be used.

PART 2 - PRODUCTS

2.1 GENERAL

- A. Provide all hangers and rods, turnbuckles, angles, channels and other structural supports to support the piping systems.
- B. Pipe hangers, hanger rods, trapeze type hangers, upper attachments and other supports shall be selected based on pipe size (plus insulation of pipes specified to be insulated) and the weight of the medium being transported or the medium used for testing, whichever is heavier. For sprinkler piping, in addition to the pipe and water, allow a minimum of 250 pounds applied at the point of hanging.
- C. Rods for pipe hangers shall be carbon steel. Rod size shall be:

Pipe Size	Standard Hanger Rod Diameter

½" - 2"	3/8"
2 ½" - 3"	½"
4" - 5"	5/8"
6"	¾"
8" - 12"	7/8"
14" - 16"	1"
18"	1 1/8"
20" & larger	1 1/4"

- D. All ferrous metal pipe hangers, except copper plated hangers, and concrete inserts shall be provided with a factory-applied coat of rust inhibiting paint.
- E. Pipe hangers for suspending the following horizontal non-insulated piping shall be sized to fit directly around the pipe and protective shield.
 - 1. Sanitary Sewer & Vent Piping.
 - 2. Natural Gas Piping.
- F. Pipe hangers for suspending the following horizontal insulated piping shall be sized to fit around the pipe, pipe insulation and pipe insulation protective shields:
 - 1. Refrigerant suction piping.

2. Condensate drain piping from HVAC units.
 3. Waste piping from drinking fountains.
 4. Waste piping receiving condensate from HVAC units.
 5. Domestic cold water piping.
 6. Domestic hot water and hot water circulating piping.
- G. Pipe hangers for suspending the following horizontal insulated piping shall be sized to fit around the pipe, pipe insulation and pipe insulation protective saddle:
1. Not used.
- H. All supporting equipment with the exception of springs in spring isolation hangers shall be designed with a minimum factor of safety of five based on the ultimate tensile strength of the material.

2.2 PIPE SUPPORTS FOR SUSPENDED HORIZONTAL PIPING

SYSTEM	PIPE MATERIAL	PIPE SIZE	HANGER NUMBER
Natural Gas	Steel	All Sizes	I
Domestic Cold & Hot Water	Copper	All Sizes	IV
Soil, Waste, & Vent	PVC	All Sizes	V
Soil, Waste, & Vent	Cast Iron	All Sizes	I
Refrigerant (Insulated)	Copper	All Sizes	IV
Refrigerant (Uninstalled)	Copper	All Sizes	IV
Miscellaneous Drains	Steel	All Sizes	I
	Copper	All Sizes	IV
Condensate Drains	Copper	All Sizes	IV
Relief Valve Discharge	Copper	All Sizes	IV

- A. Hanger numbers listed in schedule above shall be the following types:
1. Hanger Number I: Clevis hanger, steel.
 2. Hanger Number II: Adjustable split ring hanger, malleable iron.
 3. Hanger Number III: Adjustable swivel clevis roller hanger with black cast iron roller and carbon steel yoke and cross bolt.
 4. Hanger Number IV: Clevis hanger, copper plated steel.
 5. Hanger Number V: Clevis hanger, plastic coated steel.
 6. Hanger Number VI: Adjustable band hanger, steel.

- B. Hanger numbers listed above shall be:

HANGER NUMBER	ELCEN	CARPENTER & PATERSON	ITT GRINNELL	B-LINE SYSTEMS	MICHIGAN HANGER CO.
I	12	100	260	83100	400
II	--	240	104	-----	111
III	14x	16	---	83111	612
IV	312	100CT	CT-65	83104CT	402
V	---	100 PVC	---	83100C	420
VI	89	800	70	83170	100

- C. Upper Attachments:

1. Steel Construction
 - a. For suspending pipes from steel beams, upper attachments shall be beam clamps and shall be:
 - Michigan Hanger Co. No. 364
 - B-Line System Fig. 83055
 - Carpenter & Patterson Fig. 268
 - b. For suspending joints from bottom chord of steel bar joists, upper attachments shall be C-clamps with retaining clips and shall be:
 - ITT Grinnell Fig. 87
 - B-Line Systems Figs. 8351, 83362, and 83363
 - c. For suspending pipes from the top chord of steel bar joists, upper attachments shall be top-of-beam C-clamps and shall be:
 - B-Line Systems Fig. 83034
 - ITT Grinnell Fig. 62
 - Elcen No. 236L
 - Carpenter & Paterson Fig. 192
2. Concrete Construction
 - a. New Construction
 1. For suspending pipe in concrete construction, upper attachments shall be adjustable type concrete inserts. Where weight to be supported by an insert is 300 lbs. or more, install two No. 3 steel reinforcing bars, each 3 ft. long, through the yoke of the insert. Concrete inserts shall be:
 - ITT Grinnell Fig. 281
 - B-Line Systems Fig. 82500
 - Michigan Hanger Co. No. 355
 - Elcen No. 86
 - Carpenter & Paterson Fig. 75
 - b. Existing Construction
 1. For suspending pipes in concrete construction, upper attachments shall be electro-galvanized concrete anchors. Anchors shall be flush-mount, threaded, self-drilling, snap-off type. Anchors shall be:
 - Michigan Hanger Co. No. 345-S
 - Carpenter & Paterson Fig. 512
 - Elcen No. 212
 - Phillips "Red Head" Snap-off End Fastener

2.3 PIPE SUPPORTS FOR FLOOR SUPPORTED HORIZONTAL PIPING

A. General

1. Pipe supports for horizontal piping supported on concrete floors and on

concrete bases shall be adjustable pipe saddle support with U-bolt and screwed floor flange. Bolt floor flange to floor and bases utilizing all bolt holes. Adjustable pipe saddle supports shall be steel and shall be:

- B-Line Systems Fig. 83090
 - Carpenter & Paterson Fig. 125
 - Elcen No. 49
2. Pipe supports for horizontal piping in trench below floor level shall be adjustable pipe roller stands. Base shall be bolted to the trench floor utilizing all bolt holes. Adjustable pipe roller stands shall be steel and cast iron and shall be:
- B-Line Systems Fig. 83118
 - Carpenter & Paterson Fig. 40
 - Elcen No. 20
 - ITT Grinnell Fig. 274
 - Michigan Hanger Co. No. 619

2.4 PIPE SUPPORTS FOR VERTICAL PIPING

- A. Supports for vertical piping shall be riser clamps sized to fit directly around the pipe.
1. Riser clamps shall be steel and shall be:
- B-Line Systems Fig. B3373
 - Carpenter & Patterson Fig. 126
 - Elcen No. 39
 - ITT Grinnell Fig. 261
 - Michigan Hanger Co. No. 510
2. Offset pipe clamps shall be steel and shall be:
- B-Line Systems Fig. B3148
 - Carpenter & Paterson Fig. 179
 - Elcen No. 44
 - Michigan Hanger Co. No. 700
3. Clamps for copper tubing shall be copper plated.

2.5 PIPE INSULATION PROTECTIVE SHIELDS AND SADDLES FOR HORIZONTAL PIPING

- A. Shields shall be galvanized sheet metal type. Shields shall be 180 degrees type at all pipe hangers, except on trapeze hangers, pipe rack and on floor supported horizontal pipe shields shall be 360 degrees type. Shields sizes shall be:

<i>Pipes 2 in and smaller - -</i>	<i>18 gage x 12" long</i>
<i>Pipes 2 ½ in. thru 6" - -</i>	<i>16 gage x 18" long</i>
<i>Pipes 8 in. and longer - -</i>	<i>14 gage x 24" long</i>

- B. Saddles shall be steel and shall be:

<u>INSULATION THICKNESS</u>	<u>ELCEN</u>	<u>CARPENTER & PATERSON</u>	<u>ITT GRINNELL</u>	<u>B-LINE SYSTEMS</u>	<u>MICHIGAN HANGER CO</u>
1"	251	351	160	B3160	630
1 ½"	252	352	161	B3161	631
2"	253	353	162	B3162	632

2 ½ "	254	354	163	B3163	633
3"	255	355	164	B3164	634
4"	256	356	165	B3165	635

2.6 FACTORY - FABRICATED FRAMING CHANNELS AND FITTINGS

- A. Factory fabricated framing channels and fittings shall be used for:
1. Constructing pipe racks for supporting multiple horizontal pipes where indicated on the drawings.
 2. Constructing trapeze type hangers for suspending multiple horizontal pipes where indicated on the drawings.
 3. Securing vertical exposed water service drops for hose bibbs and wall hydrants.
 4. Securing vertical exposed compressed air service drops for compressed air outlets.
 5. Securing vertical exposed gas service drops for gas outlets and equipment.
- B. Framing channels and fittings shall be provided with factory applied baked enamel finish.
- C. Galvanized pipe clamps, including bolts and nuts, shall be provided with the framing channels and shall be used for securing pipes to channels, except pipe roller type supports shall be provided for pipes 2 ½ inches and larger for hot water heating, pipe roller supports shall include rollers, ½ inch diameter axle, nuts and angle brackets. Pipe clamps on insulated pipes shall fit around pipe, pipe insulation and pipe insulation protection shield. Pipe roller supports on insulated pipes shall be sized to fit around pipe saddles.
- D. Framing channels and fittings shall be:
- Michigan O-Strut System
 - B-Line Systems B-Line's Strut System
 - Unistrut Metal Framing System

2.7 DIELECTRIC ADAPTERS/SEPARATORS

- A. Dielectric adapters/separators shall be provided between copper and iron pipe connections and between ferrous and non-ferrous piping or equipment or between dissimilar metals.

PART 3 EXECUTION

3.1 HORIZONTAL PIPE SUPPORT INSTALLATION

- A. Spacing of hangers and supports shall be as follows:
1. Cast iron pipe shall be supported at not more than four (4) feet intervals and near each hub or coupling & at base of all risers. PVC soil pipe shall be supported at not more than four (4) feet intervals and near each hub or coupling & at base of all risers.
 2. Copper Tubing:

<i>Sizes ½" thru 1-½":</i> <i>Sizes 2" & Larger:</i>	<i>Piping supported from structural member of structure shall be at each member or 4'0" on centers, all sizes.</i> <i>Piping supported from structural member of structure shall be at each member or 4'0" on centers, all sizes.</i>

3. Steel Pipe:

All Sizes: Any piping supported from structural member of structure shall be at each member or 4'0" on centers, all sizes.

- B. Additional hangers shall be provided adjacent to all valves and fittings size 8" and larger.
- C. Intermediate pipe supports shall be provided between building structural members so as not to exceed maximum support spacing hereinbefore specified.
 - 1. In filler type concrete construction, intermediate angle supports shall be fastened to concrete joists or beams. In no case shall angle supports be fastened in floor slabs or in roof slabs. Intermediate supports shall be fastened to concrete slabs. Intermediate supports shall be fastened to concrete with concrete inserts or concrete anchors.
 - 2. In steel construction, intermediate supports shall be welded to steel beams and to steel joists. In no case shall supports be attached to roof purlins, roof decks, or permanent metal forms.
 - 3. In steel construction, install additional supports as recommended by Structural Engineer due to loading capacity of structure.

3.2 UNDERGROUND PIPING

- A. Piping underground shall be laid on a firm bed of minimum 6" pea gravel for its entire length, provide minimum 6" cover of pea gravel. Refer to pipe trench detail.
 - 1. Figure in bid backfilling with pea gravel. Should pipe manufacturer recommend river sand in lieu of pea gravel, then the contractor shall comply with the manufacturer's recommended installation guidelines and provide a credit back to the owner.

3.3 VERTICAL PIPE SUPPORT INSTALLATION

- A. Supports for all pipes shall fit directly around the pipe. On insulated pipes, the support shall be insulated and provided with vapor barrier as specified for pipe insulation .
- B. Vertical pipes passing through floors shall be provided with a riser clamp at each floor. Riser clamps shall have steel lugs, 1/4" thick x 2" high x 1 1/2" long, welded to the clamp arms so that clamp does not come in contact with the pipe sleeve; the lugs shall support the clamp from the floor.
- C. Where distance between floors is 15 ft. or more, in addition to the riser clamps, vertical pipes shall be provided with offset pipe clamps anchored to walls at the approximate midpoint between floors.
- D. Exposed to sight vertical service drops to hose bibbs, and wall hydrants, and misc. outlets shall be supported with not less than two equally spaced sections of factory-fabricated framing channel with standard pipe clamps. Channel section shall be 8" long and shall be fastened to wall with not less than two spring wing toggle bolts.
- E. Copper tubing supported by channel framing shall be provided with a lead sleeve to isolate the pipe from the framing channel and the pipe clamp.
- F. Contractor to provide pipe supports for all domestic cold/hot water piping drops within walls to fixtures/equipment. Pipe clamp to be Anvil CT-138R copper plated split tubing clamp, provide 3/8" threaded rod as required to nearest wall framing member, provide 3/8" female threaded rod zinc-plated baseplate (Anvil 128R) fastened to wall framing member. Provide a minimum of one (1) support assembly at each drop in addition to copper plated Holdrite system.

3.4 CONCRETE INSERTS AND ANCHORS

- A. In filler type concrete construction, inserts and anchors shall be installed in joists or beams only. Install inserts in sides of joists or beams.
- B. In framed type concrete construction, inserts and anchors shall be installed for all piping.

3.5 SHIELD AND SADDLE INSTALLATION

- A. Shields shall be installed at all pipe hangers in horizontal insulated piping, as noted in section 2.1,F above.
- B. Not used.

3.6 EXTERIOR PIPE SUPPORT COATINGS

- A. All exterior pipe supports are to receive a brush painted, 2 layers, cold zinc galvanizing paint for exterior use.

END OF SECTION

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SECTION 20 0548 - VIBRATION ISOLATION FOR MECHANICAL SYSTEMS

PART 1 GENERAL

1.01 GENERAL

- A. Drawings and general provisions of the contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this section.

1.02 SUMMARY

- A. Work Included:
 - 1. Isolation Pads
 - 2. Spring Isolators
 - 3. Spring Hangers

1.03 SUBMITTALS

- A. General: All submittals shall comply with the requirements of Division 1 - GENERAL REQUIREMENTS and Section 20 01 00 - General Provisions.
- B. Product Data: Data shall be submitted on the following items:
 - 1. Spring Hangers
 - 2. Vibration Isolators

PART 2 PRODUCTS

2.01 SOLE SOURCE

- A. All isolators and bases shall be from same manufacturer.

2.02 DEFLECTION

- A. All spring isolators shall have 1" min. deflection unless otherwise specified.

2.03 TYPE I ISOLATORS

- A. Type I Isolators shall be neoprene waffle embossed pads with crossed double ribs. A steel shim plate shall be provided between the two layers. Pads shall be molded using oil resistant 25,000 PSI tensile strength neoprene. Pads shall be:

Kinetics Noise Control	NPD Series
Amber Booth	NP-NR Series
Mason Industries	WMW Series

2.04 TYPE II ISOLATORS

- A. Type II Isolators shall be double deflection neoprene type designed for loading in both shear and compression. Isolator shall be one piece molded assembly with ribbed base plate and top. Isolators shall be:

Kinetics Noise Control	RD Series
Amber Booth	NRV Series

2.05 TYPE III ISOLATORS

- A. Type III Isolators shall be free-standing, un-housed, laterally stable steel springs incorporating leveling bolts and 1/4" thick ribbed neoprene isolation pads. The spring shall have a lateral spring stiffness, and shall be designed to provide 50% overload capacity over 5000 lbs. Springs shall be welded to the top and bottom load plate assemblies. Isolators shall be:

Kinetics Noise Control	FDS Series
Amber Booth	SW Series
Mason Industries	SLFH Series

2.06 TYPE IV ISOLATORS

- A. Type IV Isolators shall be vertically restrained steel springs incorporating leveling bolts, 1/4" thick ribbed noise isolation pads, and steel housing. Springs shall be designed to provide 50% overload capacity over 5000 lbs. Springs shall be welded to the top and bottom load plates assemblies. Assembly for outdoor installation shall be hot dipped galvanized after fabrication. Isolators shall be:

Kinetics Noise Control	FLS Series
Amber Booth	CT Series
Mason Industries	SLR Series

2.07 TYPE V ISOLATORS

- A. Type V Isolators shall be combination spring and neoprene hangers, incorporating double deflection neoprene noise and vibration pads in series with the springs, all encased in welded steel brackets. Springs shall be designed for 50% overload capacity, and shall accommodate rod misalignment over a 30 degree arc. Brackets shall be designed to carry 50% overload without failure. Isolators shall be:

Kinetics Noise Control	SRH Series
Amber Booth	BSR Series
Mason Industries	DNSH Series

PART 3 EXECUTION

3.01 INSTALLATION

- A. All isolation products shall be installed in accordance with the manufacturer's installation instructions.
- B. All spring-mounted equipment shall be leveled.
- C. Type II isolators shall be bolted to the floor or base and to the equipment or equipment base.
- D. Type III isolators shall be bolted to the floor or base and to the equipment and base.
- E. Type IV isolators shall have the bottom plate bolted to the structure and the top plate tack welded to the equipment rails in four places.
- F. Type V isolators shall have jam nuts on the top and bottom rods to prevent movement of nuts.
- G. Type VI thrust restraint shall have angle brackets welded or bolted to equipment, duct or structure, as applicable.
- H. Type VII and VIII bases shall be bolted to the equipment.

3.02 ISOLATION SCHEDULE

A. Isolators and bases shall be installed on equipment and piping as indicated on schedule below:

ITEM	ISOLATOR	BASE	NOTES	MIN. DEFLECT.
GAS FURNACES	I	----	2	
FAN	V	----	----	0.75 IN.
WATER HEATERS	I	----	----	
CONDENSING UNITS	I	----	----	

B. Schedule Notes:

1. Provide additional vibration isolators as recommended by equipment manufacturers.
2. Provide at all corners and every 12" around perimeter of gas furnace.

END OF SECTION

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SECTION 20 05 53 - IDENTIFICATION OF PIPING, VALVES AND EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this section.

1.2 SUMMARY

- A. Work Included:
 - 1. Valve Tags
 - 2. Pipe Bands
 - 3. Equipment Labels

1.3 SUBMITTALS

- A. General: All submittals shall comply with the requirements of Division 1 - *GENERAL REQUIREMENTS*, AND Section 200100- *GENERAL PROVISIONS*.
- B. Product Data: Data shall be submitted on the following items:
 - 1. Valve Tags
 - 2. Pipe Bands

1.4 QUALITY ASSURANCE

- A. Standards:
 - 1. American National Standards Institute (ANSI):
 - a. Standard A13.1, The Scheme for Identification of Piping Systems, 1981 Edition.

PART 2 - PRODUCTS

2.1 GENERAL

- A. Pipe identification shall comply with ANSI A13.1.

2.2 VALVE TAGS

- A. Valve tags shall be 18 gauge (minimum) brass with 1 1/4" (minimum) height and width. Identification letters and numbers shall be stamped in tag and shall be filled with black enamel paint. Valve tags shall be:

Emedco	CB/W Series
Seton	Valve Tags
Brady	Valve Tags

- B. Valve tag shape and designations shall be as indicated in Table I, hereinafter.

2.3 PIPE BANDS

- A. Pipe identification bands shall be snap-on type with clear polyester exterior surface. Bands shall be of size, color and background as outlined in Table II and III, hereinafter, with directional flow arrows and legends. Identification bands on pipe or coverings 5 1/2" or less in diameter shall have stainless steel spring fasteners. Pipe identification bands shall be:

Seton / Setmark	SNA / STR
Series Brady	Snap-on Series

- B. Contractor has option to use Seton Custom Opti-Code Self-Adhesive Pipe Markers in lieu of snap on labels, Seton style M4154. Secure with additional cable tie (minimum two (2) per label).

2.4 EQUIPMENT LABELS / TAGS

- A. Plastic Tags: Laminated three-layer plastic with engraved white letters on black contrasting background color. Tag size minimum 1 ½ inch (40 mm) wide, length as required, with lettering minimum 3/4" tall.

2.5 TAPE

- A. Identification tape shall be vinyl pressure sensitive type with adhesive backing. Tape width shall be a minimum of 2". Tape shall be color to match pipe identification band background. Tape shall be:

Emedco	T100 Series
Seton	PST Series
Brady	Tape

2.6 CABLE TIES

- A. Cable ties for valve tag attached shall be self-locking nylon ties. Cable ties shall be:

Thomas & Betts	Ty-Rap-Nylon
Ideal	Double Lock Cable (Plain Head)
Efcor	Sure-Ty Self-Locking Cable Ties

2.7 VALVE CHART

- A. Valve chart shall be typed listing of all valve tags. List shall include identification number, valve location in system (e.g., water heater, chilled water pump, etc.) And its function (e.g., shut-off, balancing, drain, etc.). Chart shall be mounted in a wooden frame with glass cover. Chart shall be mounted where shown on the drawings.

2.8 IDENTIFICATION

- A. Valve tags shall be installed at all shut-off, balancing, metering, and drain valves in the following systems:

TABLE 1 - VALVE TAGS

<u>SYSTEM</u>	<u>SHAPE</u>	<u>IDENTIFICATION NUMBER</u>
Natural Gas	Octagonal	NG - 1, 2, 3, ...
Domestic Cold Water	Hexagonal	CW - 1, 2, 3, ...
Domestic Hot Water	Hexagonal	HW - 1, 2, 3, ...
Domestic Hot Water Circulation	Hexagonal	HWC - 1, 2, 3, ...
Domestic Tempered Water	Hexagonal	TW - 1, 2, 3, ...
Domestic 110°F Hot Water	Hexagonal	110 - 1, 2, 3, ...
Domestic 140°F Hot Water	Hexagonal	140 - 1, 2, 3, ...

- B. Pipe identification shall comply with ANSI A13.1 - 1981 Standard entitled "Scheme for Identification of Piping Systems." Pipe identification bands shall be installed on piping at each valve, each piece of equipment, each change of direction, wall penetration, each branch take-off, and at a maximum spacing of 15 feet on exposed straight run piping. Pipe bands shall be installed on systems indicated below. Install on all piping exposed in mechanical rooms & above all ceiling, all piping to receive labels & directional flows arrows.

TABLE II - BAND AND LETTER SIZE

<u>PIPE OR PIPE COVERING</u>	<u>WIDTH OF BAND</u>	<u>LETTER & NUMBER SIZE</u>

<u>DIAMETER (inches)</u>	<u>(Inches)</u>	<u>(inches)</u>
3/4 to 1 1/4	8	1/2
1 1/2 to 2	8	3/4
2 1/2 to 6	12	1 1/4
8 to 10	24	2 1/2
Over 10	32	3 1/2

TABLE III - BAND COLORING

<u>PIPE</u>	<u>BAND</u>	<u>LETTERING</u>	<u>LETTER COLORING</u>
Natural Gas (Inside Buildings)	Safety Yellow	NATURAL GAS	Black
Gas Valves on Interior to be painted	Meter Gray		
Natural Gas (Outside Building)	Meter Gray	NATURAL GAS	Black
Gas Valves on exterior to be painted	Safety Yellow		
Refrigerant Suction	Yellow	REF. SUCTION	Black
Refrigerant Liquid	Yellow	REF. LIQUID	Black
Domestic Cold Water	Green	DOM. COLD WATER	White
Domestic Hot Water	Yellow	DOM. HOT WATER	Black
Domestic Hot Water Circulation	Yellow	CIRCULATION WATER	Black
Domestic Tempered Water	Green	TEMPERED WATER	White
Domestic 110°F Water	Yellow	110°F - HOT WATER	Black
Domestic 140°F Water	Yellow	140°F - HOT WATER	Black

- B. Equipment identification labels with 2" high letters shall be installed on the following equipment:

TABLE IV - EQUIPMENT LABELS

<u>ITEM</u>	<u>BAND</u>	<u>LETTERING</u>	<u>LETTER COLORING</u>
Gas Furnace, Cooling Coils,	Yellow	See Equipment Schedules	Black
Domestic Hot Water Heaters, Pumps, Fans,			
Etc. & Misc. Mech/Plumbing Equipment.			

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Valve tags shall be attached to the handwheel with cable ties.
- B. Plastic pipe bands shall be wrapped around pipe or pipe covering under pressure so that no gaps or wrinkles occur. Bands on pipe or pipe covering 6" or smaller shall overlap and adhere to themselves. Bands on pipe or pipe covering larger than 6" shall be further secured at both ends with tape. Tape shall overlap and adhere to itself.
- C. Install plastic nameplates with corrosive-resistant mechanical fasteners, or adhesive. Apply with sufficient adhesive to ensure permanent adhesion and seal with clear lacquer.
- D. Install tags with corrosion resistant chain.
- E. Install plastic pipe markers in accordance with manufacturer's instructions.

- F. Install plastic tape pipe markers complete around pipe in accordance with manufacturer's instructions.
- G. Install underground plastic pipe markers 6 to 8 inches below finished grade, directly above buried pipe.
- H. Identify air handling units, pumps, heat transfer equipment, tanks, and water treatment devices with plastic nameplates. Small devices, such as in-line pumps, may be identified with tags.
- I. Identify control panels and major control components outside panels with plastic nameplates.
- J. Identify valves in main and branch piping with tags or numbered plastic nameplates.
- K. Identify piping, concealed or exposed, with plastic tape pipe markers. Identify service, flow direction, and pressure. Install in clear view and align with axis of piping. Locate identification not to exceed 15 feet on straight runs including risers and drops, adjacent to each valve and Tee, at each side of penetration of structure or enclosure, and at each obstruction.

3.2 PAINTING

- A. All surfaces requiring painting shall be left clean by the Mechanical Subcontractor. All painting shall be done by the General Contractor's painting Subcontractor. All exposed piping, grilles, or fans, in building or on roof will be painted. All insulated piping to be covered in color coated PVC Jackets, color to be determined by Owner. If owner has no preference, color to be same as band color in schedule. Paint pipe, equipment, hangers and accessories in Equipment Rooms including covering and foundations with two (2) coats of approved paint after thoroughly cleaning. Equipment having factory finish shall be touched up and given one (1) additional coat of machinery enamel color as selected. The above shall be done by the General Contractor. See Section PAINTING SECTION.
 - 1. Gas Piping will be painted using a high quality solvent based paint. Aervoe "Direct to Metal" or approved equal paint. For all gas pipes located outside of a building or in an area exposed to the general public, pipes, meters and regulators will be painted Meter Gray with Key Valves painted Safety Yellow. For mechanical rooms, above ceilings and other inaccessible areas, the pipe will be painted safety yellow and gas valves and regulators will be painted meter gray. The contractor may use the exterior gray color in gyms or other similar conditions where aesthetics is a concern, coordinate with architect prior to painting. All new and existing gas piping shall be painted.
- B. All piping throughout project (HVAC, Plumbing) shall be identified with pipe markers with directional arrows. The color code shall be as per Table III above. Labels should appear every 10'-0" and at all changes in direction.
- C. Provide color coded PVC jackets, piping labels, & directional flow arrows on all insulated piping (HVAC, Plumbing) whether exposed or concealed above ceiling space. All piping (entire piping system) to have color coded PVC jackets, piping labels, & directional flow arrows. PVC jacket color to match band color as specified in Table III within these specifications.

END OF SECTION

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SECTION 20 07 00 - PIPE INSULATION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Piping Insulation
- B. Jackets and Accessories

1.02 PRODUCTS FURNISHED BUT NOT INSTALLED UNDER THIS SECTION

- A. Section 20 05 29 - Hangers and Support Devices

1.03 RELATED SECTIONS

- A. Section 20 01 00 - General Provisions

1.04 REFERENCES

- A. ASTM B209 - Aluminum and Aluminum-Alloy Sheet and Plate.
- B. ASTM C177 - Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus.
- C. ASTM C195 - Mineral Fiber Thermal Insulation Cement.
- D. ASTM C335 - Steady-State Heat Transfer Properties of Horizontal Pipe Insulation.
- E. ASTM C449 - Mineral Fiber Hydraulic-setting Thermal Insulating and Finishing Cement.
- F. ASTM C518 - Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.
- G. ASTM C534 - Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form.
- H. ASTM C547 - Mineral Fiber Performed Pipe Insulation.
- I. ASTM C552 - Cellular Glass Block and Pipe Thermal Insulation.
- J. ASTM C578 - Preformed, Block Type Cellular Polystyrene Thermal Insulation.
- K. ASTM C585 - Inner and Outer Diameters of Rigid Thermal Insulation for Nominal Sizes of Pipe and Tubing.
- L. ASTM C591 - Rigid Preformed Cellular Urethane Thermal Insulation.
- M. ASTM C610 - Expanded Perlite Block and Pipe Thermal Insulation.
- N. ASTM C640 - Corkboard and cork Pipe Thermal Insulation.
- O. ASTM C921 - Properties of Jacketing Materials for Thermal Insulation.
- P. ASTM D1056 - Flexible Cellular Materials - Sponge or Expanded Rubber.
- Q. ASTM D1667 - Flexible Cellular Materials - Vinyl Chloride Polymers and Copolymers (Closed Cell Foam).
- R. ASTM D2842 - Water Absorption of Rigid Cellular Plastics.
- S. ASTM E84 - Surface Burning Characteristics of Building Materials.
- T. ASTM E96 - Water Vapor Transmission of Materials.
- U. NFPA 255 - Surface Burning Characteristics of Building Materials.
- V. UL 723 - Surface Burning Characteristics of Building Materials.

1.05 SUBMITTALS

- A. Submit under provisions of Section 01300.
- B. Product Data: Provide product description, list of materials and thickness for each service, and locations.
- C. Manufacturer's Installation Instructions: Indicate procedures which ensure acceptable workmanship and installation standards will be achieved.

1.06 QUALITY ASSURANCE

- A. Materials: Flame spread/smoke developed rating of 25/50 in accordance with ASTM E84, NFPA 255, and UL 723.

1.07 QUALIFICATIONS

- A. Applicator: Company specializing in performing the work of this section.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, protect, and handle products to site under provisions of Section 01600.
- B. Deliver materials to site in original factory packaging, labeled with manufacturer's identification, including product density and thickness.
- C. Store insulation in original wrapping and protect from weather and construction traffic.
- D. Protect insulation against dirt, water, chemical, and mechanical damage.

1.09 ENVIRONMENTAL REQUIREMENTS

- A. Maintain ambient temperatures and conditions required by manufacturers of adhesives, mastics, and insulation cement.
- B. Maintain temperature during and after installation for minimum period of 24 hours.

PART 2 PRODUCTS

2.01 GLASS FIBER

- A. Manufacturers:
 - 1. Knauf - ASJ - SSL
 - 2. Owen Corning 25 ASJ/SSL
- B. Insulation: ASTM C547; rigid molded, noncombustible.
 - 1. 'K' value: ASTM C335, 0.23 at 75 degrees F.
 - 2. Minimum Service Temperature: -20 degrees F.
 - 3. Maximum Service Temperature: 850 degrees F.
 - 4. Maximum Moisture Absorption: 0.2 percent by volume.
- C. Vapor Barrier Jacket:
 - 1. ASTM C921, white kraft paper reinforced with glass fiber yarn and bonded to aluminized film.
 - 2. Moisture Vapor Transmission: ASTM E96; 0.02 perm inches.
 - 3. Secure with self sealing longitudinal laps and butt strips.
 - 4. Secure with white vapor barrier tape and vapor barrier mastic.
 - 5. Provide bonds for identification per Section 15190 Requirements.
- D. Tire Wire: 16 gage stainless steel with twisted ends on maximum 12 inch centers.
- E. Indoor Vapor Barrier Finish
 - 1. Manufacturers:
 - a. Childers Model CP-30
 - b. Manville Model Insulkote
 - 2. Vinyl emulsion type acrylic, compatible with insulation, white color.
- F. Outdoor Vapor Barrier Mastic
 - 1. Manufacturers:
 - a. Childers Model CP-30
 - b. Manville Model Insulkote

2. Vinyl emulsion type acrylic, compatible with insulation, white color.

G. Fittings:

1. Mitered segments of insulation held in place with white vapor barrier tape and Zeston 25/50 PVC, knauf 25/50 rated PVC, pre-molded insulated fitting covers.

2.02 CELLULAR GLASS

A. Manufacturers:

1. Pittsburgh Model Foamglass
2. Corning Model Foamglass

B. Insulation: ASTM C552.

1. 'K' value: 0.40 at 75 degrees F.
2. Maximum Water Vapor Transmission: 0.1 perm.

C. Vapor Barrier Jacket: Similar to Glass Fiber.

D. All joints to be caulked and glued with a vapor barrier sealant as per manufacturer's recommendations.

2.03 POLYURETHANE FOAM

A. Insulation:

1. 'K' value: ASTM 518; 0.14 at 75 degrees F.
2. Minimum Service Temperature: -250 degrees F.
3. Maximum Service Temperature: 250 degrees F.
4. Maximum Moisture Absorption: ASTM D2842; 0.054 percent by volume.
5. Moisture Vapor Transmission: 1.26 perm inches.
6. Maximum Flame Spread: ASTM E84; 20.
7. Connection: Waterproof vapor barrier adhesive.

2.04 CELLULAR FOAM

A. Manufacturers:

1. Armstrong Armaflex 25/50.
2. Aerotube 25/50.

B. Insulation: ASTM C534; flexible, cellular elastomeric, molded or sheet.

1. 'K' value: ASTM C177 or C518; 0.27 at 75 degrees F.
2. Minimum Service Temperature: 0 degrees F.
3. Maximum Service Temperature: 220 degrees F.
4. Maximum Moisture Absorption: ASTM D1056; 1.0 percent (pipe) by volume, 1.0 percent (sheet) by volume.
5. Moisture Vapor Transmission: ASTM E96; 0.20 perm inches.
6. Maximum Flame Spread: ASTM E84; 25.
7. Maximum Smoke Developed: ASTM E84; 50.
8. Connection: Waterproof vapor barrier adhesive.

C. Elastomeric Foam Adhesive

1. Manufacturers:
 - a. Armstrong 520
 - b. Manville Elastomeric Adhesive
2. Air dried, contact adhesive, compatible with insulation.

2.05 JACKETS

- A. PVC Plastic
 - 1. Manufacturers:
 - a. Proto
 - b. Zeston
 - 2. Jacket: ASTM C921; One piece molded type fitting covers and sheet material. See color chart in Section 15190 for jacket colors.
 - a. Minimum Service Temperature: -20 degrees F.
 - b. Maximum Service Temperature: 140 degrees F.
 - c. Moisture Vapor Transmission: ASTM E96; 0.002 perm inches.
 - d. Maximum Flame Spread: ASTM E84; 25.
 - e. Maximum Smoke Developed: ASTM E84; 50.
 - f. Thickness: 30 mil.
 - g. Connections: Brush on welding adhesive.
 - h. Fitting covers with inserts supplied by the manufacturers.
 - 3. Covering Adhesive Mastic:
 - a. Manufactures:
 - 1. Proto PVC Glue.
 - 2. Zeston PVC Glue.
 - b. Compatible with insulation.
- B. Aluminum Jacket: ASTM B209.
 - 1. Thickness: 0.016 inch sheet.
 - 2. Finish: Smooth.
 - 3. Joining: Longitudinal slip joints and 2 inch laps.
 - 4. Fittings: .020 inch thick die shaped fitting covers with factory attached protective liner.
 - 5. Metal Jacket Bands: ½ inch; 0.015 inch thick aluminum.
- C. Stainless Steel Jacket: Type 304 stainless steel.
 - 1. Thickness: 0.010 inch.
 - 2. Finish: Smooth.
 - 3. Metal Jacket Bands: ½ inch wide; 0.010 inch thick stainless steel.

2.06 GLASS FIBER, FLEXIBLE

- A. Insulation: ASTM C553; flexible, noncombustible blanket.
 - 1. 'K' ("ksi") value: ASTM C518, 0.29 at 75 degrees F.
 - 2. Maximum service temperature: 250 degrees F.
 - 3. Maximum moisture absorption: 0.20 percent by volume.
 - 4. Density: 0.75 lb/cu ft.
- B. Vapor Barrier Jacket
 - 1. Kraft paper reinforced with glass fiber yarn and bonded to aluminized film.
 - 2. Moisture vapor transmission: ASTM E96; 0.04 perm.
 - 3. Secure with pressure sensitive tape.
- C. Vapor Barrier Tape

1. Kraft paper reinforced with glass fiber yarn and bonded to aluminized film, with pressure sensitive rubber based adhesive.

D. Tie Wire: Annealed steel, 16 gage.

2.07 APPROVED MANUFACTURERS

A. Johns Manville, Knauf, DOW, Owens Corning

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that piping has been tested before applying insulation materials.
- B. Verify that surfaces are clean, foreign material removed, and dry.

3.02 INSTALLATION

- A. Install materials in accordance with manufacturer's instructions.
- B. On exposed piping, locate insulation and cover seams in least visible locations.
- C. Insulated dual temperature pipes or cold pipes conveying fluids below ambient temperature.
 1. Provide vapor barrier jackets, factory applied or field application.
 2. Insulate fittings, joints, and valves with molded insulation of like material and thickness as adjacent pipe.
 3. Finish with glass cloth and vapor barrier adhesive.
 4. PVC fitting covers shall be used.
 5. Continue insulation through walls, sleeves, pipe hangers, and other pipe penetrations.
 6. Insulate entire system including fittings, valves, unions, flanges, strainers, flexible connections, pump bodies, and expansion joints.
- D. For insulated pipes conveying fluids above ambient temperature:
 1. Provide standard jackets, with or without vapor barrier, factory applied or field applied.
 2. Insulate fittings, joints, and valves with insulation of like material and thickness as adjoining pipe.
 3. Finish with glass cloth and adhesive.
 4. PVC fitting covers shall be used.
 5. For hot piping conveying fluids below 140 degrees F, do not insulate flanges and unions at equipment, but bevel and seal ends of insulation.
- E. Inserts and Shields:
 1. Application: All piping.
 2. Shields: Galvanized steel between pipe hangers or pipe hanger rolls and inserts.
 3. Insert Location: Between support shield and piping and under the finish jacket.
 4. Insert Configuration: Minimum 6 inches long, of same thickness and contour as adjoining insulation; may be factory fabricated.
 5. Insert Material: ASTM C640 cork or other heavy density insulating material suitable for the planned temperature range.
- F. Finish insulation at supports, protrusions, and interruptions.
- G. For pipe exposed in mechanical equipment rooms, garage, or in exposed finished spaces, finish with color coded PVC jacket and fitting covers. Color to be as indicated in Section 230553 - Identification of Piping, Valves and Equipment.

- H. For exterior applications, provide vapor barrier jacket. Insulate fittings, joints, and valves with insulation of like material and thickness as adjoining pipe, and finish with glass mesh reinforced vapor barrier cement. Cover with aluminum jacket with seams located on bottom side of horizontal piping.
- I. All HVAC & Plumbing piping to have PVC color coded jacket, typical entire piping system s throughout entire project.

3.03 TOLERANCE

- A. Substituted insulation materials shall provide thermal resistance within 10 percent at normal conditions, as materials indicated.

3.04 GLASS FIBER INSULATION SCHEDULE

<u>SYSTEMS</u>	<u>PIPE SIZE (inch)</u>	<u>THICKNESS (inch)</u>
1. Domestic Hot Water	½" thru 1-1/4"	1"
2. Domestic Hot Water	1-1/2" & Larger	1-1/2"
3. Domestic Cold Water	All	1"

Note: 1. All piping exterior to building (above grade, excluding refrigerant piping) shall be covered in 16 mil aluminum jacket with premolded aluminum fittings, no PVC (Zeston) fittings allowed.

2. All HVAC & Plumbing piping to have PVC color coded jacket, typical entire piping systems throughout entire project.

3.05 CELLULAR FOAM INSULATION SCHEDULE

<u>SYSTEMS</u>	<u>PIPE SIZE (inch)</u>	<u>THICKNESS (inch)</u>
1. Water Piping (exposed to weather)	½" - 4"	1"
2. Condensate Drain Lines	All Sizes	1"
3. Refrigerant Piping	All Sizes	1"

Note: 1. All piping exterior to building (above grade, excluding refrigerant piping) shall be covered in 16 mil aluminum jacket with premolded aluminum fittings, no PVC (Zeston) fittings allowed.

2. All insulated piping exterior to building to receive two (2) coats of Aerocel Aerocoat pure acrylic emulsion paint. Allow 4 hours drying time in between coat applications.

3. All HVAC & Plumbing piping to have PVC color coded jacket, typical entire piping systems throughout entire project.

3.06 LAVATORY P-TRAP AND SUPPLY LINES

- A. Insulate P-trap, tailpiece and water supplies on all lavatories with Truebro Model 102, Handi Lav-Guard, Bocar "Trap Wrap" or approved equivalent insulating system.
- B. All wall hung lavatory's are to come with Truebro Lav-Shield in lieu of Lav-Guard, no exception.

3.07 PIPE SUPPORTS

- A Contractor shall insulate down minimum 12" for all pipe supports in direct contact with HVAC water piping with same material and jacket as pipe insulation.

3.08 WASTE LINE P-TRAPS

- A. P-traps receiving HVAC condensate and associated horizontal waste lines shall be insulated with fiberglass ductwrap insulation with aluminum foil vapor barrier. Insulation shall be sealed at all seams and joints.

END OF SECTION

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SECTION 20 21 16 - PIPING SPECIALTIES

PART 1 GENERAL

1.01 GENERAL

- A. Drawings and general provisions of the contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this section.

1.02 SUMMARY

- A. Work Included:
 - 1. Piping specialties for plumbing systems.

1.03 SUBMITTALS

- A. General: All submittals shall comply with the requirements of Division 1 - GENERAL REQUIREMENTS and Section 20 01 00 - GENERAL PROVISIONS.
- B. Product Data: Data shall be submitted on the following items:
 - 1. Strainers
 - 2. Pressure Reducing Valves
 - 3. Air Vents
 - 4. Dielectric Adapters
 - 5. Thermometer and Test Wells
 - 6. Pressure Gauges and Gauge Cocks
 - 7. Expansion Tank

1.04 QUALITY ASSURANCE

- A. Standards
 - 1. American Society of Mechanical Engineers (ASME):
 - a. Boiler and Pressure Vessel Code, Section VIII - Unfired Pressure Vessels.
 - 2. American Society for Testing and Materials (ASTM):
 - a. Standard A53, Pipe, Steel, Black and Hot-Dipped Zinc-Coated, Welded and Seamless.
 - b. Standard A74, Cast Iron Soil Pipe and Fittings.

PART 2 PRODUCTS

2.01 STRAINERS

- A. All strainers, except those installed as integral part of equipment, shall be the product of a single manufacturer.
- B. Y-Type Strainers:
 - 1. Strainers 2 inches and smaller shall be iron-body with screwed end connections and screwed plug in blow-off. Strainers shall be rated for 400 pounds minimum and 250 pounds minimum SWP. Screens for water and steam service shall be 20 mesh model. Strainers shall be:

Keckley	Style B
Metraflex	Style S
Mueller	No. 11-FCB
Spirex Sarco	Type IT
 - 2. Strainers 2 1/2 inches and larger shall be iron-body with 125-pound flanged end connections for installation between 150-pound raised face slip-on weld flanges. Strainers shall be rated for 175-pound minimum WOG and 125-pound minimum SWP. Strainers shall have blow-down connection which shall be provided with full size gats valve.

Strainers shall be equipped with perforated baskets or perforated baskets lined with mesh screens. Strainer screens and baskets shall be stainless steel in accordance with the following:

<u>Size</u>	<u>Service</u>	<u>Perforation Diameter</u>
2-1/2", 3"	Water	.033"
	Air or Gas	.009"
4", 5"	Water	1/8"
	Air or Gas	.033"
6", 8"	Water	1/8"
	Air or Gas	3/64"
10", 12"	Water	1/4"

Strainers shall be:

Schade Davis	No. 78M
McAlear	No. 528-8
Keckley	Style D
Metra Flex	Series M1
Mueller	No. 751 to 12", No. 752 14" & larger
Spirex Sarco	Type C1-125

C. Basket Strainers: Not Used.

2.02 PRESSURE REDUCING VALVES

- A. Pressure reducing valves shall be field adjustable with outlet pressure set as specified hereinafter or as indicated on drawings.
- B. All internal parts subject to wear shall be replaceable without removing the pressure reducing valve from the piping.
- C. For Plumbing Systems

The Pressure Reducing Valve shall be certified to NSF/ANSI 372, consisting of a low lead bronze body and bronze bell housing, a separate access cover for the plunger and a bolt to adjust the downstream pressure. The bronze bell housing and access cap shall be threaded to the body and shall not require the use of ferrous screws. The assembly shall be of the balanced piston design and shall reduce pressure in both flow and no-flow conditions. The assembly shall be accessible for maintenance without having to remove the body from the line. The Pressure Reducing Valve shall be a ZURN WILKINS Model 500XL.

1. Type "A" pressure reducing valves for water service shall be diaphragm actuated type with bronze body and 150 psi (minimum) working pressure. Valves shall have an adjustable outlet pressure range of not less than 10-35 psi. Valves shall be:
Watts U5LP
A.W. Cash Type E Series 3
2. Type "B" pressure reducing valves for water service shall be diaphragm actuated type with bronze body and 150 psi (minimum) working pressure. Valves shall have an adjustable outlet pressure range of not less than 35 to 75 psi. Valves shall be:
Watts No. 223-S Series
A.W. Cash Type E Series 3
3. Type "C" pressure reducing valves for compressed air service shall be diaphragm actuated type with an adjustable outlet pressure range of not less than 0 to 200 psi. Valves shall be:

Watts No. 199 Series

A.W. Cash Type E-55 Series

4. Plumbing contractor shall provide pressure reducing valve at dishwasher prior to connection to hot water line.

2.03 AIR VENTS

- A. Automatic Air Vent: Designed to vent automatically with float principle; bronze body and nonferrous internal parts; working pressure; operating temperature; with discharge connection and inlet connection. Air vents shall be:

Armstrong No. 71

Hoffman No. 78

Thrush No. 8

Taco No. 424

- B. Manual Air Vent: Bronze body and nonferrous internal parts; working pressure; operating temperature; manually operated with screwdriver or thumbscrew; with discharge connection and inlet connection.

2.04 DIELECTRIC ADAPTERS

- A. Dielectric adapters shall be the union type for pipes 2" in size and smaller and flanged type for pipes 2-1/2 " in size and larger. Adapters shall have a working pressure of 250 psi for union type and 175 psi for flanged type. The insulating gasket shall have an operating range of 40°F to 240°F and shall limit the galvanic corrosion to a maximum of 1% of the short circuit current.

2.05 THERMOMETER AND TEST WELLS

- A. Thermometers:

1. Thermometers shall be the blue-reading spirit-filled adjustable angle type. Thermometer shall be adjustable to any angle through a 180° arc and shall be provided with a locking device.
2. Thermometers shall have V-cast aluminum case with baked enamel separable sockets and where installed on insulated pipes, sockets shall be extension neck type to provide for 2" thick insulation.
3. Thermometer scale range shall be
 - a. Domestic Water Systems - 30-240°F
4. Thermometers shall be:

Weksler Adjust-Angle Series Type AA-5

Trerice Adjustable Angle Series Type BX

Weiss Vari-Angel Series Type BS

- B. Test Wells:

1. Test wells shall be for use with engraved stem thermometers. Test wells shall be brass and shall be provided with cap and chain with gasket for sealing when not in use.
2. Wells installed in insulated pipes shall be extension neck-type to provide for 2" thick insulation.

2.06 PRESSURE GAUGE AND GAUGE COCKS

- A. Pressure Gauges

1. Gauges shall be flangeless type and shall have 4-1/2 dials, cast aluminum cases, stainless steel rotary gear movements, phosphor bronze bourdon tubes, forged brass rod sockets and tips, 1/2% accuracy of scale range, Plexiglass dial covers, safety blow-out disc and 1/4 inch lower connections.

2. Gauges in pump suction line shall be the compound type. Gauges in all other locations and discharge shall be the plain pressure type.
3. Range for pressure gauges shall be selected so that the normal operating point for each application falls in the approximate midpoint of the gauge range. Shop drawings shall indicate ranges.
4. Gauges shall be:

Weksler Type AA1
Trerice No. 500X Series
Weiss Series PG

B. Gauge Cocks:

1. Gauge cocks shall be brass lever handle type. Gauge cocks shall be:

Weksler Type A
Trerice No. 880
Weiss type LC

2.07 TEMPERATURE/PRESSURE TEST FITTINGS

- A. Fittings shall be the combination temperature pressure test type with brass body, self-sealing EPDM gasket, threaded connections and cap. Temperature/Pressure Test Fittings shall be:

	Pete's Plug
Sisco	P/T plug
Fairfax	Test plug

2.08 PIPE SLEEVES

A. Pipe Sleeves

1. Sleeve size shall be such as to provide an annular space of the sleeve and the passing pipe or pipe insulation.
2. Sleeve material shall be as follows:
 - a. In walls below grade: Schedule 40 black steel pipe, ASTM A53.
 - b. In concrete floors on grade: Service weight cast-iron pipe, ASTM A74.
 - c. In walls and partitions above grade: 20-gauge galvanized sheet steel with lock-type longitudinal seams.
 - d. In concrete floors above grade: 20-gauge galvanized sheet steel with lock-type longitudinal seams.
 - e. In concrete roofs: Service weight cast-iron pipe, ASTM A74.

2.09 FLOOR, WALLS AND CEILING PLATES

- A. Escutcheons shall be chrome-plated steel plates, hinged type with set screw.
- B. Escutcheons for chrome-plated connections at plumbing fixture shall be as specified under the plumbing fixtures.

2.10 EXPANSION TANKS

A. Thermal Expansion Tank (Plumbing Systems)

1. Furnish and install as shown on drawings a pre-charged steel thermal expansion tank with a fixed FDA approved butyl bladder. The tank shall have a top NPT stainless steel system connection and a charging valve connection (standard tire valve) to facilitate the on-site charging of the tank to meet system requirements. The tank must be constructed in accordance with Section VIII of the ASME Boiler and Pressure Vessel Code and stamped 150 psi working pressure.

2. Thermal expansion tank to limit the pressure of the water being heated to no more than 80 pounds per square inch as required per the International Plumbing Code (Current Edition)
3. Tanks shall be:

Wessels TTA Series
TACO, Bell & Gossett

PART 3 EXECUTION

3.01 GENERAL

- A. All equipment shall be installed where indicated on the drawings and shall be installed in accordance with manufacturer's instructions.
- B. Unless otherwise indicated on the drawings, thermometers and pressure gauges shall be installed no higher than 8 feet above finished floor. Final position of each thermometer and pressure gauge shall be such that it is readable from the floor.
- C. Pipe sleeves in walls, partitions and roofs and in floors on grade shall be cut flush with each surface except where clamping flanges are used. Sleeves through floors above grade shall be cut flush with the underside of the floor and shall extend 1" above the top side of the floor. Where pipes penetrate existing slabs above grade, install a 2" high concrete water dam around pipe.
- D. Except where otherwise specified, pipes passing through concrete and masonry walls, concrete and masonry partitions, concrete floors and roofs, and fire rated gypsum board or plaster partitions shall be provided with pipe sleeves which shall be installed at the time of construction of walls, partitions, floor or roof. Sleeves are not required for water and waste connections through a wall or partition to an individual fixture not for cast-iron pipe through concrete slab on grade. Sleeves shall not be installed in structural members except where specifically indicated or approved by the Architect. The annular spaces between pipe and sleeve and between insulation and sleeve, including drain pipes at water closets, shall be sealed. In addition, penetrations through fire-rated walls and partitions and through floors above grade shall be packed solid with Fiberglass insulation behind a backup material and sealant.
- E. A strainer shall be provided on the inlet side of each pressure reducing valve. Pressure reducing valves provided with an integral strainer do not require a separate strainer.
- F. Dielectric adapters shall be installed between copper and iron pipe connections and between ferrous and non-ferrous metal piping or equipment.
- G. Test wells shall be installed above the horizontal so as to hold oil and wells shall be filled with oil.
- H. Pressure gauges shall be connected to the piping system with threaded brass pipe and screwed brass fittings. Install gauge cock on inlet pipe to gauge. All gauges used on services exceeding 200°F shall be mounted on a brass pigtail siphon.
- I. Where exposed piping, bare or insulated, passes through floors, walls and ceiling, except in Mechanical rooms, escutcheons shall be provided.
- J. Expansion tank shall be mounted as indicated on the drawing. Expansion tank shall not be supported by piping systems.
- K. All sanitary sewer piping routed up thru grade beams shall be down within cast iron pipe sleeve one pipe size larger than service pipe. Pack annular space between cast iron pipe and service piping with closed cellular foam insulation.

END OF SECTION

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SECTION 22 0523 - PLUMBING SYSTEM VALVES

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. Work Included
 - 1. Valves for Domestic Water System
 - 2. Valves for Natural Gas System

1.03 SUBMITTALS

- A. General: All submittals shall comply with the requirements of Division 1 - GENERAL REQUIREMENTS and Section 20 01 00 - GENERAL PROVISIONS.
- B. Product Data: Data shall be submitted on the following items:
 - 1. Valves

PART 2 PRODUCTS

2.01 GENERAL

- A. Valves shall have the name or trademark of the manufacturer and the working pressure stamped or cast on the valve body.
- B. All valves in each system, except for special types, shall be the product of a single manufacturer.
- C. All valves requiring packing shall be designed and constructed such that they can be repacked under pressure.
- D. Valve hand wheels shall be malleable iron except where specified otherwise.
- E. All domestic water valves to be lead-free type.
- F. Approved Manufacturer's: Kitz, Nibco.

2.02 VALVES FOR DOMESTIC WATER SYSTEM

- A. Gate valves (4" in size and larger) shall have iron body, bronze trim, non-rising stem, solid wedge, and flanged ends for 200 pound W.O.G. Valves to be lead-free. Valves shall be:

Crane	No. 461
Hammond	IR1138
Stockham	G-612
Nibco	F-619
Grinnell	6060A
- B. Ball Valves (3" in size and smaller) shall be bronze body, full port, with PTFE Seats. Full port brass ball, orifice must be drilled, hollow ball is not acceptable. Stem shall be blowout-proof, lever handle, solder ends adjustable packing gland. Ball valve shall be rated for 150 WSP. Valves to be lead-free. Valves shall be:

Watts
Hammond
Apollo
- C. Check valves (4" in size and larger) shall be horizontal swing type with iron body, bronze trim, and flanged ends for 200 pound W.O.G. Valves to be lead-free. Valves shall be:

Crane	No. 373
Hammond	IR1124

Stockham	G-931
Nibco	F-918-B
Grinnell	6300A

- D. Check valves (3" in size and smaller) shall be horizontal swing type with bronze body, composition disc, and solder ends for 200 pound W.O.G. Valves to be lead-free. Valves shall be:

Crane	No. 1342
Hammond	IB943
Stockham	B-310-B
Nibco	S-413-W
Grinnell	3315 SJ

- E. Globe valves (2 ½" in size and larger) shall have iron body, bronze trim, rising stem, and flanged ends for 200 pound W.O.G. Valves to be lead-free. Valves shall be:

Crane	No. 351
Hammond	IR116
Stockham	G-512
Nibco	F-718-B

- F. Globe valves (2" in size and smaller) shall have bronze body, rising stem, composition disc, and solder ends for 200 pound W.O.G. Valves to be lead-free. Valves shall be:

Crane	No. 1310
Hammond	IB423
Stockham	B-14-T
Nibco	S-211-Y
Grinnell	3210 SJ

- G. Hose and drain valves shall be 3/4" in size with bronze body, non-rising stem, solid wedge, threaded inlet, and hose outlet with cap and chain for 200 pound W.O.G. Valves to be lead-free. Valves shall be:

Crane	No. 451
Jenkins	372
Nibco	T-113-H

- H. Underground Gate Valves and Valve Boxes:

- Gate valves (4" in size and larger) shall be AWWA approved with iron body, bronze trim, non-rising stem, parallel seat double disc, square operating nut, and [mechanical joint ends] [hub ends] for 200 pound W.W.P. Valves to be lead-free. Valves shall be:

	<u>Mechanical Joint</u>	<u>Hub Ends</u>
Mueller	A-2380-20	A-23 80-5
American Darling	55	53
Stockham	G-743-0	G-744-0

- Gate valves (2" & 3" in size) shall have iron body, bronze trim, non-rising stem, parallel seat double disc, square operating nut, and threaded ends for 200 pound W.W.P. Valves to be lead-free. Valves shall be:

Mueller Company	A-2380-8
Stockham	G-739-0

- Gate valves (1 ½" in size and smaller) shall have bronze, non-rising stem, solid wedge, square operating nut, and threaded ends for 200 pound W.W.P. Valves to be lead-free. Valves shall be:

Mueller Company

H-10280

4. Valve boxes shall be provided over each underground gate valve. Valve boxes shall be adjustable cast iron roadway type with belled lower section and removable lid at grade. Lid shall be labeled "Water" and boxes not in paved areas shall be set in a 24" x 24" x 6" concrete pad. Valves to be lead-free. Valve boxes shall be:

Mueller Company

H-10360

Central Foundry

B-5003

Tyler Pipe Company

6850

Russell Foundry

B-122

5. Provide one T-wrench for each size operating nut.

2.03 VALVES FOR NATURAL GAS SYSTEM

A. GAS COCKS:

1. Up to 2 Inches: Bronze body, bronze tapered plug, non-lubricated, teflon packing, threaded ends.
2. Over 2 Inches: Cast iron body and plug, non-lubricated, teflon packing, flanged ends.
3. Powell Model 961, Mueller Model H-11170, or approved equal.

PART 3 EXECUTION

3.01 INSTALLATION

- A. All valves installed in horizontal lines shall be installed with the stems horizontal or above. Valve hand wheels shall be oriented, when installed, to provide maximum accessibility for operation.
- B. All valves located within ceiling space are to have two (2) complete wraps of 1" wide red reflective tape around ceiling grid hanger/support directly below valve. Tape to be concealed above ceiling.
- C. Not used.
- D. All valves to be located within 12" of finished ceiling. Offset piping down as required.
- E. ADDITIONAL CLOSE DOCUMENTS: Contractor to provide a set of plans shows valve schedule & valve location on plans (full size set, 24"x36 plans). Plans to have valve type, manufacturer and model #. Also provide replacement part contact information for each valve.
- F. All valves underground shall be gate valve type.
- G. All domestic water valves are to be lead-free.

END OF SECTION

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SECTION 22 1000 - DOMESTIC WATER SYSTEM

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provision of the contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. Work Included
 - 1. Domestic Water Piping
 - 2. Water Hammer Arrestors
 - 3. Hose Bibbs
 - 4. Vacuum Breakers
 - 5. Backflow Preventers
 - 6. Disinfecting
 - 7. Valve Boxes
 - 8. Refrigerator Valve Box w/ Valve
 - 9. Washing Machine Connection Box
- B. Description
 - 1. Provide systems of domestic water piping and accessories so that every fixture and piece of water using equipment in the building will be furnished with a water supply.
 - 2. Extend the domestic cold water service to point shown on the drawings.

1.03 SUBMITTALS

- A. General: All submittals shall comply with the requirements in Division 1 - GENERAL REQUIREMENTS and Section 20 01 00 - GENERAL PROVISIONS.
- B. Product Data: Data shall be submitted on the following items:
 - 1. Domestic Water Piping
 - 2. Water Hammer Arrestors
 - 3. Hose Bibbs
 - 4. Vacuum Breakers
 - 5. Backflow Preventers
 - 6. Valve Boxes
 - 7. Refrigerator Valve Box w/ Valve
 - 8. Washing Machine Connection Box
- C. Operation and Maintenance Instructions: Data shall be provided for the following items:
 - 1. Hose Bibbs
 - 2. Vacuum Breakers
 - 3. Backflow Preventers
 - 4. Water Hammer Arrestors.
 - 5. Washing Machine Connection Box

1.04 QUALITY ASSURANCE

- A. Standards
 - 1. American National Standards Institute (ANSI):
 - a. Standard B16.18, Cast Copper Alloy Solder-Joint Pressure Fittings, 1978 Edition.

- b. Standard B16.21, Non-Metallic Gaskets for Pipe Flanges, 1962 Edition.
 - c. Standard B16.22, Wrought Copper and Bronze Solder-Joint Pressure Fittings, 1980 Edition.
 - d. Standard B16.24, Bronze Flanges and Flanged Fittings, 150 and 300 Pound, 1979 Edition.
 - e. Standard B31.1, Power Piping and Addendum, 1977 Edition.
- 2. American Society for Testing and Materials (ASTM):
 - a. Standard A307, Carbon Steel Externally and Internally Threaded Standard Fasteners, 1980 Edition.
 - b. Standard B88, Specification for Seamless Copper Water Tube, 1983 Edition.
- 3. American Water Works Association (AWWA):
 - a. Standard C110, Grey-Iron and Ductile-Iron Fittings, 3 inc. through 48 inc., for Water and Other Liquids, 1977 Edition.
 - b. Standard C111, Rubber-Gasket Joints for Cast-Iron and Ductile-Iron Pressure Pipe Fittings, 1979 Edition.
 - c. Standard C151, Ductile-Iron Pipe, Centrifugally Cast In Metal Molds or Sand-Lined Molds, for Water or other Liquids, 1976 Edition.
- 4. Federal Specifications (Fed. Spec.):
 - a. Specification BB-C-120B, Chlorine, Technical: Liquid.
 - b. Specification WW-U-516C, Unions, Brass or Bronze, Threaded Pipe Connections, and Solder Joint Tube Connections.
- 5. Plumbing and Drainage Institute (PDI):
 - a. Standard WH-201, Water Hammer Arrestors, 1977 Edition.
- B. Qualifications of Manufacturer
 - 1. All copper piping to be a product of the United States of America. Manufacturer's of copper pipe to be Cerro, Reading, & Mueller. Contractor to provide submittals of pipe as noted within this specification.
- C. Qualifications of Installers
 - 1. All welders employed for the work shall be qualified under the requirements of ANSI B31.9.0, Section 127.5. Certification of welder's qualifications shall be submitted to the Architect before any welds are made.

PART 2 PRODUCTS

2.01 PIPING AND FITTINGS

- A. Pipe and fittings shall be as listed herein and shall be used on the services indicated.
- B. PVC Pipe: ASTM D1785, Schedule 80, or ASTM D2241. SDR for not less than 200 psig pressure rating; Fittings: ASTM D2467, PVC; and Joints: ASTM D2672, solvent weld for:
 - 1. All site domestic water piping shown on Mechanical/Plumbing drawing to 5'-0" from building slab.
- C. Type "k" hard down copper tubing, ASTM B88, with silver soldered joints and wrought copper, ASME B16.22, or cast bronze, ASME B16.18, socket fittings for:
 - 1. Under/slab water service piping 4" in size and smaller to a point 3'-0" above the finished floor.
 - 2. All site water piping shown on Mechanical/Plumbing site plan.
- D. Type "L" hard down copper tubing, ASTM B88, with soldered joints and wrought copper, ASME B16.22, or cast bronze, ASME B16.18, socket fittings for:
 - 1. Above-ground cold & hot water piping, all sizes.

2. All HVAC condensate piping.
- E. Type "L" soft drawn copper tubing, ASTM B88, with soldered joints and socket fittings for:
 1. Underground water piping to trap primers. No joints under slab allowed.

Note: All piping underslab shall be fitted with a color coded (red for "hot" and blue for "cold") polyethylene sleeve which shall be extended a minimum 6" above the slab.
- F. PEX piping NOT allowed.
- G. All potable water pipes, pipe related products, and materials that join or seal pipes conform to ANSI/NSF 61.
- H. All solvent cements and primers used to join and seal PVC materials shall comply with the requirements of ANSI/NSF 14.
- I. All underslab piping to be in polyethylene sleeve.

2.02 WATER HAMMER ARRESTORS & AIR CHAMBERS

- A. Contractor shall provide either of the following at every plumbing fixture. If Water Hammer Arrestors are used, they shall be installed in strict accordance with manufacturer's recommendations.
 1. Water Hammer Arrestors shall have a spun closed copper tube chamber permanently sealing a pressurized inert gas chamber, O-ring sealed piston and certification stamp as conforming to PDI WH-201. Water hammer arrestors shall be:

Watts	Number 15
Josam	75000-S Series
Sioux Chief	Hydra-rester
 2. Air Chambers: Air chambers shall be Type "L" copper tubing 12" in length and one pipe size larger than the pipe on which it is installed.

2.03 DIELECTRIC ADAPTERS

- A. Dielectric adapters shall be provided between copper and iron pipe connections and between ferrous and non-ferrous piping or equipment. Refer to Section 20 2116- Piping Specialties.

2.04 UNIONS

- A. Unions in copper tubing shall be cast bronze, Fed. Spec. WW-U-516C, with threaded or solder joint ends to match pipe connections.
- B. Unions between ferrous and non-ferrous piping shall be dielectric type as specified hereinbefore under Dielectric Adapters.

2.05 FLANGES

- A. Flanges in copper tubing shall be 150 pound cast bronze, ANSI B16.24, with solder neck and raised or flat face to mate with adjacent flange, valve, fitting, or piece of equipment.
- B. Flanges between ferrous and non-ferrous piping shall be dielectric type as specified hereinbefore under Dielectric Adapters.
- C. Flange gaskets shall be 1/16 inch non-metallic, ring type, ANSI B16.21.
- D. Flange gaskets shall be carbon steel, all threaded type. Nuts shall be carbon steel hexagon type. Steel for bolts and nuts shall conform to ASTM A307, Grade A.

2.06 VACUUM BREAKERS

- A. Vacuum breakers shall be the screw on vandal proof type with finish to match outlet finish - (i.e. chrome plated vacuum breakers on chrome plated hose outlets). Vacuum breakers shall be:

Watts	8A
A.W. Cash	VB101
Nidel	34HD

2.07 BACKFLOW PREVENTERS

- A. Backflow preventers shall be the same size as the pipe on which it is installed unless noted otherwise on the drawings.
- B. Backflow preventers to be lead-free.

2.08 REFRIGERATOR VALVE BOX

- A. Refrigerator valve box shall be fully recessed flush mounted type constructed of 20 gauge steel (faceplate to be 20 gauge) with powder coat white finish. Metal box to have flame spread of 94 (UL) and 94BHB (ASTM). Valve shall comply with NSF 61 & ASME A112.18.1. Valve to be low-lead type. Valve box to have nail support brackets with screw-on faceplate frame. Valve to be 1/4 turn. Supply connection shall be 1/2" copper sweat connection. Provide with water hammer arrestor (ASSE 1010 compliant).
- B. Manufacturer: Guy Gray Model 88531, Oatey 39140

2.09 FIXED AIR GAPS

- A. Fixed air gaps shall be:

	<u>3/4" - 1"</u>	<u>1 1/4" - 4"</u>
Watts	Series AG	Series AG
J.R. Smith	Series 3950	Series 3951
Josam	Series 1801	Series 1800
Zurn	Series Z-1025	Series Z-1025
Josam	88900	

2.10 TRAP PRIMER

- A. Trap primer shall be automatic type with cast bronze body, removable valve mechanism, integral vacuum breaker, and 1/2 inch diameter socket tube ends.

- 1. Trap primer shall be:

J.R. Smith	2699-1
Josam	88250
Wade	W-2400-CS
Zurn	Z-1022
Precision	PR-500
Josam	Series 88250

- 2. Trap Primer serving more than one (1) floor drain shall be:

Precision	P-1
Mifab	MI-DU

- 3. Automatic trap primer shall be equipped with backflow preventer as required by Current Edition, International Plumbing Code.

- B. Drainage-Type Trap Seal Primer Valves: ASSE 1044, fixture-trap, waste-drainage-fed type, with the following characteristics:

- 1. Chrome-plated, cast-brass, NPS 1-1/4 DN 32 minimum, lavatory P-trap with NPS 3/8 DN 10 minimum, trap makeup connection.
- 2. Contractor shall utilize white PVC flexible tubing for water pipe connection from p-trap connection to wall.
- 3. All piping within wall & under slab to be 1/2" soft rolled copper with no joints.

2.11 ICE MAKER CONNECTION BOX

- A. Ice Maker valve box shall be fully recessed flush mounted type constructed of 20 gauge steel (faceplate to be 20 gauge) with powder coat white finish. Metal box to have flame spread of 94 (UL) and 94BHB (ASTM). Valve shall comply with NSF 61 & ASME A112.18.1. Valve to be low-lead type. Valve box to have nail support brackets with screw-on faceplate frame. Valve to

be 1/4 turn. Supply connection shall be 1/2" copper sweat connection. Provide with water hammer arrestor (ASSE 1010 compliant).

B. Manufacturer: Guy Gray Model 88531, Oatey 39140

2.12 WASHING MACHINE (LAUNDRY) CONNECTION BOX (FIRE RATED)

A. All washing Machine (laundry) connection boxes shall be fully recessed flush mounted type constructed of bulk molding compound (BMC) with UL-classified intumescent pads and UL-classified fyrewrap insulating material. The connection box shall include 1/2" FIP inlet valves (hot and cold water) and 2" drain. Supply connection shall be 1/2" mpt or 5/8" sweat connection. Box to be 2 hour fire rated. Valve shall comply with NSF 372 Annex G & ASME A112.18.1. Provide with water hammer arrestor (ASSE 1010 compliant).

B. Manufacturer: Oatey Model 38478, Guy Gray Model 82371

2.13 ALLOWANCES

A. Plumbing Contractor shall assume a minimum of five (5) additional water drops (3/4" and below) with ball valves due to possible changes in equipment requirements. These drop will come off nearest available source of sufficient size.

PART 3 EXECUTION

3.01 INSTALLATION

- A. A union or flange shall be provided at all piping connection to equipment.
- B. Faucets, flush valves, and shower heads shall be cleaned of dirt and debris.
- C. Changes in pipe size shall be made with reducing fittings. No bushings will be allowed.
- D. Underground water piping shall have a minimum cover of 3' - 0" to the top of the pipe. Provide tracer warning tape, refer to General Provisions Specifications.
- E. Install water hammer arrestors within the chase or in the wall on the hot and cold water branch lines serving fixtures; on the cold water branch lines serving individual flush valve water closets and urinals; and elsewhere as indicated on the drawings.
- F. Install air chambers on the hot and cold water branch lines to all fixtures not provide with water hammer arrestors. Individual fixtures in a battery or fixtures with water hammer arrestors on the supply line will not require an air chamber.
- G. Vacuum breakers shall be provided on all hose outlets unless the drawings indicate that a backflow preventer is to be provided on the piping serving the outlet.
- H. The atmospheric relief from backflow preventers shall be piped through a fixed air gap to a floor drain.
- I. Underground piping from trap primer to floor drains shall be installed without fittings.
- J. The owner provided equipment shall be furnished and set in place under another section of these specifications and/or by separate contract. Plumbing Contractor shall provide necessary rough-in required for this equipment and shall completely connect all plumbing services for this equipment, providing cut-off valves and union for all plumbing supply service to each piece of equipment. It is the obligation of the plumbing contractor to obtain correct roughing-in dimensions and drawings for this equipment as well as the equipment furnished under this contract.
- K. Contractor to test all new backflow preventers in accordance with International Plumbing Code (current edition) & in accordance with one of the following standards: ASSE 5013, ASSE 5015, ASSE 5020, ASSE 5047, ASSE 5048, ASSE 5052, ASSE 5056, CSA B64.10.1, USC's FCCC & HR's "Manual of Cross- Connection Control", or UFL's TREEO's "Backflow Prevention – Theory and Practice". Provide initial certification (at project completion). Include certification within closeout documents (O&M manuals).

3.02 JOINTS

- A. Mechanical joints for ductile iron pipe shall be made with a follower gland, gasket, bolts, and nuts as per AWWA C111.
- B. Push-on joints for ductile iron pipe shall be made with a one piece lubricated compression rubber gasket as per AWWA C111.
- C. Threaded joints shall be made up with Teflon tape. After cutting but prior to threading, pipe shall be reamed and shall have burrs removed.
- D. Brazed joints shall be made using a BcuP-5 brazing alloy with a compatible flux.
- E. Solder joints shall be made using a 95-5 tin-antimony solder with a compatible flux.
- F. Flanged joints shall be made with ring type non-metallic gaskets, bolts and nuts.
- G. At contractor's option, tee branches in aboveground copper tubing may be made using the T-drill method. Joint between main and branch tubing shall be sealed using a BcuP-5 brazing alloy with a compatible flux.

3.03 ADJUSTING

- A. Adjust and balance all water systems to obtain operating flows at all fixtures and water using equipment. Also adjust and balance the hot water circulation from all portions of the building.

3.04 DISINFECTION

- A. All domestic water service and supply piping installed under this DIVISION shall be disinfected with chlorine before it is placed into operation in strict accordance with International Plumbing Code, Current Edition. The Contractor shall submit to the Architect written certification that the system was disinfected. Certification that the system was disinfected. Certification shall include name of project, name of owner, and name of operators, date of disinfection, times of disinfection period, maximum chlorine level, and residual chlorine level.
- B. Flush water system a minimum of three (3) times prior to owner occupancy. Provide in writing record of flush to mechanical engineer on contractor letterhead.
- C. The following is an excerpt of the International Plumbing Code (2021), 610: Disinfection of Potable Water System. The plumbing official may require that a potable water system or any part thereof installed or repaired be disinfected in accordance with one of the following methods before it is placed in operation.

New potable water systems shall be purged of deleterious matter and disinfected prior to utilization. The method to be followed shall be that prescribed by the health authority or water purveyor having jurisdiction or, in the absence of a prescribed method, the procedure described in either AWWA C651 or AWWA C652, or as described in this section. This requirement shall apply to "on-site" or "inplant" fabrication of a system or to a modular portion of a system.

1. The pipe system shall be flushed with clean, potable water until dirty water does not appear at the Points of outlet.

2. The system or part thereof shall be filled with a water/ chlorine solution containing not less than 50 parts per million (50 mg/L) of chlorine, and the system or part thereof shall be valved off and allowed to stand for 24 hours; or the system or part thereof shall be filled with a water/chlorine solution containing not less than 200 parts per million (200 mg/L) of chlorine and allowed to stand for 3 hours.

3. Following the required standing time, the system shall be flushed with clean potable water until the chlorine is purged from the system.

4. The procedure shall be repeated where shown by a bacteriological examination that contamination remains present in the system.

3.05 PROTECTIVE COATING FOR UNDERGROUND PIPING

- A. Refer to specification section 200200.

3.06 WATER FLOW TEST

- A. The contractor shall provide A/E written documentation of water flow test results at new connection to existing water system. Test existing water system prior to construction.

3.07 FLUSHING OF SYSTEM

- A. Contractor shall flush new and existing system three (3) times prior to turning facility over to owner.

END OF SECTION

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SECTION 22 11 23 - NATURAL GAS SYSTEM

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this section.

1.2 SUMMARY

- A. Work Included
 - 1. Pipe standard compliance certificates.
 - 2. Pressure regulators.
 - 3. Gas Piping & Fittings.
 - 4. Pipe connection methods.
 - 5. Single Seal Anodeless Risers.
 - 6. Gas Connection to Equipment
- B. Description
 - 1. Provide system of natural gas piping to all equipment requiring gas. Provide new gas meter and regulator. The new gas regulator plus extension into the building will be installed by the contractor. Fees for such work shall be the responsibility of the Contractor. Contractor to coordinate with local gas company for delineation point of work (coordinate where gas company will run pipe to and where this contractor begin work). Contractor to coordinate with local gas company and include all associated fees, permits, connections, etc. (including cost of bringing gas pipe service to building). Contractor to provide a complete and working system & include all associated costs (including connection to building from city main).

1.3 SUBMITTALS

- A. General: All submittals shall comply with the requirements of Division 1 - GENERAL REQUIREMENTS and section 200100 - GENERAL PROVISIONS.
- B. Product Data: Data shall be submitted on the following items:
 - 1. Pipe standard compliance certificates.
 - 2. Pressure regulators.
 - 3. Gas Piping & Fittings.
 - 4. Pipe connection methods.
 - 5. Single Seal Anodeless Risers.
 - 6. Gas Connection to Equipment
- C. Operation and Maintenance Instructions: Data shall be provided for the following items:
 - 1. Pressure Regulators.
 - 2. Solenoid valves.

1.4 QUALITY ASSURANCE

- A. Standards
 - 1. American National Standards Institute (ANSI):
 - a. Standard B16.3, Malleable Iron Fittings, 1977 Edition.
 - b. Standard B16.5, Steel Pipe Flanges and Flanged Fittings, Joint Pressure Fittings, 1981 Edition.
 - c. Standard B16.18, Cast Copper Alloy Solder - Joint Pressure Fittings, 1978 Edition.
 - d. Standard B16.21, Non-Metallic Gaskets for Pipe Flanges, 1962 Edition.

- e. Standard B16.22, Wrought Copper and Bronze Solder - Joint Pressure Fittings, 1980 Edition.
 - f. Standard B31.1, Power Piping and Addendum, 1977 Edition.
- 2. American Society for Testing and Materials (ASTM):
 - a. Standard A120, Pipe, Steel, Black and Hot-dipped Zinc-Coated (Galvanized) Welded and Seamless, for Ordinary Uses, 1983 Edition.
 - b. Standard A234, Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and Elevated Temperatures, 1982 Edition.
 - c. Standard A307, Carbon Steel Externally and Internally Threaded Standard Fasteners, 1982 Edition.
 - d. Standard B88, Specification for Seamless Copper Water Tube, 1983 Edition.
 - e. Standard D2513, Standard Specification for Thermoplastic Gas Pressure Pipe, Tubing, and Fittings, 1984 Edition.
- 3. Federal Specifications (Fed. Spec.):
 - a. Specification WW-U-516C, Unions, Brass and Bronze, Threaded Pipe Connections, and Solder Joint Tube Connections.
 - b. Specification WW-U-531E, Union, Pipe, Steel or Malleable Iron, Threaded Connection, 150 lbs. and 250 lbs.
- B. Qualifications of Manufacturer:
 - 1. Pipe and fittings shall be manufactured in the United States.
- C. Qualification of Installers:
 - 1. All welders employed for the work shall be qualified under the requirements of ANSI B31.2.0, Section 127.5. Certification of welder's qualifications shall be submitted to the Architect/Engineer before any welds are made.

PART 2 PRODUCTS

2.1 GENERAL

- A. All gas equipment specified herein shall be designed and constructed for use with natural gas.

2.2 PIPE AND FITTINGS

- A. Pipe and fittings shall be listed herein and used on the services indicated.
- B. Schedule 40 black steel pipe, ASTM A53/A106, with welded joints and standard weight black steel butt welding fittings, ASTM A234, for:
 - 1. Above ground gas piping 2-1/2" in size and larger downstream of regulator.
 - 2. All piping within building located in a concealed location.
- C. Schedule 40 black steel pipe, ASTM A53/A106, with screwed joints and 150 pound threaded malleable iron fittings, ANSI B16.3, for:
 - 1. Above ground gas piping 2" in size and smaller downstream/upstream of regulator.
- D. Polyethylene Pipe: ASTM D2513, SDR 11.5, with fittings: ASTM D2683 to ASTM D2513, socket type and joints shall be fusion welded, for:
 - 1. Gas piping installed underground.
- E. Corrugated Stainless Steel Tubing: Gas Piping as noted on drawings:
 - 1. CSST gas piping shall be routed in PVDF pipe sleeve and shall conform to the requirements of the ANSI LCI Standard for corrugated stainless steel tubing (CSST) fuel gas piping systems. Product shall carry the American Gas Association (AGA) international logo or symbol. The flexible corrugated tubing shall be made of Type 304 Series stainless steel. The tubing jacket shall be of polyethylene and shall be yellow to comply with international color code for gas. The mechanical fittings, terminations and

striker plated used in the installation of CSST shall be tested and listed as a system. No joints allowed underslab. CSST shall be Gastite Flexible Gas Piping, TracPipe Gas Piping or Diamondback Gas Piping.

2. Codes: ICC Codes (IFGC, IRC, IMC, IPC), NFPA 54, UPC, CAN/CSA B149.1, NFPA58 Standards: ANSI LC1/CSA 6.26, ASTM E84 (UL723), ICC LC 1024, ANSIZ223.1
3. Listings: CSA, ICC PMG, UL (Through Penetration Firestop System)
4. **Pipe** - CSST tubing shall be 300 series Stainless Steel Strip conforming to ASTM A240 rated for 25 psi and have an elevated pressure rating of 125G for sizes up to 1 ¼" and 25G for 1 ½" and 2". Tubing shall not be subjected to heat treating or annealing after the corrugation forming operation.
5. **Jacket** - CSST jacket shall be an extruded fire-retarded engineered polymer designed to enhance the energy dissipating properties of the flexible gas piping. Conductive jacket shall conform to ASTM E-84 (UL723) flame spread rating not to exceed 25 and ASTM-E84 (UL723) smoke density rating shall not exceed 50. Conductive jacket shall be resistant to UV.
6. **Fittings** - CSST fittings shall be made of yellow brass and be tested and listed by CSA International for use in concealed locations. The fittings shall flare the tubing using a stainless steel insert to pilot the tubing ID or an integral snap ring in a one piece fitting. The fitting and tubing assembly shall provide a metal to metal seal. Brass fittings shall not contain gaskets or O-rings to facilitate the seal between the tubing and the fitting.
7. **Quality Assurance** - CSST shall be listed by CSA International to the performance requirements of ANSI LC 1 / CSA 6.26. The conductive jacket shall meet the requirements of ANSI LC 1 / CSA 6.26, Part 5.16.
8. **Installer Qualifications** - Each installer must meet applicable state and local requirements established by the Authority Having Jurisdiction (AHJ) and must be successfully trained through the manufacturer's installation program.
9. **Installation** –
 - a. **Appliance Terminations:** Termination Mount fittings are to be used for the tubing at all moveable appliance locations and other stub-out points. The tubing may be run directly to the manual shut-off valve on fixed appliances
 - b. **Regulators:** Regulators shall be listed to a recognized national standard for pressure regulators. Line Pressure Regulators listed to ANSI Z21.80 and equipped with a vent limiter do not require a vent line to be run outdoors.
 - c. **Protection:** Striker plates shall be used where necessary and marked with the symbol of the Manufacturer and CSA International. Striker Plates shall be made from carbon steel, heat treated to >RB75 and <RB85. Floppy type RW galvanized steel electrical conduit shall be used for additional protection.
 - d. **Identification** - CSST shall be marked with the manufacturer's name or symbol, approving agencies, pressure rating and manufacturing date code. The piping system shall be marked by the manufacturer with the word "GAS" in black letters every two feet. Do not paint, stencil or apply unapproved labels to the piping system.
 - e. **Electrical Bonding** - Flexible gas piping shall be bonded in accordance with the National Electrical Code NFPA 70 Article 250.104 and the National Gas Code NFPA 54, and any local requirement which may exceed the national codes.
 - f. If bonding is required, a bonding clamp must be attached to the brass fitting or to a black pipe component in the same electrically continuous gas piping system. The corrugated stainless steel portion of the gas piping shall NOT be used as a bonding attachment under any circumstance.
- F. Schedule 80 black steel pipe, ASTM A153, with welded joints and standard weight black steel butt welding fittings, ASTM A234, for:
 1. Gas piping serving natural gas generator.

- a. All aspects of the natural gas supply shall be in accordance with NFPA, 37, 54 and 110. Where the gas supply is connected to the building gas supply system, it shall be connected on the supply side of the building main gas shutoff valve and marked as supplying an emergency generator. The building's main gas shutoff valve shall be marked to indicate the existence of the separate generator shutoff valve. Gas piping shall be Schedule 80, black steel, painted ANSI "Natural Gas" Yellow and installed by a licensed plumbing contractor. The connection at the generator is to be made with a flexible piping connection provided by the generator manufacturer. Gas trains shall include an equipment isolation valve at the generator, a manual shutoff valve in a remote location, a regulator and two automatic safety shutoff valves at the generator each with manual leak test valves. The automatic safety shutoff valves shall stop the flow of fuel in the event the engine stops for any cause. All gas piping shall be tested and purged in accordance with NFPA 54:8.

2.3 UNIONS

- A. Unions in copper tubing shall be cast bronze, Fed. Spec., WW-U-516C, with threaded or solder joint ends to match pipe connections.
- B. Unions in steel piping shall be 150 pound malleable iron, Fed. Spec. WW-U-531E, with threaded ends to match pipe connections.
- C. Unions between ferrous and non-ferrous piping shall be dielectric type as specified hereinbefore under Section 202130 - PIPING SPECIALTIES.

2.4 FLANGES

- A. Flanges in steel pipe shall be 150 pound steel, ANSI B16.5, slip-on type welding flange with raised or flat face to mate with adjacent flanges, valve, fittings, or piece equipment.
- B. Flanges between ferrous and non-ferrous piping shall be dielectric type as specified hereinbefore under Section 202130- PIPING SPECIALTIES.
- C. Flange gaskets shall be 1/16 inch non-metallic, ring type, ANSI B16.21.
- D. Flange bolts shall be carbon steel, all threaded type. Nuts shall be carbon steel hexagon type. Steel for bolts and nuts shall conform to ASTM A307, Grade A.

2.5 GAS PRESSURE REGULATORS

- A. Service Pressure Regulator(s): Gas service pressure regulator(s) shall be as provided by the serving utility company (upstream gas meter).
- B. Line Pressure Regulator(s): Line pressure regulator(s) shall be provided for precise control of the gas pressure and flow rate delivered to gas-burning appliances. Line pressure regulator's shall be provided and installed by the contractor.
- C. Regulators shall be installed where line pressure exceeds the gas pressure ratings for appliances supplied thereof and as shown on Drawings.
- D. Regulators shall be required to ensure protection for gas-fired appliances against emergency gas exposure of at least 2 psig.
- E. Regulators shall comply with ANSI Z21.80 and fabricated with internal parts that are corrosion-resistant. Regulators shall be capable of maintaining outlet pressure under no flow condition or dead end lock up situation. Approved model # shall be GOVERNOR by Pietro Fiorentini or prior approved equal.
- F. Venting of Gas Regulators: If located indoors, gas pressure regulators shall have an independent vent pipe routed to the outside of the building. The vent pipe shall be arranged so as to preclude the entry of water or foreign objects. Separate vent piping is not required if the regulator is less than 1¼", is equipped with and is labeled for utilization with approved vent-limiting device installed as per the manufacturer's recommendations.
- G. Plumbing contractor to co-ordinate with General Contractor on all Owner supplied equipment which require gas. Contractor to provide additional regulators at each piece of equipment.

2.6 SINGLE SEAL ANODELESS RISERS

- A. Provide single seal anodeless riser (premanufactured epoxy coated steel to polyethylene gas pipe riser) as manufactured by Elster Perfection. Provide single fused joint under grade at riser connection to polyethylene piping (Medium Density PE2406).
 - 1. Provide where gas piping extends from below grade to above grade.
 - 2. Provide at all gas piping entry points into building.

2.7 GAS CONNECTION TO EQUIPMENT

- A. The contractor shall provide final connection of all equipment/appliances requiring natural gas. Install connection to equipment in strict accordance with equipment manufacturer's recommended installation guidelines. Where equipment manufacturer allows for the use of flexible connections the contractor shall provide.
- B. Provide connections, shutoff valves, regulators and unions at each and every appliance and piece of equipment requiring natural gas, including equipment furnished under other Divisions of these Specifications and/or by the Owner.
- C. Provide and install union type connections at all equipment to permit removal of service piping.
- D. Gas service connections shall have a diameter at least one pipe size larger than that of the inlet connection to the equipment as provided by the manufacturer and be of adequate size to provide the total input demand of the connected equipment.
- E. Food Service Equipment Connections: Provide listed and labeled appliance connectors complying with ANSI Z21.69 and listed for use with food service equipment having casters, or that is otherwise subject to movement for cleaning, and other large movable equipment. Connectors shall have listed and labeled quick-disconnect devices and shall have retaining cables attached to structures and equipment. Connectors shall not be concealed within or extended through wall, floor or partition and shall be located entirely in the same room as the connected equipment. Provide an accessible shut-off valve not less than the nominal size of the equipment connector, immediately ahead of the connector.
- F. Rigid metallic pipe and fittings shall be used at service connections to all stationary equipment.
- G. Provide 6" dirt/drip leg with threaded cap at connection to all appliances/equipment requiring natural gas.

PART 3 EXECUTION

3.1 INSTALLATION

- A. A valve and union shall be provided at each connection to a piece of equipment. Equipment provided with a flanged inlet shall have a flanged connection.
- B. Horizontal gas piping shall slope up in the direction of flow not less than 1/4 inch in 15 feet.
- C. Drip legs, 6-inches long, shall be provided in gas piping at ends of horizontal runs, at the base of risers, and at connections to equipment.
- D. Branch piping shall be taken off the top or sides of horizontal lines but not from the bottom.
- E. Changes in pipe size shall be made with reducing fittings. No bushings will be allowed.
- F. Contractor shall obtain prices from the local gas company for their services. Prices shall include all necessary equipment, labor, etc. for tie-ins to mains including but not limited to all meters. Contractor's bid shall include the cost for these services. Contractor is responsible for coordinating all tie-ins to mains with the local utility companies.
- G. The owner equipment shall be furnished and set in place under another section of these specifications and/or by separate contract. Plumbing Contractor shall provide necessary rough-in required for this equipment and shall completely connect all plumbing services for this equipment, providing cut-off valves and union for all plumbing supply service to each piece of equipment. It is the obligation of the plumbing contractor to obtain correct roughing-

in dimensions and drawings for this equipment as well as the equipment furnished under this contract.

- H. ALL PE pipe to be traced with copper wire when bored, when installed using open trench the pipe shall have a metallic tracer tape with words "caution gas".
- I. A steel striker barrier not less than 0.0508" thick, or equivalent, shall be installed between the gas tubing (within walls) and the finished wall and extend a minimum of 4" beyond the concealed penetrations of plates, fire stops, wall studs, and so forth.
- J. Route pipe vents from gas pressure reducing valves and pipe casing sleeves to the exterior of the building and terminated with outlet turned down and capped with corrosion resistant insect screen. Vent terminations shall be at least seven feet above grade or pedestrian traffic and a minimum three (3) feet above or ten (10) feet horizontally from all air intakes or building openings.
- K. Provide access to the regulator and ensure that the device is properly installed by following the arrow indicating the gas flow direction. Line pressure regulator must be installed in a horizontal position if the device is equipped with a vent limiter.

3.2 JOINTS

- A. Threaded joints shall be made with a mixture of graphite and oil applied to male threads only. After cutting and prior to threading, pipe shall be reamed and shall have burrs removed.
- B. Welded joints shall be fusion welded in accordance with ANSI B31.1, Section 6.
- C. Flanged joints shall be faced true, provided with gasket, and made square and tight.
- D. Brazed joints shall be made up using a BCuP-5 brazing alloy with a compatible flux.
- E. Polyethylene Pipe: Fused joints shall be made by applying electric resistance heat to the joint in accordance with Federal Register 192.285, Title 49.

3.3 GENERATOR GAS PIPING INSTALLATION

- A. All aspects of the natural gas supply shall be in accordance with NFPA, 37, 54 and 110. Where the gas supply is connected to the building gas supply system, it shall be connected on the supply side of the building main gas shutoff valve and marked as supplying an emergency generator. The building's main gas shutoff valve shall be marked to indicate the existence of the separate generator shutoff valve. Gas piping shall be Schedule 40, black steel, painted and installed by a licensed plumbing contractor. The connection at the generator is to be made with a flexible piping connection provided by the generator manufacturer. Gas trains shall include an equipment isolation valve at the generator, a manual shutoff valve in a remote location, a regulator and two automatic safety shutoff valves at the generator each with manual leak test valves. The automatic safety shutoff valves shall stop the flow of fuel in the event the engine stops for any cause. All gas piping shall be tested and purged in accordance with NFPA 54:8.
 - 1. Automatic Emergency Shut-off Valves shall be U.L. Listed F.M. Approved for natural gas service, 2-way electrically tripped solenoid type; fail safe closed; manual reset; Type 3; 24 volt; solenoid enclosure; Aluminum body; POM core guide; PTFE Rider Ring, stainless steel core and plugnut; NBR seals and disc; stainless steel core tube and springs; copper shading coil; manufactured by ASCO Red Hat Series 8214 or prior approved equal (Emerson approved manufacturer). UL listed to standard 429. FM approved to class 7400. CSA certified to standard C22.2, Automatic Gas Valves Z21.21, & Automatic Gas Safety Shutoff Valves File 112872.

3.4 TRACER WIRE & WARNING TAPE

- A. Refer to General Provisions specification.

3.5 WELD TESTING:

- A. All welds are subject to inspection, visual and/or x-ray, for compliance with Specifications. The Owner will at the Owner's option, provide employees or employ a testing laboratory for the purposes of performing said inspections and/or x-ray testing. Initial visual and x-ray inspections will be provided by the Owner. The Contractor shall be responsible for all labor, material and

travel expenses involved in the re-inspection and retesting of any welds found to be unacceptable. In addition, the Contractor shall be responsible for the costs involved in any and all additional testing required or recommended by ASME/ANSI Standards B31.1 and B31.3 due to the discovery of poor, unacceptable or rejected welds.

- B. Welds lacking penetration, containing excessive porosity or cracks, or are found to be unacceptable for any reason, must be removed and replaced with an original quality weld as specified herein. All qualifying tests, welding and stress relieving procedures shall, moreover, be in accord with Standard Qualification for Welding Procedures, Welders and Welding Operators, Appendix A, Section 6 of the Code, current edition.

END OF SECTION

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SECTION 22 1300 - SANITARY WASTE & VENT SYSTEM

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the contract, including General and Supplementary conditions and Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. Work Included
 - 1. Piping
 - 2. Floor Drain(s)
 - 3. Drainage Accessories
 - 4. Cleanouts
 - 5. Traps
 - 6. Flashing

1.03 SUBMITTALS

- A. General: All submittals shall comply with the requirements of Division 1 - GENERAL REQUIREMENTS and Section 20 01 00 - GENERAL PROVISIONS.
- B. Product Data: Data shall be submitted on the following items:
 - 1. Piping
 - 2. Floor Drain(s)
 - 3. Drainage Accessories
 - 4. Cleanouts
 - 5. Traps
 - 6. Flashing

1.04 QUALITY ASSURANCE

- A. Standards
 - 1. American National Standards Institute (ANSI):
 - a. Standard B16.3, Malleable Iron Threaded Fittings, 1977 Edition.
 - b. Standard B16.5, Steel Pipe Flanges and Flanged Fittings, 1981 Edition.
 - c. Standard B16.12, Cast-Iron Threaded Drainage Fittings, 1977 Edition.
 - d. Standard B16.18, Cast Copper and Bronze Solder-Joint Pressure Fittings, 1978 Edition.
 - e. Standard B16.21, Non-metallic Gaskets for Pipe Flanges, 1962 Edition.
 - f. Standard B16.22, Wrought Copper and Bronze Solder-Joint Pressure Fittings, 1980 Edition.
 - 2. American Society for Testing and Materials (ASTM):
 - a. Standard A74, Cast Iron Soil Pipe and Fittings, 1982 Edition.
 - b. Standard A120, Pipe, Steel, Black and Hot-Dipped Zinc-Coated (Galvanized) Welded and Seamless, for Ordinary Uses, 1983 Edition.
 - c. Standard A234, Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and Elevated Temperatures, 1982 Edition.
 - d. Standard A307, Carbon Steel Externally and Internally Threaded Standard Fasteners, 1980 Edition.

- e. Standard B43, Specification for Seamless Red Brass Pipe, Standard Sizes, 1984 Edition.
 - f. Standard B88, Specification for Seamless Copper Water Tube, 1983 Edition.
 - g. Standard B306, Specification for Copper Drainage Tube, 1983 Edition.
 - h. Standard C444, Specification for Perforated Concrete Pipe, 1980 Edition.
 - i. Standard C564, Specification for Rubber Gaskets for cast Iron Soil Pipe and Fittings, 1970 Edition.
 - j. Standard D2148, Specification for Polyethylene Plastics Molding and Extrusion Materials, 1981 Edition.
 - k. Standard D2146, Specification for Propylene Plastic Molding and Extrusion Materials, 1982 Edition.
- B. Qualifications for Manufacturer
- 1. Pipe and fittings shall be of domestic manufacturer. Manufacturers of cast iron to be Charlotte Pipe or Tyler Pipe of Texas. PVC pipe manufacturers to be Charlotte Pipe or JM Eagle.

PART 2 PRODUCTS

2.01 PIPE AND FITTINGS

- A. Pipe and fittings shall be as listed herein and shall be used for the services indicated.
- B. PVC pipe: Solid Wall Schedule 40 ASTM D 2665 (cellular "Foam Core" NOT allowed) with PVC fittings and joints ASTM D 2665 shall be solvent welded, for:
 - 1. All below ground (under building slab) sanitary sewer waste & sanitary sewer vent piping.
 - 2. All site sanitary sewer piping shown on mechanical/plumbing site plan.
- C. Wrought copper and wrought copper alloy solder-joint drainage fittings for plumbing drainage waste & vents, ASTM B306; Wrought Copper Fittings ASME B16.29, or Cast Copper ASME B16.23:
 - 1. All waste piping 1" in size and smaller.
- D. Type "L" hard down copper tubing, ASTM B88, with soldered joints and wrought copper, ASME B16.22, or cast copper ASME B16.18, socket fittings for:
 - 1. Discharge from elevator sump pump.
 - A. All copper pipe, fittings and joints underground shall be field coated using a flexible polyethylene tape. Damaged polyethylene tape shall be repaired prior to backfill. Tape shall have overlapping joints, multiple layers shall be applied until a minimum thickness of 25mils is achieved.

2.02 NO-HUB COUPLINGS

- A. Furnish & install hub-less soil pipe couplings designated Heavy Weight (HW) as manufactured by Charlotte Pipe by Ideal Tridon, Fernco, Anaco, or prior approved equal, made of extra wide, heavy duty, corrugated series 304 stainless steel with axially slotted, heavy duty worm drive clamps tightened to 80 in. Lbs. of torque. Flanged gasket to be made of neoprene rubber, meeting the requirements of ASTM C-564, with sealing rubber rings under each stainless steel clamp. Coupling to be ASTM 1540 compliant. Couplings shall have FM1680 approval.

2.03 FLANGES

- A. Flanges in steel pipe shall be 150 pound steel, ANSI B16.5, slip-on type welding flange with raised or flat face to mate with adjacent flanges, valve, fitting, or piece of equipment.
- B. Flange gaskets shall be 1/16 inch non-metallic, ring type, ANSI B16.21.
- C. Flange bolts shall be carbon steel, all threaded type, Nuts shall be carbon steel hexagon type. Steel for bolts and nuts shall conform to ASTM A307, Grade A.

- A. FD (Restrooms and General Use): Floor drains shall have a cast iron body with adjustable 6"x6" square nickel bronze strainer and flashing flange. Drains shall be:

<u>Manufacturer</u>	<u>Hub & Spigot / No hub</u>
Wade	1100-G

Approved Equal: J.R. Smith, Watts, Zurn, Mifab, Josam

- B. FD2 (Mechanical Rooms - Air Handling Rooms): Floor drains shall have a cast iron body with adjustable 8" round polished bronze strainer, recessed lip, and flashing flange. Drains shall be:

<u>Manufacturer</u>	<u>Hub & Spigot / No hub</u>
J.R. Smith	2005-F37
Josam	30000-E1
Wade	W-1100ER
Zurn	ZN-415-7I
Watts	FD-100-ER7
Mifab	F1100-C-ER7-1

- C. All floor drains shall be equipped with trap primer connections.
- D. All floor drains to have barrier type trap primers in addition to the automatic trap primers. Barrier type trap primers to be SureSeal Waterless Inline Drain Trap Seal as manufactured by Rectorseal or prior approved equal.

2.05 CLEANOUTS

- A. Cleanouts shall be provided where shown on the drawings and shall be the same size as the pipe on which installed except cleanouts on underground piping shall be a maximum of 4". Contractor to provide cleanouts whether indicated on drawings or not (with cast iron boxes and covers marked "CO") every eighty (80) feet (max.) or change in direction as required by International Plumbing Code, current Edition.
- B. Cleanouts in waterproofed floors shall have flashing clamp.
- C. Exterior Cleanouts: Exterior cleanouts shall be as detailed on drawings.
- D. For Exposed Horizontal Piping: Cleanout shall be a cast iron ferrule with countersunk taper thread bronze plug for insertion in end of pipe. Cleanout shall be:

	<u>Hub & Spigot</u>	<u>No-Hub</u>
J.R. Smith	4420	Blind Plug
Josam	58540	Blind Plug
Wade	W-8550-D	Blind Plug
Zurn	Z-1470-7	Blind Plug
Mifab	C1450	

- E. For Exposed Vertical Piping: Cleanout shall be countersunk bronze plug with taper threads for insertion into tapped cast iron cleanout tee. Cleanouts shall be:

	<u>Hub & Spigot</u>	<u>No-Hub</u>
J.R. Smith	4472-U	4470
Josam	58540-15	58540
Wade	W-8590-D	W-8590-D
Zurn	Z-1470-8-VP	Z-1470
Mifab	C1430	C1430

- F. For masonry and steel stud walls: Cleanout shall be countersunk bronze plug tapped for machine screw, tapered threads, shallow stainless steel face-of-wall access cover, and vandal

proof securing screw. Cleanout shall be inserted into tapped cast iron cleanout tee. Cleanout shall be:

	<u>No-Hub</u>
J.R. Smith	4472
Josam	58890
Wade	W-8470-R-75
Zurn	Z-1460-8
Mifab	C1430-RD-3

- G. For piping concealed in pipe chase or shaft: Cleanout shall be a countersunk bronze plug with taper threads for insertion into a tapped cast iron cleanout tee. Locate a 10" x 10" chrome plated flush-with-wall access cover, with vandal proof securing screw adjacent to cleanout plug. Cleanout and cover shall be:

<u>Cleanout</u>	<u>No-Hub</u>
J.R. Smith	4472
Josam	58890
Wade	W-8590-D
Zurn	Z-1470
Jonespec	63000NH
Mifab	C1430
<u>Cover</u>	
J.R. Smith	4735
Josam	58640
Wade	W-8480-S
Zurn	ZANB-1460
Mifab	C1400-S9

- H. For concrete floors: Cleanout shall have cast iron body, adjustable square scoriated nickel bronze cover and rim, securing screw, and countersunk bronze plug with taper threads. Cleanout shall be manufactured by JR Smith, Josam, Wade, Zurn, Mifab or prior approved equal.
- I. For quarry tile or ceramic tile floors: Cleanouts shall have cast iron body, adjustable square scoriated nickel bronze cover and rim, securing screw, and countersunk bronze plug with taper threads. Cleanouts shall be manufactured by JR Smith, Josam, Wade, Zurn, Mifab or prior approved equal.
- J. For resilient tile floors: Cleanout shall have cast iron body, adjustable square nickel bronze cover recessed for tile, securing screws, and countersunk bronze plug. Cleanouts shall be manufactured by JR Smith, Josam, Wade, Zurn, Jonespec, Mifab or prior approved equal.
- K. For carpeted floors: Cleanout shall have cast iron body, adjustable square nickel bronze cover and rim, carpet marker, and countersunk bronze plug with taper threads. Cleanouts shall be manufactured by JR Smith, Josam, Wade, Zurn, Mifab or prior approved equal.
- L. For cleanouts to grade: Cleanout shall have cast iron ferrule and countersunk bronze plug with taper threads. Where not in paved areas, cleanouts shall be set in a 12" x 12" x 6" deep poured concrete pad set flush with grade. Cleanout shall be:

J.R. Smith	4400
Josam	58500
Wade	WL-8550-S
Zurn	Z-1440
Mifab	C1450

2.06 TRAPS

- A. Traps other than those furnished as a part of the plumbing fixture, shall be of the same materials and size as the pipe into which they discharge, unless specified otherwise hereinafter. Where not underground, traps shall be provided with cleanout plugs on the bottom.

2.07 DRAINAGE ACCESSORIES

- A. Backwater valves shall be cast iron with bronze backwater flap, adjustable cast iron body and collar, hub inlet spigot outlet. Backwater valves shall be:

J.R. Smith	7022
Zurn	Z-1095
Jonespec	76000
Mifab	BV-1200-R

- B. Fixed air gaps shall be cast iron with spigot outlet. Fixed air gaps shall be:

J.R. Smith	3955
Josam	1800
Zurn	Z-1025
Wade	W-2490
Mifab	MI-CAG

2.08 FLOOR SINK

- A. "FS": Floor sink shall be 12" square, cast iron, 6" deep with acid resisting porcelain enameled interior double drainage flange with weepholes, bottom outlet, inside caulk connection, aluminum interval dome strainer, and cast-iron, 3/4 acid resisting grate, sediment bucket, 1/2" trap primer connection. Floor sink shall be Josam 49320A series, Wade or approved equal.
- B. "FS2": Floor sink shall be 8" square, cast iron, 6" deep with acid resisting porcelain enameled interior double drainage flange with weepholes, bottom outlet, inside caulk connection, aluminum interval dome strainer, and cast-iron, 3/4 acid resisting grate, sediment bucket, 1/2" trap primer connection. Floor sink shall be ZURN Z1910, Wade or approved equal.

2.09 SMOKE TEST

- A. Contractor shall perform smoke test on entire sanitary sewer system at completion of project and shall include all associated costs in bid, re: Section 200213.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Horizontal soil and waste piping 2 1/2 inches in size and smaller shall be sloped at a minimum of 1/4 inch per foot. Horizontal soil and waste piping 3", 4", 6" shall be sloped at a minimum of 1/8 inch per foot. Horizontal soil and waste piping 8 inches in size and larger shall be sloped at a minimum of 1/16 inch per foot.
- B. Horizontal vent branches shall be kept above the highest fixture served by the vent branch in order to preclude the possibility of vents being used as waste pipes. Horizontal vent branches shall be sloped to prevent the accumulation of waste or scale therein.
- C. On soil, waste and vent piping changes in pipe size shall be made with reducing fittings and changes in pipe direction shall be made with fittings. No bushings allowed.
- D. Caulked hubs on all drainage and vent piping shall have the open hub end facing against the direction of flow.
- E. During construction all pipe openings, not being worked on, shall be plugged or capped to prevent foreign objects from entering system.
- F. Except for special types, floor drains shall be set flush with the floor at the low points designated on the architectural drawings.

- G. Open hub drains shall be installed as shown on the drawings and have the hub set in the floor with top 1" above the finished floor. Indirect waste piping shall terminate 2" above the top of the hub.
- H. Cleanouts on underground drainage shall have piping extended to the floor and finished with cleanout plug and removable floor plate.
- K. Cleanouts in vertical piping shall be roughed with centerline not more than 1'-6" above the finished floor, but high enough to clear the baseboard.
- I. **STAINLESS STEEL PIPE HANGERS:**
 - 1. Provide stainless steel pipe hangers for all piping located under building slab.
 - a. Piping up to 6" (Outer Diameter) and less shall utilize 1/4" thick stainless steel hanger rods.
 - b. Piping greater than 6" (Outer Diameter) up to 10" (Outer Diameter) shall utilize 3/8" thick stainless steel hanger rods.
 - c. Piping greater than 10" (Outer Diameter) shall utilize 1/2" thick stainless steel hanger rods.
 - 2. Hanger rods to span two (2) steel re-bars with 90 degree bend (2" in length) at ends of hanger rods within slab.
 - 3. Twist hanger rods tightly around top of piping two (2) complete 360 degree turns.
 - 4. Provide hanger rods every 4'-0", at all changes in directions, and at all fittings & joints.
- J. At project completion the contractor shall remove all debris (concrete, dirt, etc.) from all exterior cleanouts & manhole covers, then apply two-part epoxy coating (black) for all exterior cleanouts, manhole covers, and valve covers.
- K. Install all manufacturer's components in accordance with respective manufacturer's recommended installation guidelines.

3.02 JOINTS

- A. Gasketed joints for cast iron pipe shall be made with lubricated neoprene compression gaskets.
- B. Clamped joints for hubless cast iron pipe shall be made with bolted stainless steel clamps and neoprene gasket. Clamps shall be tightened by alternately tightening screws to 60 in. lb. torque.
- C. Threaded joints for steel pipe shall be made with a mixture of graphite and oil applied to male threads only. After cutting, but prior to threading, pipe shall be reamed and have burrs removed.
- D. Soldered joints for type 'L' copper tubing and cast DMV bronze pipe shall be made with 95-5 tin-lead solder and a compatible flux.
- E. Brazed joints for red brass pipe shall be made with BcuP-5 brazing alloy and a compatible flux.
- F. Clamped joints for storm drainage & waste drainage hubless cast iron pipe 6" and larger shall contain tie rods on the vertical to horizontal and horizontal to vertical.

3.03 FLASHING

- A. Vent pipe (in membrane roofs) shall be flashed and made water tight at roof with flashing recommended or provided by roofing manufacturer.

END OF SECTION

4-14-25

SECTION 22 33 00 - WATER HEATER ACCESSORIES

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. Work Included
 - 1. Circulating Pump
 - 2. Tempering Valve
 - 3. Thermostatic Mixing Valve

1.03 SUBMITTALS

- A. General: All submittals shall comply with the requirements of Division 1 - GENERAL REQUIREMENTS and Section 20 01 00 - GENERAL PROVISIONS.
- B. Product Data: Data shall be submitted on the following items:
 - 1. Circulating Pump
 - 2. Tempering Valve
 - 3. Thermostatic Mixing Valve
- C. Operation and Maintenance Instructions: Data shall be provided for the following items:
 - 1. Circulating Pump
 - 2. Tempering Valve
 - 3. Thermostatic Mixing Valve

1.04 QUALITY ASSURANCE

- A. Standards
 - 1. American Society of Heating, Refrigeration, Air Conditioning Engineers (ASHRAE):
 - a. Standard 90 A, Energy Conservation in New Building Design, 1980 Edition.
 - 2. American Society of Mechanical Engineers (ASME):
 - a. Boiler and Pressure Vessel Code, Section IV Low-Pressure, Heating Boilers, 1980 Edition.
 - b. Boiler and Pressure Vessel Code, Section VIII - Unfired Pressure Vessels, 1980 Edition.

PART 2 PRODUCTS

2.01 GENERAL

- A. Refer to the drawings for capacities and electrical characteristics of water heaters.
- B. Water heaters shall be provided with all openings for specified and detailed accessories.
- C. Where heater storage volume is 120 gallons or greater, tank shall be constructed in accordance with ASME Code Section IV for 125 psig working pressure.

2.02 TEMPERATURE AND PRESSURE RELIEF VALVES

- A. Temperature, pressure, and combination relief valves, if not factory installed, shall be automatic type with bronze body, threaded ends and manual test level. The temperature relief setting

shall be 210 degrees F and the pressure relief setting shall be equal to the water heater tank working pressure. Relief valves shall be:

Watts

A.W. Cash

Robert Shaw

2.03 WATER TEMPERING VALVES

- A. General: High-Low type, manually adjustable, thermostatically controlled water tempering valve; bronze body; and adjustable temperature setting.
- B. System Water Tempering Valves: Piston or discs controlling both hot- and cold-water flow, capable of limited antiscald protection. Include threaded inlets and outlet.
- C. Finish: rough bronze.
- D. Integral combination checkstops with strainers and wall support.
- E. Available Manufacturers: Leonard model XL-32A-LF-BDT-IT, lawler, or prior approved equal.
- F. Water Tempering Valves to be lead-free.
- G. Water tempering valve to be ASSE 1017 compliant.

2.04 DOMESTIC WATER THERMAL EXPANSION TANK

- A. Furnish and install, as shown on the plans, ASME Precharged steel Thermal Expansion Tank with a fixed bladder. The tank shall have a top NPT stainless system connection and a .301" - 32 charging valve connection (standard tire valve) to facilitate the on-site charging of the tank to meet system requirements. The tank must be constructed in accordance with Section VIII of the ASME Boiler and Pressure Vessel Code, stamped for 150 psi working pressure. Unit shall be designed and constructed per ASME Section VII. Manufacturer: Wessels TTA Series.
- B. Thermal expansion tank to limit the pressure of the water being heated to no more than 80 pounds per square inch as required per the International Plumbing Code (current edition)

2.05 DOMESTIC HOT WATER CIRCULATION PUMPS

- A. Domestic hot water circulation pump shall be the in-line centrifugal type designed for 125 psi working pressure with stainless steel body and impeller, mechanical seals and stainless steel impeller shaft. The pump motor shall be the ECM permanent magnet technology design with ceramic bearings, built-in thermal over-load protectors, built in timer, and shall operate at 1750 RPM. Pump shall have the capacities as shown on the drawings. Pump shall be:

Taco

0034ePlus

2.06 THERMOSTATIC MIXING VALVE (TMV)

- A. Thermostatic mixing valve shall be high-low manifold system, refer to schedule on drawings for exact size, type, & performance. Assembly shall contain an intermediate and small thermostatic mixing valve each with thermostat directly linked to valve porting adjustable limit stop, scale: cold to ht, wall support, inlet union angle strainer check stops, outlet ball valve, pressure gauges, dial thermometer. Assembly shall be rough bronze finish factory assembled and installed in wall mount stainless steel cabinet (w/ door, piano hinged and lockable) and tested. Each box to be labeled for intended services. Thermostatic mixing valve assembly shall be: Bradley, Leonard, Powers or Lawler. Provide one (1) TMV per hot water heater, refer to typical detail for installation. Thermostatic mixing valves to be lead-free type.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Hot water heaters to be installed over auxiliary drain pan per International Plumbing Code (2021 Ed.) Install water heaters to be installed in strict accordance with manufacturer's recommendations.
- B. Floor mounted hot water heaters to be installed on non-combustible platform.

- C. Temperature control valves shall be installed in accordance with manufacturers requirements.
- D. Temperature, pressure, and combination relief valves shall have discharge piped full size to exterior wall & turn down (terminate no less than 6" and no more than 12" above finished grade). If water heater is not installed by exterior wall, pipe to nearest floor sink (indirect waste receptor).

3.02 OPERATING MANUAL (DOMESTIC HW HEATERS)

- A. Instructions for installation, operation and maintenance of the water heater shall be contained in a manual provided with each boiler unit. Provide four (4) manuals with the submittal process for use by the installing contractor during the installation process.
- B. A wiring diagram corresponding to the water heater shall be affixed to the water heater near the electrical panel.

3.03 MARKING

- A. All water heaters shall bear the following, or equal wording on a visible decal or label by the manufacturer:
"There shall be installed at time of heater installation a combination temperature and pressure relief valve, selected and located in conformance with the requirements of ANSI Z21.22."

END OF SECTION

4-14-25

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SECTION 22 3301 - GAS FIRED WATER HEATERS

PART 1 - GENERAL

1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract apply to this Section, including General and Supplementary Conditions and Division 01 Specification Sections.

2 SUMMARY

- A. This Section includes packaged, factory-fabricated and assembled, gas-fired, high efficiency condensing domestic water heaters, trim and accessories for generating hot potable water.

3 SUBMITTALS

- A. Product Data: Include performance data, operating characteristics, furnished specialties and accessories.
- B. Pressure Drop Curve: Submit pressure drop curve for flows ranging from 0 GPM to maximum value of water heater.
- C. Shop Drawings: For water heaters, water heater trim and accessories, include:
 - 1. Elevations, sections, details
 - 2. Wiring Diagrams for power
- D. Operation and Maintenance Data: Data to be included in water heater emergency, operation and maintenance manuals.
- E. Warranty: Standard warranty specified in this Section.
- F. Made in America Certification (Including Buy America Act Compliance)

4 QUALITY ASSURANCE

- A. ETL Compliance. Condensing water heaters must be tested for compliance with ETL, "Commercial-Industrial Gas Heating Equipment." Condensing water heaters shall be listed and labeled by a testing agency acceptable to authorities having jurisdiction.
- B. CO Emission Standards. When installed and operated in accordance with manufacturer's instructions.

5 COORDINATION

- A. Coordinate size and location of concrete bases. Cast anchor-bolt inserts into bases. Concrete, reinforcement and formwork requirements are specified in Division 03.

6 WARRANTY

- A. Standard Warranty: Water heaters shall include manufacturer's standard form in which manufacturer agrees to repair or replace components of water heaters that fail in materials or workmanship within specified warranty period.

1. Warranty Period for Condensing Water heaters:

- a. The heat exchanger coil shall carry a 6 year from commissioning, non-prorated, limited warranty against any failure due to waterside corrosion, mechanical defects, or workmanship. The heat exchanger coil shall carry a 6 year from commissioning, non-prorated, limited warranty against any failure due to condensate corrosion, thermal stress, mechanical defects, or workmanship.
- b. Manufacturer labeled control panels are conditionally warranted against failure for one (1) year from commissioning.
- c. All other components, including the electronic igniter and electrode, are conditionally guaranteed against any failure for 12 months from commissioning.
- d. Provide extended service for manufacturer to provide factory monitoring of water heater performance and parts. Factory prognostics and predictive maintenance in the optional service

PART 2 - PRODUCTS

1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
- C. Basis-of-Design Product: Subject to compliance with requirements, provide Intellihot Model IN199A or a comparable product by one of the following:

1. PVI

2 CONSTRUCTION – ASME CERTIFIED

- A. General: Each water heater shall be ETL Listed; and shall incorporate a negative pressure gas valve on each heat exchanger capable of full fire operation at of 2.5" WC of gas pressure.

Each unit shall achieve a minimum turndown of 6.7:1 per 200,000 BTU of input . The total water content in the water heater shall be less than 2 gallons per 200,000 BTU/hr of input.

- B. Description: Water heater shall be direct fired, fully condensing, water-tube design. Power burner shall have full modulation. The minimum firing rate shall not exceed 30,000 BTU/HR input. Water heaters that have an input greater than 30,000 BTU/hr at minimum fire will not be considered equal. The water heater shall have the capability of discharging into a positive pressure vent. Water heater thermal efficiency shall increase with decreasing load (output), while maintaining set point. Water heater shall have an operational set point capability of 100 °F to 190 °F and shall maintain the outlet temperature within an accuracy of +/- 4 °F during load changes of up to 30% rated capacity. Water heater shall be factory-fabricated, factory-assembled and factory-tested, water-tube condensing water heater with heat exchanger sealed pressure-tight, built on a steel base, including a sealed insulated sheet metal enclosure that acts as combustion-air intake plenum with a built in serviceable air filter
- C. Heat Exchanger: The heat exchanger shall be constructed with 316L stainless steel helical water tube, fully floating with no welded joints in the exchanger. The exchanger will have a single-pass unitary design (no separate primary and secondary heat exchanger). The water tubes shall be 0.75" ID, with no less than 0.0472" wall thickness. The heat exchanger shall be for a working pressure not less than 150 PSIG.
- D. Modulating Air/Fuel Valve and Burner: The water heater burner shall be capable of a 6.7:1 turndown ratio of the firing rate without loss of combustion efficiency or staging of gas valves. The burner shall be stainless fiber mesh covering a stainless steel body with spark ignition and flame rectification. All burner material exposed to the combustion zone shall be of stainless steel construction. There shall be no moving parts within the burner itself. A modulating air/fuel valve shall meter the air and fuel input. A variable frequency drive (VFD), controlled pre-mix blower shall be used to ensure the optimum mixing of air and fuel between the air/fuel valve and the burner.
- E. The exhaust manifold shall be of polypropylene with a 3" diameter flue connection. Refer to specification 235123.
- F. Ignition: Ignition shall be via spark ignition with 100 percent main-valve shutoff and dual electronic flame supervision.

3 CONTROLS

- A. Refer to Division 23, Section "Instrumentation and Control of HVAC."
- B. The water heater control system shall be a Masterless Cascading design with no-master - slave designation. The entire system shall have built-in usage optimization routine.
- C. The control panel shall consist of one individual circuit. The circuit boards shall include:
 - 1. A Digital touch display to indicate temperature and status
 - 2. A CPU board housing all control functions

Each board shall be individually field replaceable.

- D. The combustion safeguard/flame monitoring system shall use spark ignition and a rectification-type flame sensor.

- E. The unit shall have a selectable exhaust temperature limit suitable for venting with Polypropylene.
- F. The controls shall annunciate water heater and sensor status and include extensive self-diagnostic capabilities.
 - 1. Set point High Limit: Set point high limit allows for a selectable maximum water heater outlet temperature and acts as temperature limiting governor. Setpoint limit is based on a closed loop function that automatically limits firing rate to maintain outlet temperature.
- G. The water heater control system shall incorporate the following additional features for enhanced external system interface:
 - 1. Temperature set point
 - 2. High Exhaust temp monitor and control. Turn down the Gas valve until the exhaust temp is kept below vent flue selected material.
 - 3. Cascading via RS232
 - 4. Error Code Display / Error Code History
 - a. Blower Fault
 - b. Blocked Flue Fault
 - c. Ignition Failure
 - d. Temp Sensor Short
 - e. Temp Sensor Wiring Fault
 - f. Flue Temp Fault
 - g. Heat Exchanger Temp Fault
 - h. Cascading Fault
 - i. Water Valve Fault
 - j. Pump Fault
 - k. Software Fault
 - 5. Monitor and access to daily, weekly, monthly water usages data.
 - 6. Monitor inlet/outlet temperatures, flow rates, flue gas temperatures, combustion rates via onboard touchscreen and via IoT app.
- H. Water Heater Management: the water heater control system shall incorporate onboard multi-unit sequencing logic that would allow Masterless Cascading (Not Lead/Lag) functionality & sequencing between multiple water heaters operating in parallel and must have the following capabilities:
 - a. Efficiently sequence 2 up to 4 (~ 800,000 BTU/h) heat exchangers on the same system to meet the load requirement.
 - b. Individual heat exchanger logic to enable accurate temperature control.

- c. Operate one motorized valve per heat exchanger as an element of the load sequencing, Valves shall close with decreased load as heaters turn off, minimum of one (depending upon Mode selection) must always stay open for recirculation.
- d. Automatically rotate Start/Stop amongst the heat exchangers in the chain based upon an internal calculation of run hours, water through put, burner starts and stops and length of time each burner has been firing. Sequencing is not based upon next in line (Lead/Lag), it is based upon the most logical (least used) heat exchanger in an effort to equalize unit run hours.
- e. Automatic bump-less transfer of sequencing in case of heat exchanger failure. All systems must be able to fail all but one heat exchanger in any order or for any reason and the last will continue to operate.
- f. Each heat exchanger will default to individual control upon failure of the sequencing chain.
- g. Automatic isolation of heat exchanger module from water circuit in case of failure and prevention of cold water from exiting the system
- h. Masterless control, change any parameter in any one of the units and all the rest in the series will automatically adjust to the most recent parameter change.

4 ELECTRICAL POWER

- A. Controllers, Electrical Devices and Wiring: Electrical devices and connections are specified in Division 26 sections.
- B. Single-Point Field Power Connection: Factory-installed and factory-wired switches, motor controllers, transformers and other electrical devices shall provide a single-point field power connection to the water heater.
- C. Electrical Characteristics:
 - 1. Voltage: 120 V
 - 2. Phase: Single
 - 3. Frequency: 60 Hz
 - 4. Full-Load Current 5 Amps or less per 200,000 BTU of heat input

5 CONDENSATE

- A. Condensate traps, manufactured from only non-corrosive materials.
- B. Provide smart condensate neutralizer with capability of monitoring pH levels through included IoT app. Smart Neutralizer to also include
 - 1. Monitor water temperatures
 - 2. CO detection, flue gas detection, water leak detection of boiler room with audible/visual alarms and alerts via app.

3. Water flow recording/monitoring
4. View history of above parameters via app.

6 VENTING

- A. The exhaust vent shall be Polypropylene compatible with positive pressure, condensing flue gas service. Refer to specification 235123
- B. The minimum exhaust vent duct size for each water heater is six-inch diameter.
- C. Combustion-Air Intake: Water heaters shall be capable of drawing combustion air from the outdoors via a polypropylene duct/pipe connected between the water heater and the outdoors. Refer to specification 235123.
- D. The minimum sealed combustion air duct size for each water heater is 3" diameter.
- E. Individually vent, do not Common Vent nor Common Combustion Air.

7 SOURCE QUALITY CONTROL

- A. Burner and Hydrostatic Test: Factory adjust burner to eliminate excess oxygen, carbon dioxide, oxides of nitrogen emissions and carbon monoxide in flue gas, and to achieve combustion efficiency.
- B. Live-fire Test and inspect factory-assembled water heaters, before shipping.,
- C. Allow Owner access to source quality-control testing of water heaters.

PART 3 - EXECUTION

1 EXAMINATION

- A. Before water heater installation, examine roughing-in for concrete equipment bases, anchor-bolt sizes and locations. Examine piping and electrical connections to verify actual locations, sizes and other conditions affecting water heater performance, maintenance and operations.
 1. Final water heater locations indicated on drawings are approximate. Determine exact locations before roughing-in for piping and electrical connections.
- B. Examine mechanical spaces for suitable conditions where water heaters will be installed.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

2 WATER HEATER INSTALLATION

- A. Install water heaters level on non-combustible platform.

- B. Install gas-fired water heaters in accordance with
 - 1. Local, states, provincial, and national codes, laws, regulations, and ordinances.
 - 2. National Fuel Gas Code, ANSI Z223.1/NFPA 54 – latest edition.
 - 3. National Electrical Code, ANSI/NFPA 70 - latest edition.
 - 4. Canada only: CAN/CGA B149 Installation Code and CSA C22.1 CEC Part 1.
 - 5. Manufacturer's installation instructions, including required service clearances and venting guidelines.
- C. Assemble and install water heater trim.
- D. Install electrical devices furnished with water heater but not specified to be factory mounted.
- E. Install control wiring to field-mounted electrical devices.

3 CONNECTIONS

- A. Piping installation requirements are specified in other Division 23 sections. Drawings indicate general arrangement of piping, fittings and specialties.
- B. Install piping adjacent to water heater to permit service and maintenance.
- C. Install piping from equipment drain connection to nearest floor/hub drain. Piping shall be at least full size of connection. Provide an isolation valve if required.
- D. Connect gas piping to water heater gas valve with unions. Piping shall be at least full size of gas train connection. Provide a reducer if required.
- E. Connect hot-water piping to supply and return water heater tapplings with shutoff valve and union or flange at each connection.
- F. Multiple heaters shall be piped such that all cold water entering the system will go through the heat exchanger first. A series of approved piping installation examples are shown in the installation and maintenance manuals provided with the unit. Each water heater shall have individual isolation valves for servicing and a hot water hose connection for start-up and field testing.
- G. Install piping from safety relief valves to nearest floor drain.
- H. Water heater Venting
 - 1. Install flue venting kit and combustion-air intake.
 - 2. Connect venting full size to water heater connections. Comply with requirements in Division 23 Section 235123 "Breechings, Chimneys and Stacks for Condensing Appliances."
- I. Ground equipment according to Division 26 Section "Grounding and Bonding for Electrical Systems."
- J. Connect wiring according to Division 26 Section "Low-Voltage Electrical Power Conductors and Cables."

4 FIELD QUALITY CONTROL

A. Perform tests and inspections and prepare test reports.

1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies and equipment installations, including connections, and to assist in testing.

B. Tests and Inspections

1. Installation and Startup Test: Perform installation and startup checks according to manufacturer's written instructions.
2. Leak Test: Perform hydrostatic test. Repair leaks and retest until no leaks exist.
3. Operational Test: Start units to confirm proper motor rotation and unit operation. Adjust air-fuel ratio and combustion, if necessary.
4. Controls and Safeties: Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
 - a. Check and adjust initial operating set points and high- and low-limit safety set points of fuel supply, water level and water temperature.
 - b. Set field-adjustable switches and circuit-breaker trip ranges as indicated.

C. Remove and replace malfunctioning units and retest as specified above.

D. Occupancy Adjustments: When requested within 6 months of date of Substantial Completion, provide on-site assistance adjusting system to suit actual occupied conditions. Provide up to four (4) visits to Project during other than normal occupancy hours for this purpose.

E. Performance Tests

The water heater manufacturer is expected to provide partial load thermal efficiency curves. These thermal efficiency curves must include at least three separate curves at various BTU input levels. If these curves are not available, it is the responsibility of the water heater manufacturer to complete the following performance tests:

1. Engage a factory-authorized service representative to inspect component assemblies and equipment installations, including connections, and to conduct performance testing.
2. Water heaters shall comply with performance requirements indicated, as determined by field performance tests. Adjust, modify, or replace equipment to comply.
3. Perform field performance tests to determine capacity and efficiency of water heaters.
 - a. Test for full capacity.
 - b. Test for water heater efficiency at [low fire, 20, 40, 60, 80, 100, 80, 60, 40 and 20] percent of full capacity. Determine efficiency at each test point.

4. Repeat tests until results comply with requirements indicated.
5. Provide analysis equipment required to determine performance.
6. Provide temporary equipment and system modifications necessary to dissipate the heat produced during tests if building systems are not adequate.
7. Notify Architect/Engineer in advance of test dates.
8. Document test results in a report and submit to Architect/Engineer.

END OF SECTION

4-14-25

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SECTION 22 4000 - PLUMBING FIXTURES AND TRIM

PART 1 GENERAL

1.01 GENERAL

- A. Plumbing Fixtures and Trim.

1.02 RELATED WORK

- A. Section 20 01 00: General Provisions
- B. Section 22 05 23: Plumbing System Valves
- C. Section 22 10 00: Domestic Water System
- D. Section 22 33 00: Water Heaters and Accessories
- E. Section 22 13 00: Sanitary Waste and Vent Drainage System

1.03 SUBMITTALS

- A. Submit manufacturer's product data and installation instruction complete with rough-in sheets.

1.04 GENERAL REQUIREMENTS

- A. Plumbing Contractor shall furnish and install plumbing fixtures as shown on the accompanying drawings and in accordance with the approved rough in drawings. This will include service sinks, lavatories, water closets, urinals, etc., with all brass in connections with supply with tubing, traps, escutcheons, stop and basin cocks, etc. All fixtures shall be new and must be delivered to the building properly crated and in perfect condition.
- B. All brass must be best quality. All brass pipe to be seamless brass tubing and all fixture traps shall be heavy with C.O. plugs. Nipples shall be extra heavy. Lightweight goods will not be accepted.
- C. All exposed metal on fixtures shall be C.P. or Chromard. All "P" traps shall be complete with cleanout plug.
- D. Plumbing contractor shall submit in his fixture brochure for approval, a rough in sheet of each fixture and indicate any variation required for the fixtures. Fixtures are to be roughed in accordance with these approved rough-in sheets and anchored so that piping cannot be moved.
- E. All plumbing fixtures, materials, and units shall conform to applicable standards (ANSI/NSK, ASME, ASSE, ASTM, FS, UL, etc.) as required International Plumbing Code, Current Edition.

1.05 JOB CONDITIONS

- A. Check millwork shop drawings. Confirm location and size of fixtures and openings before rough-in and installation.

1.06 GENERAL REQUIREMENTS AND JOB CONDITIONS

- A. Plumbing Contractor shall furnish and install plumbing fixtures as shown on the accompanying drawings and in accordance with the approved rough in drawings. This will include service sinks, lavatories, water closets, urinals, etc., with all brass in connections with supply with tubing, traps, escutcheons, stop and basin cocks, etc. All fixtures shall be new and must be delivered to the building properly crated and in perfect condition.
- B. All brass must be best quality. All brass pipe to be seamless brass tubing and all fixture traps shall be heavy with C.O. plugs. Nipples shall be extra heavy. Lightweight goods will not be accepted.
- C. All exposed metal on fixtures shall be C.P. or Chromard. All "P" traps shall be complete with cleanout plug.
- D. Plumbing contractor shall submit in his fixture brochure for approval, a rough in sheet of each fixture and indicate any variation required for the fixtures. Fixtures are to be roughed in accordance with these approved rough-in sheets and anchored so that piping cannot be moved.

- E. Check millwork shop drawings. Confirm location and size of fixtures and openings before rough-in and installation.
- F. Rough-in locations shall be carefully spotted to result in a symmetrical pattern with sufficient spacing to accommodate full escutcheons.
- G. All fixtures shall have supplies with stops. Stops shall be chrome plated brass. Trim shall be polished, chrome plated brass, same manufacturer as fixture unless otherwise indicated. All pipe, fittings, etc. in connection with supply or drain trim shall be chrome plated. In cases where fixtures may have hot and cold water trim without hot water service, connect cold water to both trim inlets.
- H. Trap separately each fixture and piece of equipment requiring connection to drainage, unless otherwise shown on drawings. Place traps as near to the fixture as possible. No fixture shall be double trapped. Unless indicated otherwise, drain "P" traps shall be polished, chrome plated cast brass with cleanout plug and 17 gauge tubular outlet to wall. For floor drains, hub drains or other similar devices with under floor traps, drain "P" traps shall be same material as the branch piping system.
- I. All plumbing fixtures, materials, and units shall conform to all applicable standards (ANSI/NSF, ASME, ASSE, ASTM, etc.) as required by the International Plumbing Code, Current Edition.
- J. All low water consumption fixtures and flush valve to be provided by the same manufacturer.

PART 2 PRODUCTS

2.01 PLUMBING FIXTURES

- A. FIXTURES: Refer to schedule on drawings.
- B. All plumbing fixtures are to be lead-free.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install each fixture in accordance with rough-in drawings as per manufacturer's recommendations. At completion thoroughly clean plumbing fixtures and equipment. Anchor fixtures rigidly; anchor piping in walls so that piping cannot be moved.
- B. Provide chrome plated rigid or flexible supplies to fixtures with stops, reducers and escutcheons.
- C. Solidly attach floor water closets to floor with lag screws and finishing caps.
- D. Existing fixtures on project in remodeled areas, not shown refused and/or relocated, shall be removed and turned over to the Owner, capping off all existing services behind finished surfaces.
- E. Install each fixture with trap, easily removable for servicing and cleaning.
- F. Mount fixtures to the following heights above finished floor (unless otherwise noted on architect's elevation drawings, ARCHITECTURAL DRAWINGS TO GOVERN FIXTURE HEIGHTS):
 - 1. Water Closets:
 - a. Standard 15" to top of bowl rim
 - b. Handicapped 18" to top of seat
 - 2. Urinal:
 - a. Standard 22" to top of bowl rim
 - b. Handicapped 17" to top of bowl rim
 - 3. Lavatories:
 - a. Handicapped 32" to top of basin rim
 - 4. Water Closet Flush Valves:
 - a. Standard 11" min. above bowl rim
- G. Provide stop valves on all hot and cold water supplies to all fixtures.

- H. Furnish fixture carriers to suit wall construction (and drainage fittings where necessary) on wall hung water closets, wall hung urinals and lavatories. Carriers to be anchored securely to floor.
- I. Install all fixtures according to manufacturer's recommendation.
- J. Mount wall hung water closets with rim at height required by applicable codes.
- K. All exposed screws and fasteners on all plumbing penal fixture including floor drains, cleanout covers, access panels on equipment, etc. shall be vandal proof and tamper resistant.
- L. Provide insulation on hot water, cold water and sanitary piping below handicapped lavatories.
- M. At each toilet on plan provided with a floor drain (or drains), provide a trap primer assembly as specified herein at the handicapped water closet installation or sink/lavatory and extend a trap primer supply line to floor drain or trap connection in accordance with the manufacturer's recommendations.
- N. All flush valves installed on handicapped water closet (ADA) shall be installed with handle to wide side of toilet. Handles on all tanks (applicable to tank water closets) shall be installed with handle to wide side of toilet.
- O. Contractor shall provide copper plated bracket between wall stubs to anchor water piping for flush valves for both water closets and urinals. Contractor shall spot solder water pipe to bracket.
- P. Contractor to provide offset in vertical flush valve piping as not to conflict with installation if grab bars.
- Q. All hardware utilized to secure plumbing fixtures is to be stainless steel. Submit product cut sheet to A/E for review prior to installation.

3.2 FIXTURE ROUGH-IN SCHEDULE

- A. Rough-in fixture piping and size connections shall be in accordance with the following table of minimum sizes for particular fixtures unless noted different on the drawings:

=====	
WATER PIPE SIZING TABLE	
=====	
UNLESS SHOWN OTHERWISE, DOMESTIC WATER LINES SHALL RUN CONCEALED OVERHEAD AS DESIGNATED IN PLUMBING FIXTURE SCHEDULE AND BE SIZED ACCORDING TO TABLE BELOW. PLANS AND RISER DIAGRAMS DO NOT NECESSARILY SHOW ALL PIPING RUNS. INSTALL A FACTORY SHOCK ABSORBER AT TOP OF EACH FIXTURE GROUP AND ALSO AT WATER HEATERS.	
=====	

<u>NUMBER OF FIXTURES</u>	<u>PIPE SIZE (IPS)</u>
2 or Less	1/2"
3 to 5	3/4"
6 to 10	1"
11 to 15	1-1/4"
16 to 28	1-1/2"

**FLUSH VALVE WATER CLOSET IS EQUIVALENT TO SIX (6) FIXTURES*

- B. SIZES INDICATED ABOVE ARE MINIMUM SIZES TO BE USED UNLESS OTHERWISE SPECIFIED DIFFERENT.

END OF SECTION
4-14-25

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SECTION 23 04 14 - MOTOR STARTERS

PART 1 MANUFACTURER

1.01 Manufacturer

- A. Approved Manufacturer: Franklin Controls, General Electric, or prior approved equal.

1.02 Submittals

Manufacturer shall provide copies of the following documents:

- A. Product data sheets on specified products.
- B. Shop drawings for specified product.
- C. Wiring Schematics for specified products.

PART 2 PRODUCTS

2.01 Section Includes:

- A. Enclosed FVNR combination single phase motor starter with electronic overload relay
- B. Enclosed FVNR non-combination motor starters with electronic overload relay
- C. Enclosed FVNR combination motor starters with electronic overload relay

2.02 References

The starters referenced in this section are designed and manufactured to the following standards unless otherwise noted:

- A. ANSI/NFPA -70, National Electric Code
- B. UL 508, and UL508A Industrial Control Equipment
- C. NEMA ICS-2, 2000
- D. IEC 60947-5, 60947-4, 60947-3

2.03 System Description

- A. Single Phase Starter: Starters for 115VAC single phase motors less than 1 HP shall be capable of both manual and automatic operation. Refer to Section 2.03.1 for single phase starter requirements.
- B. Magnetic Starters: Starters for 3-phase motors shall be magnetic starters. Refer to Section 2.03.2 for magnetic starter requirements.
- C. Combination Starters: Provide combination magnetic starters for all motors requiring branch circuit protection or a line-of-sight disconnect. Refer to Section 2.03.3 for combination magnetic starter requirements.
- D. Enclosures: NEMA/UL Type 1 for indoor applications, NEMA or UL Type 3R for outdoor applications

2.03.1 Enclosed Full Voltage Non-Reversing (FVNR) Single Phase Starter

- A. Single Phase Motor Starter Control: The single phase motor starter shall consist of a manually operated quick-make toggle mechanism lockable in the "Off" position which shall also function as the motor disconnect. Additionally, the starter shall provide thermal overload protection, run status pilot light and fault pilot light. The starter must include the capability to operate in both manual and automatic control modes. In automatic mode, the starter shall have the capability to integrate with a building automation system by providing terminals for run input, run status output and fault output. All control terminals shall be integrated in the starter. At a minimum, each single phase starter shall include an interposing run relay and current sensing status output relay. Single phase motor starter shall be in a surface mount enclosure.
- B. Approved manufacturer: Franklin Controls, model BAS-1P or approved equal.

2.03.2 Enclosed Full Voltage Non-Reversing (FVNR) Non-Combination Starter

- A. Magnetic Motor Starters shall be enclosed in a general purpose electrical enclosure with the appropriate environmental rating.
- B. Starters shall consist of a horsepower rated magnetic contactor with a minimum of 2NO and 2NC auxiliary contacts and solid state electronic overload relay.
- C. Overload relay shall protect all three phases with a wide range 1-40 amp current setting and trip class to allow field adjustment for specific motor FLA. Interchangeable heater elements are not acceptable.
- D. Overload relay shall incorporate SmartStart Technology, or the following protective functions:
 - a. Out of calibration protection (if the FLA on the overload is set outside acceptable range, overload will trip to indicate fault event)
 - b. Stall protection
 - c. Max time to start
 - d. Locked Rotor
 - e. Phase Unbalance
 - f. Phase loss
 - g. Cycle Fault
- E. Starter shall be field selectable for manual or auto reset to restore normal operation after a trip or fault condition. Manual pushbutton shall be accessible without removing or opening cover on starter.
- F. In the event of a power failure, starter shall restart in last mode by default. Starter shall also be capable of restart with 10 second delay, or restart in "off" mode.
- G. All starters must be provided with a universal power supply capable of a 208 to 600 volt input range. The power supply must accept the available line voltage and the control voltage shall not exceed 24V.
- H. Installed accessories shall include Hand-Off-Auto operation pushbutton keypad. Include LED pilot light indicators for Hand, Off, Auto, Run and Overload conditions.
- I. When remotely controlled by an automation system, the starter shall include remote run terminals which accept both a voltage input signal and a contact closure. The voltage run input shall accept both AC and DC signals from 12-250V to allow direct connection of the transistorized automation signal to the starter.
- J. Starter must contain an integral current sensor with NO contact which closes to indicate motor run status as well as a NO contact which closes when an overload trip condition occurs.
- K. In applications where the motor is interlocked with a 24VDC damper or valve, the actuator control must reside within the starter enclosure. The starter must provide a voltage output to operate the actuator to open the damper or valve without closing the motor circuit. The starter will only close the motor circuit and start the motor after it has received a contact closure from a limit or end switch confirming the damper or valve position.
- L. The starter shall include a dedicated voltage input for Fireman's Override operation. When activated, the starter run the motor in any mode (Hand, Off or Auto) regardless of other inputs or lack of inputs either manual or auto. The purpose of the Fireman's Override input is to act as a smoke purge function. Fireman's Override has priority over the Emergency Shutdown input.
- M. If the starter is controlled by a fire alarm or life safety system, the starter shall include an Emergency Shutdown input which will disable the starter from operating in either Hand or Auto mode regardless of other inputs either manual or auto.
- N. Manufacturer shall provide and install tags with engraved white lettering to designate equipment served

2.03.3 Enclosed Full Voltage Non-Reversing (FVNR) Combination Starter

- A. Enclosed combination starters shall include all of the magnetic starter requirements in addition to a disconnecting method. All disconnects shall include a lock-out mechanism when in the off position.
- B. Motor circuit protectors (MCP) shall be provided as the acceptable form of disconnecting means. The MCP shall be a UL listed 508 current limiting manual motor starter with magnetic trip elements only. The MCP shall carry a UL 508F rating (up to 100A frame size) which provides for coordinated short circuit rating for use with the motor contactor and provides a minimum interrupting rating of 30,000 AIC for the combination starter.

2.04 PROVIDE OPTIONAL FEATURES, AS REQUIRED, TO MEET DESIGN PERFORMANCE ACCORDING TO THE FOLLOWING REQUIREMENTS.

- A. Must provide over/under voltage and phase monitoring capability. Monitor shall be field adjustable for both over and under voltage levels and a delay time before returning to normal operation after a trip.
- B. Starter must measure and display output current on the front cover. If necessary, install digital or analog ammeter.
- C. The starter shall provide the capability to monitor and calculate power consumption (kWh) of the motor load. Each starter shall display the calculated kW and kWh. Additionally, provide either a pulse output (kWh) or 4-20mA analog signal (kW) to the automation system to monitor the power consumption.
- D. Starter must be capable of communicating over BACnet MS/TP. At a minimum, reported points shall include starter mode, terminal input status, run/fault status, voltage, current, power factor, kW and kWh.

2.05 Quality Assurance

- A. Manufacturer shall provide a five year warranty on the complete starter assembly.
- B. The starter assembly shall be UL listed under UL 508A.

END OF SECTION

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SECTION 23 0590 - CONTRACTOR COORDINATION WITH TESTING, ADJUSTING & BALANCING

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. Specifications throughout all Divisions of the Project Manual are directly applicable to this Section, and this Section is directly applicable to them.

1.2 SUMMARY

- A. Perform all Work required to prepare the building HVAC systems for testing, adjusting, and balancing (TAB) Work indicated by the Contract Documents, including the following:
 - 1. Preparation of air systems for testing, adjusting and balancing.
 - 2. Providing materials and labor to assist TAB Firm in meeting testing, adjusting and balancing requirements.
- B. Testing, adjusting and balancing of the air conditioning systems and related ancillary equipment will be performed by a technically qualified TAB Firm. The preparation for and corrections necessary for the testing, adjusting and balancing of these systems, as described herein, are the responsibility of this Contractor.
- C. Make any changes or replacements to the sheaves, belts, dampers and valves required for correct balance as advised by the TAB Firm, at no additional cost to the Owner.

1.3 REFERENCE STANDARDS

- A. The latest published edition of a reference shall be applicable to this Project unless identified by a specific edition date.
- B. All reference amendments adopted prior to the effective date of this Contract shall be applicable to this Project.
- C. All materials, installation and workmanship shall comply with the applicable requirements and standards addressed within the following references:
 - 1. AABC: National Standards for Testing and Balancing Heating, Ventilating and Air Conditioning Systems.
 - 2. AABC: Testing and Balancing Procedures.
 - 3. ASHRAE HVAC Applications Chapter 37: Testing, Adjusting and Balancing.
 - 4. ANSI/ASHRAE Standard 111: Practices for Measurement, Testing, Adjusting and Balancing of Buildings, Heating, Ventilation, Air Conditioning and Refrigeration Systems.

1.4 QUALITY ASSURANCE

- A. Provide and coordinate the services of qualified, responsible Subcontractors, suppliers and personnel as required to correct, repair, and/or replace any and all deficient items or conditions found during the course of this project, including during the testing, adjusting and balancing period.
- B. In order that systems may be properly tested, adjusted, and balanced, the Contractor shall operate systems at Contractor's expense for the length of time necessary to properly verify the systems' completion and readiness for TAB.
- C. Project Contract completion schedules shall allow for sufficient time to permit the completion of TAB services prior to Owner occupancy. Allow adequate time for the testing and balancing activities during the construction period and prior to Substantial Completion.

PART 2 - PRODUCTS

2.1 GENERAL

PART 3 - EXECUTION

3.1 PREPARATION

- A. Contractor shall be responsible to prepare the building heating, ventilating, and air conditioning systems ready for TAB when scheduled.
- B. Operational readiness requires that the construction status of the building will permit the closing of doors, windows, ceilings installed, etc., to obtain simulated or projected operating conditions.
- C. Notification of System Readiness:
 - 1. Upon completion of the system installation Work, the Contractor shall notify the Owner and TAB Firm in writing, certifying that the Work has been accomplished and that the air conditioning systems are in operational readiness for testing, adjusting, and balancing.
 - 2. TAB Firm shall notify the Contractor of TAB Firm's readiness for balancing.
 - 3. Should the TAB Firm be notified as described above, and the TAB Work commenced and the systems are found NOT to be in readiness or a dispute occurs as to the readiness of the systems, the Contractor shall request an inspection be made by a duly appointed representative of the Owner, Architect, TAB Firm and the Contractor. This inspection will establish to the satisfaction of the represented parties whether or not the systems meet the basic requirements for TAB services. Should the inspection reveal the TAB services notification to have been premature, all cost of the inspection and wasted Work accomplished by the TAB Firm shall be the responsibility of the Contractor.

3.2 INSTALLATION

- A. Installation shall meet or exceed all applicable federal, state and local requirements, referenced standards and conform to codes and ordinances of authorities having jurisdiction.
- B. All installation shall be in accordance with manufacturer's published recommendations.
- C. Allow sufficient time for the TAB Firm to perform TAB Firm's Work within the Project schedule. Complete installation Work by system or floor, whichever is the most efficient for scheduling. Develop the Project schedule in close coordination with the TAB Firm.
- D. The Drawings and Specifications indicate valves, dampers and miscellaneous adjustment devices for the purpose of adjustment to obtain optimum operating conditions. Install these devices in a manner that will leave the devices accessible and readily able to be adjusted. Immediately correct any malfunction encountered that the TAB Firm reports so that the balancing Work can proceed with minimal delay.
- E. Contractor shall promptly correct deficiencies of materials and workmanship identified as delaying completion of TAB Work.

3.3 SYSTEMS VERIFICATION

- A. Air Distribution Systems:
 - 1. Verify installation for conformity to the Contract Documents. All supply, return, and exhaust ducts shall be terminated and pressure tested for leakage as required by the Contract Documents.
 - 2. All volume, smoke and fire/smoke dampers are properly located and functional. Dampers serving requirements of minimum and maximum outside, return, and relief air shall provide tight closure and full opening, smooth and free operation.
 - 3. All supply, return, exhaust and transfer grilles, registers, diffusers and terminal devices are installed and airflow at each device shall be verified.
 - 4. Air handling systems, units and associated apparatus, such as heating and cooling coils, filter sections, access doors, etc., shall be sealed or blanked-off to eliminate excessive uncontrolled bypass or leakage of air.
 - 5. All fans (supply, return and exhaust) operating and verified for freedom from vibration, with proper fan rotation and belt tension. Heater elements in motor starters are of proper size

and rating. Record motor amperage and voltage on each phase at Start-up and running, and verify they do not exceed nameplate ratings.

6. Duct systems and air handling units and coils are clean and free of debris.
7. Air systems are pressure independent and can be tested by floor, riser, system, etc. but once the all systems are installed, the total flows and system tracking will require final testing, adjusting and balancing.

B. Building Automation System (BAS):

1. Verify that all control components are installed in accordance with the Contract Documents and that all control components are functional, including all electrical interlocks, damper sequences, air resets, fire and freeze stats, high and low temperature thermostats, safeties, etc.
2. Verify that all controlling instruments are calibrated and set for design operating conditions with the exception of room thermostats or sensors, which shall be calibrated at the completion of TAB services with cooperation between the TAB Firm and BAS Provider.
3. BAS Provider shall thoroughly check all controls, sensors, operators, sequences, etc. before notifying the TAB Firm that the building automation system is operational. The BAS Provider shall provide technical support, including technicians and necessary computers, to the TAB Firm for a complete check of these systems.
4. BAS Provider shall assist the Contractor with functional performance testing and point-to-point testing back to the main graphics.
5. BAS Provider, if requested by Owner, shall set-up controls on sample computer at TAB Firm's office.

END OF SECTION

4-14-25

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SECTION 23 0593 - TESTING AND BALANCING

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

- A. All division 23 specification sections, drawings, and general provisions of the contract apply to work of this section, as do other documents referred to in this section.

1.2 SCOPE OF WORK

- A. The **CONTRACTOR** shall obtain the services of an independent Test and Balance (TAB) Company which specializes in the testing and balancing of heating, ventilating and air conditioning (HVAC) systems to test, adjust and balance all HVAC systems in the building(s). *The project shall not be accepted until approved Testing and Balancing Report has been submitted and approved.*
- B. The work included in this section consists of furnishing labor, instruments, and tools required in testing, adjusting and balancing the HVAC systems, as described in these specifications or shown on accompanying drawings. Services shall include checking equipment performance, taking the specified measurements, and recording and reporting the results. The testing, adjusting and balancing agency shall act as a reporting agency; that is, list and report each piece of equipment as to identification number, manufacturer, model number, serial number, proper location, specified performance, and report actual performance of all equipment as found during testing. The report is intended to be used during the life of the building as a ready reference indicating original conditions, equipment components, etc.
- C. Representatives of the Test and Balance Company shall visit the job site at 60% and 90% completion of installation of the HVAC equipment, piping and ductwork to review the installation. After each site visit, the Test and Balance Company shall report to the Architect any items that are not installed properly, are missing from the installation or items that are required to enable him to perform the testing and balancing of the HVAC systems as per normal standard practice. After review, the Architect shall instruct the Contractor to implement the recommendations at no additional cost to the Owner if these items were specified in the original scope of the project.
- D. Upon completion of the HVAC system installation, the Test and Balance Company shall perform all required testing and balancing with the full cooperation of the Contractor and his Sub-contractors. The Contractor shall make changes and/or adjustments to the HVAC system components that are required by the Test and Balance Company to accomplish proper balancing. The TAB agency shall not supply or install any materials or balancing devices such as pulleys, drives, belts, etc. All of this work is by the Contractor and shall be performed at no additional cost to the Owner.
- E. The test and balance report shall be submitted to the Architect for review by his Mechanical Engineer. If the Mechanical Engineer agrees with the report, he shall sign it and return it to the Architect. If he does not concur with the report, he shall meet with the Test and Balance Company to determine what needs to be done to obtain a properly balanced system.
- F. After the Mechanical Engineer signs the testing and balancing report, the Test and Balance Company shall supply four (4) copies of the final and complete report to the Architect for inclusion in the Operation and Maintenance Manuals.

1. Report to in format of sample report located at the end of this specification section. For all items that are not applicable the contractor shall note as "NOT APPLICABLE".

- G. The items requiring testing, adjusting, and balancing include (but are not restricted to) the following:

AIRSYSTEMS:

Supply Fan

Gas Furnace

Exhaust Fans

Zone branch and main ducts

Diffusers, Registers, Grilles and Dampers

Coils (Air Temperatures)

Valves

Vibration Isolators

Kitchen Exhaust/Supply Fans

- H. The Contractor will provide the services of a qualified test and balance contractor. The qualifications of the TAB contracting firm shall be submitted, along with the specific qualifications of the lead site technician who will remain on site during all TAB work, within 30 days of notice to proceed. Recent projects shall be listed and described for both the company and the lead technician. Names and telephone numbers of the project contractors and facility managers will be provided.
- I. The owner must approve in writing the qualifications of both the company and the lead technician.
- J. At the time of final inspection, the TAB agency shall be required to recheck, in the presence of the owner's representative & mechanical engineer, specific and random elections of data, temperatures, air quantities, and air motion recorded in the certified report. Points and areas for recheck shall be selected by the owner's representative & mechanical engineer at time of recheck. Measurements and test procedures shall be the same as approved for the initial work for the certified report. Selections for recheck, specific plus random, shall not exceed 10% of the total number tabulated in the report.

1.3 DEFINITIONS, REFERENCES, STANDARDS

- A. All work shall be in accordance with the latest edition of the Associated Air Balance Council (AABC) National Standards. If these contract document set forth more stringent requirements than the AABC National Standards, these contract documents shall prevail.

1.4 QUALIFICATIONS

- A. Agency Qualifications: The TAB Agency shall be a current member of the AABC, NEBB certification alone not acceptable.

1.5 SUBMITTALS

- A. Qualifications: The TAB agency shall submit a company resume listing

personnel and project experience in air and hydronic system balancing and a copy of the agency's test and balance engineer (TBE) certificate.

- B. Procedures and Agenda: The TAB agency shall submit the TAB procedures and agenda proposed to be used.
- C. Sample Forms: The TAB agency shall submit sample forms, which shall include the minimum data required by the AABC National Standards.

1.6 TAB PREPARATION AND COORDINATION

- A. Shop drawings, submittal data, up-to-date revisions, change orders, fan curves, pump curves and other data required for planning, preparation, and execution of the TAB work shall be provided when available and no later than 30 days prior to the start of TAB work.
- B. System installation and equipment startup shall be complete prior to the TAB agency's being notified to begin, except that duct leak testing shall be done during construction.
- C. The building control system (BCS) contractor shall provide and install the control system, including all temperature, pressure and humidity sensors. These shall be calibrated for accurate control. If applicable, the BCS contractor shall install all necessary computers and computer programs, and make these operational. Assistance shall be provided as required for reprogramming, coordination, and problem resolution.
- D. All test points, balancing devices, identification tags, etc., shall be accessible and clear of insulation and other obstructions that would impede TAB procedures.
- E. Qualified installation or startup personnel shall be readily available for the operation and adjustment of the systems. Assistance shall be provided as required for coordination and problem resolution.
- F. If, upon commencing the work, the TAB contractor finds that the systems are not ready, or if a dispute occurs as to the readiness of the systems, the TAB contractor may request an inspection to be made by the Designer's Mechanical Engineer. This inspection shall establish to the satisfaction of the represented parties whether or not the systems meet the basic requirements for testing and balancing. Items that are determined to be not ready for testing and balancing shall be completed by the Mechanical Contractor and placed in operational readiness before TAB services are again requested.

1.7 REPORTS

- A. Final TAB Report - The TAB agency shall submit the final TAB report for review by the Architect. On plans provided, all outlets, devices, HVAC equipment, etc., shall be identified (including manufacturer, model number, serial number, motor manufacturer, HP, drive type, fan and motor sheaves and belt number), along with a numbering system corresponding to report unit identification. The TAB agency shall submit an AABC "National Project Performance Guaranty" assuring that the project systems were tested, adjusted and balanced in accordance with the project specifications and AABC National Standards.
- B. Submit 4 copies of the Final TAB Report to the Architect for inclusion in the Operation and Maintenance Manuals.

- A. All instruments used for measurements shall be accurate and calibrated.
- B. Calibration and maintenance of all instruments shall be in accordance with the requirements of AABC National Standards.

PART 3 - EXECUTION

3.1 GENERAL

- A. The specified systems shall be reviewed and inspected for conformance to design documents. Testing, adjusting and balancing on each identified system shall be performed. The accuracy of measurements shall be in accordance with AABC National Standards. Adjustment tolerances shall be + or - 10% unless otherwise stated.
- B. Equipment settings, including manual damper quadrant positions, valve indicators, fan speed control levers, and similar controls and devices shall be marked to show final settings.
- C. All information necessary to complete a proper TAB project and report shall be per AABC standards unless otherwise noted. The descriptions of work required, as listed in this section, are a guide to the minimum information needed.
- D. TAB contractor shall cut insulation, ductwork and piping for installation of test probes to the minimum extent necessary to allow adequate performance of procedures. Upon completion, patch insulation, ductwork and housings using materials identical to those removed. Seal insulation to reestablish integrity of the vapor barrier.
- E. TAB work shall include additional inspection and adjustment of components during the season following the initial balance to include re-balance of any items influenced by seasonal changes or as directed by the Owner.

3.2 AIR SYSTEMS

- A. The TAB agency shall verify that all ductwork, splitters, extractors, dampers, grilles, registers, and diffusers have been installed per design, are functional and set full open. Any leakage in the ductwork shall be repaired prior to the test. The TAB agency shall perform the following TAB procedures in accordance with the AABC National Standards:

For supply fans:

1. Fan speeds - Test and adjust fan RPM to achieve design CFM requirements.

*Prior to replacing pulley's & sheaves at supply fan, TAB contractor to measure total air flow of supply fan with respective variable speed drive (VFD) set @ 30Hz. TAB contractor to dial up on VFD until total specified total air flow is achieved. Provide frequency of VFD at maximum air flow on TAB report.
2. Current and Voltage - Test and record motor voltage and amperage, and compare data with the nameplate limits to ensure fan motor is not in or above the service factor.
3. Pitot-Tube Traverse - Perform a Pitot-tube traverse of main supply and return ducts, as applicable to obtain total CFM. If a Pitot-tube traverse is not practical, an explanation of why a traverse was not made must appear on the appropriate data sheet.

4. Outside Air - Test and adjust the outside air on applicable equipment using a Pitot-tube traverse. If a traverse is not practical, an explanation of why a traverse was not made must appear on the appropriate data sheet. If a traverse is not practical use the mixed- air temperature method if the inside and outside temperature difference is at least 20 degrees Fahrenheit or use the difference between Pitot-tube traverses of the supply and return air ducts.
5. Static Pressure - Test and record system static pressure, including the static pressure profile of each supply fan.

For kitchen exhaust / supply fans:

1. Fan speeds - Test and adjust fan RPM to achieve design CFM requirements.
2. Current and Voltage - Test and record motor voltage and amperage, and compare data with the nameplate limits to ensure motor is not in or above the service factor.
3. Pitot-Tube Traverse - Perform a Pitot-tube traverse of main transfer ducts to obtain total CFM. If a Pitot-tube traverse is not practical, an explanation of why a traverse was not made must appear on the appropriate data sheet.
4. Static Pressure - Test and record system static pressure, including the static pressure profile of each smoke exhaust fan.

For exhaust fans:

1. Fan speeds - test and adjust fan RPM to achieve design CFM requirements.
2. Current and Voltage - Test and record motor voltage and amperage, and compare data with the nameplate limits to ensure motor is not in or above the service factor.
3. Pitot-Tube Traverse - Perform a Pitot-tube traverse of main exhaust ducts to obtain total CFM. If a Pitot-tube traverse is not practical, an explanation of why a traverse was not made must appear on the appropriate data sheet.
4. Static Pressure - Test and record system static pressure, including the static pressure profile of each exhaust fan.

For zone, branch and main ducts:

1. Adjust ducts to within design CFM requirements. As applicable, at least one zone balancing damper shall be completely open. Multi- diffuser branch ducts shall have at least one outlet or inlet volume damper completely open.

For diffusers, registers and grilles:

1. Tolerances - Test, adjust, and balance each diffuser, grille, and register to within 10% of design requirements. Minimize drafts. Include required CFM, initial test CFM and final CFM.
2. Identification - Identify the type, location, and size of each grille, diffuser, and register. This information shall be recorded on air outlet data sheets.

For coils:

1. Air Temperature - Once air flows are set to acceptable limits, take wet bulb and dry bulb air temperatures on the entering and leaving side of each cooling coil. Dry-bulb temperature shall be taken on the entering and leaving side of each heating coil.

3.3 SOUND TESTING

- A. The TAB agency shall conduct sound testing in the following areas per AABC National Standards and to the criteria listed, using sound meter with octave band analyzer:

<u>TEST AREA</u>	<u>NUMBER OF LOCATIONS</u>	<u>ACCEPTABLE LEVEL</u>
General Offices	6	30-35
Executive Offices	1	25-30

- B. All measurements are to be in accordance with AABC. Contractor shall utilize a sound meter with octave band analyzer.
- C. Provide cut sheet of all sound measurement devices to mechanical engineer for approval.

3.5 ADDITIONAL TAB SERVICES

- A. Verification of HVAC Controls:

The TAB agency shall be assisted by the building control systems contractor in verifying the operation and calibration of all HVAC and temperature control systems. The following tests shall be conducted:

1. Verify that all control components are installed in accordance with project requirements and are functional, including all electrical interlocks, damper sequences, air and water resets, fire and freeze stats, and other safety devices.
2. Verify that all controlling instruments are calibrated and set for design operating conditions.

- B. Temperature Testing:

To verify system control and operation, a series of three temperature tests shall be taken at approximately two hour intervals in each separately controlled zone. The resulting temperatures shall not vary more than two degrees Fahrenheit from the thermostat or control set point during the tests. Outside temperature and humidity shall also be recorded during the testing periods.

- C. Kitchen Hood Testing:

The TAB agency shall test and adjust kitchen hood total air flow by duct Pitot-tube traverse if applicable under local code. If a Pitot-tube traverse is not practical, an explanation of why a traverse was not made must appear on the appropriate data sheet. All sealing of test holes in the exhaust duct to be by others per local code requirements. The TAB agency shall test and record face velocities in accordance with design requirements. It shall test and adjust makeup air flow (if included) to meet design face velocities and pressurization and to minimize turbulence.

1. Fan speeds - Test and adjust fan RPM to achieve design CFM requirements.

2. Current and Voltage - Test and record motor voltage and amperage, and compare data with the nameplate limits to ensure motor is not in or above the service factor.
 3. Pitot-Tube Traverse - Perform a Pitot-tube traverse of main transfer ducts to obtain total CFM. If a Pitot-tube traverse is not practical, an explanation of why a traverse was not made must appear on the appropriate data sheet.
 4. Static Pressure - Test and record system static pressure, including the static pressure profile of each fan.
- D. TAB Report Verification:
- At the time of final inspection, the TAB agency may be required to recheck, in the presence of the owner's representative, specific and random selections of data, air quantities, and air motion recorded in the certified report. Points and areas for recheck shall be selected by the owner's representative. Measurements and test procedures shall be the same as approved for the initial work for the certified report. Selections for recheck, specific plus random, will not exceed 10% of the total number tabulated in the report.
- E. Job Site Inspections:
- During construction, the TAB agency shall inspect the installation of pipe systems, sheet metal work, temperature controls, and other component parts of the HVAC systems. Inspections shall be conducted a minimum of two times. (Typically, these are performed when 60% of the total system is installed and again when 90% of the total system is installed, prior to insulation of the duct and piping). The TAB agency shall submit a written report of each inspection to the Architect.
- F. Seasonal Rebalancing:
- This TAB contractor shall figure in bid rebalancing HVAC system during peak seasonal conditions (summer & winter) in order to provide design team with HVAC information from peak design conditions. This work shall be completed within the one (1) year warranty period.
- G. Duct Leakage Testing:
- The installing contractor shall isolate and seal sections of ductwork for testing. The pressurization fan and test apparatus shall be connected to the test section and the test performed. The test pressures required and the amount of duct to be tested shall be described by the engineer in the appropriate duct classification section. All testing shall be based on one test per section.
- H. Building/Zone Pressurization:
- The TAB agency shall test and adjust building/zone pressurization by setting the design flows to meet the required flow direction and pressure differential. For positive pressure areas, it shall set the supply air to design flow, and gradually reduce the exhaust air rate to obtain the required flow or pressure difference. For negative pressure areas, it shall set the supply air to design flow, and gradually increase the exhaust air rate to obtain the required flow or pressure difference.
- I. Air Leakage Rate Testing:
- The entire facility (All Buildings) shall be tested for air leakage rate by fan pressurization (Blower Door Test). The air leakage test shall be in accordance with ASTM E779 (Current Edition).

3.4 INDOOR AIR QUALITY VERIFICATION

- A. The TAB agency shall take measurements at minimum outside air. It shall measure temperature and humidity uniformity throughout the space, check filter installation for proper fit, seal, and operation, and verify condensate drain operation. The TAB agency shall note any water damage or obvious contamination sources from inside or outside.
- B. The TAB agency shall conduct the following air sampling tests using TWA limits shown in ASHRAE Standard 62.1-2013, Table B-1 (the test shall be performed on the exterior of the building as well as throughout the interior of the building as to establish comparative data between the indoor & outdoor IAQ):
 - 1. Carbon dioxide
 - 2. Carbon monoxide
 - 3. Formaldehyde
 - 4. Lead
 - 5. Nitrogen dioxide
 - 6. Ozone
 - 7. Radon
 - 8. Sulfur Dioxide
 - 9. Particles
- C. The TAB agency shall prepare a short report showing the results and location of each test, a summary of the HVAC operating conditions, and a listing of any discrepancies.

3.5 VIBRATION TESTING

- A. The TAB agency shall conduct vibration testing on the following equipment per AABC National Standards. Test deflection in mils and velocity in inches per second shall be measured and the results compared to requirements in equipment specification sections.

EQUIPMENT:

Gas Furnaces

Fans

Condensing Units

END OF SECTION

4-14-25

TEST AND BALANCE ANALYSIS REPORT

FOR

JOB

CONTRACTOR

ARCHITECT

ENGINEER

C_x AGENT

PJ#

CERTIFICATION:

AIR DISTRIBUTION SYSTEM HAS BEEN COMPLETELY BALANCED AS PER
REQUIREMENTS OF SPECIFICATIONS AND RESULTS FOR TESTS HEREIN LISTED.

CERTIFICATION NO.

BY

DATE

APPROVED

AIR UNIT TEST SHEET

JOB NAME: _____ DATE _____

SYSTEM _____

SPECIFICATIONS:

FAN: CFM _____ TSP _____ ESP _____ RPM _____ BHP _____ O.A. CFM _____

COOLING	MBH _____	GPM _____	WATER ON _____	OFF _____
	AIR ON DB/WB _____		OFF DB/WB _____	Δ TH _____
HEATING	MBH _____	GPM _____	WATER ON _____	OFF _____
	AIR ON DB _____		OFF DB _____	
	MBH _____	GPM _____	WATER ON _____	OFF _____
	AIR ON DB/WB _____		OFF DB/WB _____	

TEST DATA:

UNIT _____ SIZE _____ SERIAL _____

MOTOR _____ HP _____ RPM _____ VOLTAGE _____ FLA _____

TEST VOLTAGE _____ CORRECTED FLA _____ MISC. _____

STARTER / HEATER SIZE _____ RATING _____ RUNNING AMPS _____

FAN: CFM _____ TSP _____ ESP _____ RPM _____ O.A. CFM _____

COIL:	AIR ON	AIR OFF	Δ		WATER ON	OFF	Δ T	MBH
COOLING				Δ TH				
HEATING				Δ T				
				Δ T				

FLOW METER:	MODEL/SIZE	DESIGN READING	TEST READING	GPM
COOLING	_____	_____	_____	_____
HEATING	_____	_____	_____	_____

MTR. PULLEY = _____ FAN SUCTION = _____

FAN PULLEY = _____ FAN DISCHARGE = _____

BELTS = _____ TOTAL STATIC = _____

AIR MOVING EQUIPMENT TEST SHEET

JOB NAME: _____

DATE: _____

LOCATION

MANUFACTURER

MODEL NO.

SA SIZE/FPM

OPERATING COND.

TOTAL C.F.M.

RETURN AIR C.F.M.

O.S.A. C.F.M.

EXT. STATIC PRESS.

SUCTION PRESSURE

DISCHARGE PRESS.

FAN SHEAVE

MOTOR SHEAVE

BELTS

MOTOR MANUF.

SIZE HP

VOLTAGE

PHASE

RPM MOTOR

AMPERAGE

RPM FAN

COOL MBH

HEAT MBH

UNIT #		UNIT #		UNIT #		UNIT #	
SPECIFIED	ACTUAL	SPECIFIED	ACTUAL	SPECIFIED	ACTUAL	SPECIFIED	ACTUAL
RATED	RUNNING	RATED	RUNNING	RATED	RUNNING	RATED	RUNNING

DUCT TRAVERSE SHEET

ZONE TOTALS

JOB NAME: _____ DATE: _____

[illegible]

VAV BOX TEST SHEET

JOB NAME _____

DATE _____

SYSTEM _____

[illegible]

VAV BOX AT MAX. CFM TEST SHEET

JOB NAME: _____ DATE: _____

[illegible]

AIR QUANTITY EACH INLET/OUTLET

JOB NAME: _____ DATE: _____

SYSTEM _____

[illegible]

FAN TEST SHEET

JOB NAME: _____

DATE: _____

SPECIFIED

Total CFM

Fan RPM

Total S.P.

Motor H.P.

FAN #	FAN #	FAN #	FAN #

TEST

Manufacturer

Model #

Serial #

Size

Motor Mfg.

Motor HP

Motor RPM

Motor Volts

Motor F.L.A.

Run Amps.

Heaters Size/Rtg.

Line Voltage

Total CFM

Fan RPM

Total S.P.

Notes

ERV TEST SHEET

JOB NAME: _____

DATE: _____

SPECIFIED

Total CFM

Fan RPM

Total S.P.

Motor H.P.

TEST

Manufacturer

Model #

Serial #

Size

Motor Mfg.

Motor HP

Motor RPM

Motor Volts

Motor F.L.A.

OSA FAN	WHEEL	EXH. FAN	WHEEL

	DES. TEMPS.		DES. TEMPS.
	EDB =		EDB =
	EWB =		EWB =
	LDB =		LDB =
	LWB =		LWB =

Run Amps.

Heaters Size/Rtg

Line Voltage

Total CFM

Fan RPM

Total S.P.

	ACT. TEMPS.		ACT. TEMPS.
	EDB =		EDB =
	EWB =		EWB =
	LDB =		LDB =
	LWB =		LWB =

Notes

ELECTRIC RE-HEAT COIL TEST SHEET

JOB NAME: _____ DATE: _____

[illegible]

HOT WATER RE-HEAT COIL TEST SHEET

JOB NAME: _____ DATE: _____

[illegible]

PUMP TABULATION TEST SHEET

JOB NAME: _____ DATE: _____

SPECIFIED

GPM

HEAD

HP

TEST

MANUFACTURER

MODEL

SIZE

SERIAL

MOTOR MFG.

HP

RPM

VOLTS

LINE VOLTS

F.L. AMPS

TEST AMPS

HEATER

IMPELLER SIZE

DISCHARGE LBS.

SUCTION LBS.

DIFFERENTIAL

HEAD IN FEET

GPM

PUMP #		PUMP #		PUMP #		PUMP #	
</							

AIR COOLED CHILLER DATA

JOB NAME: _____

DATE: _____

UNIT NUMBER		
MANUFACTURER		
CAPACITY		
MODEL NUMBER		
SERIAL NUMBER		
EVAPORATOR	DESIGN	ACTUAL
EWT		
LWT		
P.D. FT.		
GPM		
CONDENSER	DESIGN	ACTUAL
EAT		
LAT		
ELECTRICAL	DESIGN	ACTUAL
VOLTAGE		
AMPERAGE		

REMARKS: _____

UNIT NUMBER		
MANUFACTURER		
CAPACITY		
MODEL NUMBER		
SERIAL NUMBER		
EVAPORATOR	DESIGN	ACTUAL
EWT		
LWT		
P.D. FT.		
GPM		
CONDENSER	DESIGN	ACTUAL
EAT		
LAT		
ELECTRICAL	DESIGN	ACTUAL
VOLTAGE		
AMPERAGE		

REMARKS: _____

WATER COOLED CHILLER DATA

JOB NAME: _____

DATE: _____

UNIT NUMBER		
MANUFACTURER		
CAPACITY		
MODEL NUMBER		
SERIAL NUMBER		
EVAPORATOR	DESIGN	ACTUAL
EWT		
LWT		
P.D. FT.		
GPM		
CONDENSER	DESIGN	ACTUAL
EWT		
LWT		
P.D. FT.		
GPM		
ELECTRICAL	DESIGN	ACTUAL
VOLTAGE		
AMPERAGE		

REMARKS: _____

UNIT NUMBER		
MANUFACTURER		
CAPACITY		
MODEL NUMBER		
SERIAL NUMBER		
EVAPORATOR	DESIGN	ACTUAL
EWT		
LWT		
P.D. FT.		
GPM		
CONDENSER	DESIGN	ACTUAL
EWT		
LWT		
P.D. FT.		
GPM		
ELECTRICAL	DESIGN	ACTUAL
VOLTAGE		
AMPERAGE		

REMARKS: _____

COOLING TOWER DATA

JOB NAME: _____

DATE: _____

UNIT NUMBER		
MANUFACTURER		
CAPACITY		
MODEL NUMBER		
SERIAL NUMBER		
PERFORMANCE	DESIGN	ACTUAL
AMBIENT AIR DB		
AIR EWB		
AIR LWB		
GPM		
EWT		
LWT		
MOTOR	DESIGN	ACTUAL
MANUFACTURER		
HORSEPOWER		
RPM		
VOLTAGE		
PHASES		
AMPERAGE		
HEATER AMPS		
HEATER VOLTS		
HEATER KW		

REMARKS: _____

UNIT NUMBER		
MANUFACTURER		
CAPACITY		
MODEL NUMBER		
SERIAL NUMBER		
PERFORMANCE	DESIGN	ACTUAL
AMBIENT AIR DB		
AIR EWB		
AIR LWB		
GPM		
EWT		
LWT		
MOTOR	DESIGN	ACTUAL
MANUFACTURER		
HORSEPOWER		
RPM		
VOLTAGE		
PHASES		
AMPERAGE		
HEATER AMPS		
HEATER VOLTS		
HEATER KW		

REMARKS: _____

AIR COOLED CONDENSING UNIT DATA

JOB NAME: _____

DATE: _____

UNIT NUMBER		
MANUFACTURER		
CAPACITY		
MODEL NUMBER		
SERIAL NUMBER		
CONDENSER	DESIGN	ACTUAL
EAT		
LAT		
ELECTRICAL	DESIGN	ACTUAL
VOLTAGE		
AMPERAGE		

UNIT NUMBER		
MANUFACTURER		
CAPACITY		
MODEL NUMBER		
SERIAL NUMBER		
CONDENSER	DESIGN	ACTUAL
EAT		
LAT		
ELECTRICAL	DESIGN	ACTUAL
VOLTAGE		
AMPERAGE		

UNIT NUMBER		
MANUFACTURER		
CAPACITY		
MODEL NUMBER		
SERIAL NUMBER		
CONDENSER	DESIGN	ACTUAL
EAT		
LAT		
ELECTRICAL	DESIGN	ACTUAL
VOLTAGE		
AMPERAGE		

UNIT NUMBER		
MANUFACTURER		
CAPACITY		
MODEL NUMBER		
SERIAL NUMBER		
CONDENSER	DESIGN	ACTUAL
EAT		
LAT		
ELECTRICAL	DESIGN	ACTUAL
VOLTAGE		
AMPERAGE		

REMARKS: _____

HOT WATER BOILER DATA

JOB NAME: _____

DATE: _____

UNIT NUMBER		
MANUFACTURER		
CAPACITY		
MODEL NUMBER		
SERIAL NUMBER		
SECONDARY HW	DESIGN	ACTUAL
EWT		
LWT		
P.D. FT.		
GPM		
CNTL. SET. PT.		

UNIT NUMBER		
MANUFACTURER		
CAPACITY		
MODEL NUMBER		
SERIAL NUMBER		
SECONDARY HW	DESIGN	ACTUAL
EWT		
LWT		
P.D. FT.		
GPM		
CNTL. SET. PT.		

UNIT NUMBER		
MANUFACTURER		
CAPACITY		
MODEL NUMBER		
SERIAL NUMBER		
SECONDARY HW	DESIGN	ACTUAL
EWT		
LWT		
P.D. FT.		
GPM		
CNTL. SET. PT.		

UNIT NUMBER		
MANUFACTURER		
CAPACITY		
MODEL NUMBER		
SERIAL NUMBER		
SECONDARY HW	DESIGN	ACTUAL
EWT		
LWT		
P.D. FT.		
GPM		
CNTL. SET. PT.		

REMARKS: _____

LETTERHEAD

FUME HOOD TEST SHEET

JOB NAME: _____

DATE: _____

ROOM NO. _____ HOOD NO. _____ HOOD SIZE _____ AVERAGE FACE VELOCITY _____

FULL OPEN HEIGHT

ROOM NO. _____ HOOD NO. _____ HOOD SIZE _____ AVERAGE FACE VELOCITY _____

OPERATIONAL HEIGHT

**AIR CHANGE PER HOUR
TEST SHEET**

JOB NAME: _____ DATE TESTED: _____
EXPIRATION DATE: _____

LOCATION

AREA CU. FT.

REQUIRED MIN. SUPPLY ACH

REQUIRED MIN. OUTSIDE AIR ACH

REQUIRED MIN. RA/EXH. ACH

REQUIRED MIN. SUPPLY CFM

REQUIRED MIN. OUTSIDE AIR CFM

REQUIRED MIN. RA/EXH. CFM

ACTUAL SUPPLY QUANTITY CFM

ACTUAL OUTSIDE AIR QUANTITY CFM

ACTUAL RA/EXH. QUANTITY CFM

ACTUAL SUPPLY ACH

ACTUAL OUTSIDE AIR ACH

ACTUAL RA/EXH. AIR ACH

ROOM PRESSURE

NOTE: _____

**DUCT PRESSURE TEST
CERTIFICATION**

JOB NAME _____

DATE TESTED _____

DUCT SYSTEM ID _____

DESIGN CFM _____

OPERATING PRESSURE _____

TEST REQUIREMENTS _____

TEST RESULTS _____

CFM LEAKAGE _____

COMMENTS _____

APPROVED BY _____

ELECTRIC RE-HEAT COIL
TEST SHEET

JOB NAME: _____ DATE: _____

BOX NO.	DESIGN CFM	DESIGN BTUH	DESIGN KW	ACTUAL CFM	ACTUAL EAT/LAT	ACTUAL BTUH	ACTUAL KW
NOTE: 1.0 KW = 3413 BTUH							

AHU
TEMPERATURE/PRESSURE PROFILE

JOB NAME: _____ DATE: _____

Testing & Balancing Agency: _____

[illegible]

SPACE TEMPERATURE/HUMIDITY TEST SHEET

JOB NAME: _____ DATE: _____

[illegible]

CHILL WATER COIL
AIR DATA TEST SHEET

JOB NAME: _____ DATE: _____

UNIT NO.	CFM	EDB/EWB	LDB/LWB	ΔTH	MBH	NOTES	
							DESIGN
							ACTUAL
							DESIGN
							ACTUAL
							DESIGN
							ACTUAL
							DESIGN
							ACTUAL
							DESIGN
							ACTUAL
							DESIGN
							ACTUAL
							DESIGN
							ACTUAL
							DESIGN
							ACTUAL

CHILL WATER COIL WATER DATA TEST SHEET

JOB NAME: _____ DATE: _____

UNIT NO.	MBH	EWT	LWT	Δ TW	WPD	GPM	
							DESIGN
							ACTUAL
							DESIGN
							ACTUAL
							DESIGN
							ACTUAL
							DESIGN
							ACTUAL
							DESIGN
							ACTUAL
							DESIGN
							ACTUAL
							DESIGN
							ACTUAL
							DESIGN
							ACTUAL

HOT WATER COIL
AIR DATA TEST SHEET

JOB NAME: _____ DATE: _____

UNIT NO.	CFM	EAT	LAT	ΔTA	MBH	NOTES	
							DESIGN
							ACTUAL
							DESIGN
							ACTUAL
							DESIGN
							ACTUAL
							DESIGN
							ACTUAL
							DESIGN
							ACTUAL
							DESIGN
							ACTUAL
							DESIGN
							ACTUAL

HOT WATER COIL WATER DATA TEST SHEET

JOB NAME: _____ DATE: _____

UNIT NO.	MBH	EWT	LWT	Δ TW	WPD	GPM	
							DESIGN
							ACTUAL
							DESIGN
							ACTUAL
							DESIGN
							ACTUAL
							DESIGN
							ACTUAL
							DESIGN
							ACTUAL
							DESIGN
							ACTUAL
							DESIGN
							ACTUAL
							DESIGN
							ACTUAL

JOB NAME: _____

[illegible]

11

[illegible]

FAN COIL UNIT
TEST SHEET
COOLING

JOB NAME: _____ DATE: _____

Testing & Balancing Agency: _____

[illegible]

FAN COIL UNIT TEST SHEET HEATING

JOB NAME: _____ DATE: _____

Testing & Balancing Agency: _____

[illegible]

BLOWER DOOR TEST

DATE: _____

JOB NAME:	
CITY/STATE:	

BLOWER DOOR MODEL	FAN MODEL	NUMBER OF FANS	RING

LOCATION			
REFERENCE			
TEST NUMBER			
RELATIONSHIP			
DESIGN Δp	INCHES H ₂ O	PASCALS	1 Pa (N/m ²) = 0.0040186 Inch of
FINAL CFM			
FINAL Δp INCHES H₂O / PASCALS	INCHES H ₂ O	PASCALS	1 Pa (N/m ²) = 0.0040186 Inch of

TESTED BY:

NOTES:

SECTION 23 0700 - DUCTWORK INSULATION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Ductwork insulation.
- B. Duct Liner.
- C. Insulation jackets.

1.02 RELATED SECTIONS

- A. Section 23 31 00 - Metal Ductwork.

1.03 REFERENCES

- A. ASTM B209 - Aluminum and Aluminum-Alloy Sheet and Plate.
- B. ASTM C518 - Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.
- C. ASTM C553 - Mineral Fiber Blanket and Felt Insulation.
- D. ASTM C612 - Mineral Fiber Block and Board Thermal Insulation.
- E. ASTM E84 - Surface Burning Characteristics of Building Materials.
- F. ASTM E96 - Water Vapor Transmission of Materials
- G. NFPA 255 - Surface Burning Characteristics of Building Materials.
- H. SMACNA - HVAC Duct Construction Standards - Metal and Flexible.
- I. UL 723 - Surface Burning Characteristics of Building Materials.

1.04 SUBMITTALS

- A. Submit under provisions of Section 01300.
- B. Product Data: Provide product description, list of materials and thickness for each service, and locations.
- C. Manufacturer's Installation Instructions: Indicate procedures which ensure acceptable workmanship and installation standards will be achieved.

1.05 QUALITY ASSURANCE

- A. Materials: Flame spread/smoke developed rating of 25/50 in accordance with NFPA 25.

1.06 QUALIFICATIONS

- A. Applicator: Company specializing in performing the work of this section.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, protect and handle products to site under provisions of Section 01600.
- B. Deliver materials to site in original factory packaging, labeled with manufacturer's density and thickness.
- C. Store insulation in original wrapping and protect from weather and construction traffic.
- D. Protect insulation against dirt, water, chemical, and mechanical damage.

1.08 ENVIRONMENTAL REQUIREMENTS

- A. Maintain ambient temperatures and conditions required by manufacturers of adhesives, mastics, and insulation cements.
- B. Maintain temperature during and after installation for minimum period of 24 hours.

PART 2 PRODUCTS

2.01 GLASS FIBER, FLEXIBLE

- A. Insulation: ASTM C553; flexible, noncombustible blanket.

1. 'K' ("ksi") value: ASTM C518, 0.29 at 75 degrees F.
 2. Maximum service temperature: 250 degrees F.
 3. Maximum moisture absorption: 0.20 percent by volume.
 4. Density: 0.75 lb/cu ft.
- B. Vapor Barrier Jacket
1. Kraft paper reinforced with glass fiber yarn and bonded to aluminized film.
 2. Moisture vapor transmission: ASTM E96; 0.04 perm.
 3. Secure with pressure sensitive tape.
- C. Vapor Barrier Tape
1. Kraft paper reinforced with glass fiber yarn and bonded to aluminized film, with pressure sensitive rubber based adhesive.
- D. Tie Wire: Annealed steel, 16 gage.

2.02 GLASS FIBER, RIGID

- A. Insulation: ASTM C612; rigid, noncombustible blanket.
1. 'K' value: ASTM C518, 0.29 at 75 degrees F.
 2. Maximum service temperature: 250 degrees F.
 3. Maximum moisture absorption: 0.20 percent by volume.
 4. Density: 1.5 lb/cu ft.
- B. Vapor Barrier Jacket
1. Kraft paper reinforced with glass fiber yarn and bonded to aluminized film.
 2. Moisture vapor transmission: ASTM E96; 0.04 perm.
 3. Secure with pressure sensitive tape.
- C. Vapor Barrier Tape
1. Kraft paper reinforced with glass fiber yarn and bonded to aluminized film, with pressure sensitive rubber based adhesive.

2.03 GLASS FIBER DUCT LINER, FLEXIBLE

- A. Insulation: ASTM C553; flexible, noncombustible blanket.
1. 'K' value: ASTM C518, 0.28 at 75 degrees F.
 2. Maximum service temperature: 250 degrees F.
 3. Density: 1.5 lb/cu ft.
 4. Maximum Velocity on Coated Air Side: 4,000 ft/min.
- B. Adhesive
1. Waterproof fire-retardant type.
- C. Liner Fastener
1. Galvanized steel, impact applied with integral head.

2.04 GLASS FIBER DUCT LINER, RIGID

- A. Insulation: ASTM C518, 0.23 at 75 degree F.
1. 'K' value: ASTM C518, 0.23 at 75 degrees F.
 2. Maximum service temperature: 250 degrees F.
 3. Density: 3.0 lb/cu ft.
 4. Maximum Velocity on Coated Air Side: 4,000 ft/min.
- B. Adhesive

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1. Waterproof fire-retardant type.
- C. Linear Fasteners
 1. Galvanized steel, self-adhesive pad with press on head.

2.05 FIRED RATED GLASS FIBER DUCT, FLEXIBLE

- A. Insulation: ASTM C518, 0.23 at 75 degree F.
 1. 'K' value: ASTM C518, 0.23 at 75 degrees F.
 2. Flammability (ASTM E 84 / UL 723)
 - Foil: Flame spread 5, Smoke developed 5
 - Blanket: Flame Spread 0, Smoke developed 0
 3. Insulation, strict accordance with manufacturer's recommendations.
- B. Manufacturer: "Fyrewrap", 3M Fire master "Fast Wrap".

2.06 DUCTWORK JACKET (Exterior or in ventilated spaces)

- A. Contractor to provide specialty rubberized bitumen membrane designed specifically to be installed over insulation on ductwork subject to ambient conditions. The membrane is 'peel and stick', self-healing if punctured, UV stable, and will expand and contract with the mechanical system. The membrane has excellent emissivity and sound attenuation properties.
 1. Total product thickness of 0.60"
 2. Water Vapor Transmission (grains/hr-ft²) of 0.0022
 3. Upper Temperature Limit of 160 degrees (F).
 4. Sound Transmission Coefficient of 0.18
 5. Permeance of 0.0053
- B. Manufacturer: "Alumaguard" as manufactured by Polyguard. Provide "Alumaguard lite" on bottom of ductwork as to eliminate the need to pin through the Alumaguard on the bottom of the ductwork.

2.07 APPROVED MANUFACTURERS

- A. John Manville, Knauf, Owens Corning

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that ductwork has been tested before applying insulation materials.
- B. Verify that surfaces are clean, foreign materials removed, and dry.

3.02 INSTALLATION

- A. Install materials in accordance with manufacturer's instructions.
- B. Insulated ductwork conveying air below ambient temperature:
 1. Provide insulation with vapor barrier jackets.
 2. Finish with tape and vapor barrier jackets.
 3. Continue insulation through walls, sleeves, hangers, and other duct penetrations.
 4. Insulate entire system including fittings, joints, flanges, fire dampers, flexible connection, and expansion joints.
- C. Insulated ductwork conveying air above ambient temperature.
 1. Provide with or without standard vapor barrier jacket.
 2. Insulate fittings and joints. Where service access is required, bevel and seal ends of insulation.
- D. External Duct Insulation Application

1. Secure insulation with vapor barrier tape and seal jacket joints with vapor barrier adhesive or tape to match jacket.
 2. Secure insulation without vapor barrier with adhesive tape.
 3. Install without sag or underside of ductwork. Use adhesive & mechanical fasteners to prevent sagging. Lift ductwork off trapeze hangers and insert spacers.
 4. Seal vapor barrier penetrations by mechanical fasteners with vapor barrier adhesive.
 5. Stop and point insulation around access doors and damper operators to allow operation without disturbing wrapping.
 6. All external insulation to be installed utilizing adhesive & mechanically pinned fasteners.
- E. Duct and Plenum Liner Application:
1. Adhere insulation with adhesive for 100 percent coverage.
 2. Secure insulation with mechanical liner fasteners. Refer to SMACNA Standards for spacing.
 3. Seal and smooth joints.
 4. Seal liner surface penetrations with adhesive.
 5. Duct dimensions are metal to metal dimension.

3.03 TOLERANCE

- A. Substituted insulation materials shall provide thermal resistance with 10 percent at normal conditions, as materials indicated.

3.04 FLEXIBLE GLASS FIBER DUCTWORK INSULATION SCHEDULE

<u>LOCATION</u>	<u>THICKNESS (inch)</u>	<u>FINISH</u>
1. Round/oval Supply, Return, Fresh air, & exhaust ductwork	3"	Foil Faced
2. Tops of Diffusers & Grilles	3"	Foil Faced
3. Rectangular fresh air & Exhaust Air Ductwork	3"	Foil Faced
4. Rectangular Supply & Return Air Ductwork (within attic & unconditioned interior spaces)	1.5"	Foil Faced

3.05 GLASS FIBER DUCT LINER

<u>LOCATION</u>	<u>THICKNESS (Inch)</u>
1. Rectangular Return air Duct & rectangular supply duct (Low Pressure & downstream VAV boxes)	1"
2. Return air transfer assembly ducts And sleeves	1"

Note: 1. All other ductwork to be externally insulated.

2. Kitchen hood supply ductwork to be externally insulated, do not internally insulate kitchen hood supply ductwork.

3.06 DUCTWORK JACKET SCHEDULE

<u>LOCATION</u>	<u>THICKNESS (mil)</u>	<u>FINISH</u>
1. Rectangular & Round Outside air, Exhaust, Supply & Return Ductwork	60	Aluminized

Note: 1. Install as per manufacturer's recommendations.

2. *Provide on all ductwork that are exposed to ambient conditions.*
3. *Provide on all externally insulated ductwork located in attic spaces within 48" of attic floor framing.*

3.07 RIGID GLASS FIBER DUCTWORK INSULATION SCHEDULE

<u>LOCATION</u>	<u>THICKNESS (inch)</u>	<u>FINISH</u>
1. Not used.		

3.08 FIRE RATED GLASS FIBER, FLEXIBLE

<u>LOCATION</u>	<u>THICKNESS (inch)</u>	<u>FINISH</u>
1. Kitchen Hood Exhaust Duct	3"	Foil Faced

3.09 MINERAL WOOL, FLEXIBLE

1. Top of Kitchen Hood (and back side between hood and wall if wall type hood provided), contractor shall also extend insulation 18" around Perimeter of hood. Insulation to lay on 22 ga. Metal with minimal 1" air space clearance. 1" thickness.

END OF SECTION

4-14-25

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SECTION 23 0800 - OPERATING AND MAINTENANCE INSTRUCTIONS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. Refer to individual Division 20, 22 and 23 sections for additional equipment specific Operations and Maintenance Manual requirements.

1.02 SUMMARY

- A. This Section includes preparing and furnishing an operating and maintenance manual for mechanical equipment.

1.03 DESCRIPTION

- A. Compile an Operating and Maintenance Manual:
 - 1. For all building mechanical systems and major equipment items.
 - 2. Including, but not necessarily limited to:
 - a. Installing company's name, address, telephone number and name of job supervisor.
 - b. Maintenance and operating booklets (as supplied by the equipment Manufacturer) for each item or representative type item installed.
 - c. Valve tag schedule. Contractor to provide a set of plans shows valve schedule & valve location on plans (full size set, 24"x36 plans). Plans to have valve type, manufacturer and model #. Also provide replacement part contact information for each valve.
 - d. A complete set of Shop Drawings.
 - e. Temperature control drawings.
 - f. Equipment information forms for each equipment piece.
 - 3. Each equipment information form includes all applicable items of the following:
 - a. Type of unit.
 - b. Manufacturer's name.
 - c. Equipment service area.
 - d. Filter Information:
 - 1) Filter change period.
 - 2) Type of filter.
 - 3) Size of filter and number.
 - e. Motor and Drive Information:
 - 1) Belt type and quantity.
 - 2) Belt size.
 - 3) HP.
 - 4) Voltage.
 - 5) Phase.
 - f. Lubrication Information:
 - 1) Recommended service interval.
 - 2) Lubricant application points.
 - 3) Recommended lubricant type.

- g. Recommended cleaning procedures and intervals.
- B. Prepare Information Packets:
 - 1. Attach to each major piece of equipment in a string tie envelope labeled with the equipment's designation in large print.
 - 2. Information Required:
 - a. A copy of the equipment information form as defined above.
 - b. A temperature control written operation sequence.
 - c. A maintenance checklist form with equipment identification information and listing all relevant maintenance procedures in a column format to accommodate date entries.

1.04 SUBMITTALS

- A. Three copies of Operating and Maintenance Manual.

PART 2 PRODUCTS

- A. Not used.

PART 3 EXECUTION

- A. Not used.

END OF SECTION

4-14-25

SECTION 23 0900 - TEMPERATURE CONTROLS

PART 1 - GENERAL

1.01 GENERAL

- A. Complete System of Automatic Controls
- B. Electric or Electronic Control System
- C. Control Devices, Components, Wiring, and Material

1.02 RELATED WORK

- A. Section 20 01 00: General Provisions

1.03 SUBMITTALS

- A. Complete control drawings shall be submitted for approval before field installation is started. The submittals shall give a complete description of all control devices and show schematic piping and wiring.
- B. Submittal data shall include a schedule of all devices to be installed, including properly sized control valves and dampers.

1.04 WORK BY OTHERS

- A. Wiring: All power wiring will be provided under the electrical section and be installed by the electrical contractor, but all control wiring and conduit and control disconnects shall be furnished and installed by the control contractor.
- B. Not used.

PART 2 - PRODUCTS

2.01 SYSTEM REQUIREMENTS

- A. Provide control system consisting of thermostats, dampers, operators, indicating devices, interface equipment, and other apparatus to operate mechanical system and to perform functions specified.
- B. Provide necessary materials and field work necessary to connect control components factory supplied as part of equipment controlled, unless specified otherwise.

2.02 THERMOSTATS & HUMIDISTATS

- A. Refer to respective Gas Furnace & Condensing Unit specifications. Install in strict accordance with manufacturers recommendations.

2.03 FIRESTATS

- A. Provide manually reset firestats in return air at each air handling unit and in the intake of each exhaust fan handling 600 cfm or more. These firestat shall act to de-energize the fan if the inlet temperature exceeds 125-degrees F.

2.04 SMOKE DETECTORS

- A. Smoke detectors shall be provided under this contract. General contractor to coordinate with mechanical contractor, electrical contractor and fire alarm contractor prior to bid as to ensure a complete and working system. These smoke detectors shall have dry auxiliary contacts to stop air unit fan as follows:
 - 1. For units over 2000 cfm (or as indicated on the drawings) but less than 15000 cfm, smoke detector shall be located in main supply air duct downstream side of filters.
 - 2. For units 2000 cfm or above, additional smoke detector shall be provided in return air stream, prior to exhausting from building or being diluted by outside air.
- B. All interlock wiring between the smoke detectors and the air unit fans shall be performed under this section of the specifications. General contractor to coordinate with Mechanical Contractor, electrical contractor and fire alarm contractor prior to bid to ensure a complete and working system.

- C. Where no building fire alarm system is present, the smoke detectors shall be furnished with remote visual/audio alarms (locate above thermostat locations, 12" down from finished ceiling, for respective units). System Sensor APA451 or approved equal. Temperature Control Contractor to be responsible to provide all required power/control wiring, control transformer, power, etc.

2.05 WIRING

- A. All wiring shall conform to the methods and materials described in the Electrical Section of these specifications, and all NEC, State and Local Codes outlined in that section shall apply to this work.
- B. Control components furnished under this contract shall be equipped for operation at no more than 24 volts AC, with the exception of motor starter interlock wiring, which shall be no more than 120 volts AC.
- C. Wiring shall be a minimum of 14 gauge, except for instrumentation sensors which shall carry a minimum requirement of 18 gauge.
- D. Wiring shall be color-coded throughout, using a minimum of nine standard colors. Schematic drawings shall indicate the color code to be followed.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install systems and material in accordance with manufacturer's instructions and roughing-in drawings, and details on drawings.
- B. Install electrical components and use electrical products complying with requirements of applicable Division 26 Sections of these specifications.

3.02 SEQUENCE OF OPERATION

- A. Sequences of operation shall be as follows:
 - 1. HVAC SYSTEMS:
 - a. HVAC Unit (Typical): Refer to specified unit manufacturer data for sequence.
 - b. If return air temperature rises above firestat setpoint then firestat de-energizes unit evaporator fan.
 - c. If supply air or return air contains smoke, the smoke detector shall de-energize unit evaporator fan and activate fire alarm.
 - d. Motorized damper in fresh air duct to open to setpoint when respective HVAC system calls for cooling.

3.03 EXHAUST FANS:

- A. Refer to schedules for control methodology of exhaust fans.

END OF SECTION

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SECTION 23 2300 - REFRIGERANT PIPING

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes refrigerant piping used for air-conditioning applications.
- B. Related Sections include the following:
 - 1. Division 20 Section 20 05 29 "Hangers and Support Devices" for pipe supports and installation requirements.

1.3 SUBMITTALS

- A. Product Data: For each type of valve and refrigerant piping specialty indicated. Include pressure drop, based on manufacturer's test data, for thermostatic expansion valves, solenoid valves, and pressure-regulating valves.
- B. Shop Drawings: Show layout of refrigerant piping and specialties, including pipe, tube, and fitting sizes, valve arrangements and locations, slopes of horizontal runs, oil traps, double risers, wall and floor penetrations, and equipment connection details. Show interface and spatial relationship between piping and equipment.
- C. Refrigerant piping indicated is schematic only. Manufacturer's installation instructions shall take precedence over contract drawings where a conflict may occur. Size piping and design the actual piping layout in accordance with equipment manufacturers instructions and recommendations, including oil traps, double risers, solenoids and other specialties, and pipe and tube sizes, to ensure proper operation and compliance with warranties of connected equipment.
- D. Maintenance Data: For refrigerant valves and piping specialties to include in maintenance manuals specified in Division 1.

1.4 QUALITY ASSURANCE

- A. Welding/Brazing: Qualify procedures and personnel according to ASME Boiler and Pressure Vessel Code: Section IX; "Welding and Brazing Qualifications."
- B. ASHRAE Standard: Comply with ASHRAE 15, "Safety Code for Mechanical Refrigeration."
- C. ASME Standard: Comply with ASME B31.5, "Refrigeration Piping."
- D. UL Standard: Provide products complying with UL 207, "Refrigerant-Containing Components and Accessories, Non-electrical"; or UL 429, "Electrically Operated Valves."

1.5 COORDINATION

- A. Coordinate layout and installation of refrigerant piping and suspension system components with other construction, including plumbing and electrical.
- B. Coordinate pipe sleeve installations for penetrations in exterior walls.

PART 2 PRODUCTS

2.1 COPPER TUBE AND FITTINGS

- A. Refrigerant piping shall be run in Type "ACR" hard drawn copper tubing (ASTM B280 compliant) attached with wrought copper fittings, utilizing 1000-degree silver solder and a non-corrosive flux. Refrigerant piping shall be sized and installed in strict accordance with the air conditioning unit manufacturer's recommendations and directions and shall be submitted to the Engineer for prior approval before installation. Pressure drops shall not exceed the equivalent of 2-psi. Refrigerant piping system shall be evacuated, charged with refrigerant holding charge. The refrigerant lines to be tested with nitrogen to a test pressure of not less than 450 psi and proved before final charge of refrigerant. Compressor shall not be subject to the 450 psi pressure test.

2.2 VALVES

- A. Provide valves as recommended by equipment manufacturer.

2.3 REFRIGERANT PIPING SPECIALTIES

- A. Provide refrigerant piping specialties as recommended by manufacturer.

PART 3 EXECUTION

3.1 PIPING APPLICATIONS

- A. Aboveground, within Building and Exterior: hard drawn-copper tubing.

3.2 VALVE APPLICATIONS

- A. Install a full-sized, three-valve bypass around each dryer.
- B. Install thermostatic expansion valves as close as possible to evaporator.
- C. Secure bulb to clean, straight, horizontal section of suction line using two bulb straps. Do not mount bulb in a trap or at bottom of the line.

3.3 SPECIALTY APPLICATIONS

- A. Install moisture-liquid indicators in liquid lines between filter-dryers and thermostatic expansion valves and in liquid line to receiver.
- B. Install permanent filter-dryers before each solenoid valve.
- C. Install solenoid valves in liquid line of systems operating with single pump-out or pump-down compressor control.
- D. Install receivers, sized to accommodate pump-down charge, on systems and larger and on systems with long piping runs.

3.4 PIPING INSTALLATION

- A. Install refrigerant piping according to ASHRAE 15.
- B. Install refrigerant piping as recommended by the HVAC equipment manufacturer. Include liquid line solenoid, sight glass, filter drier, and thermostatic expansion valve (TXV) with by-pass and check valve assembly around TXV to allow liquid flow from the indoor unit coil to the outdoor unit during the heating mode.
- C. Basic piping installation requirements are specified in Division 23 Section 20 02 13 "Basic Piping".
- D. Install piping as short and direct as possible, with a minimum number of joints, elbows, and fittings.
- E. Arrange piping to allow inspection and service of compressor and other equipment. Install valves and specialties in accessible locations to allow for service and inspection.
- F. Install piping with adequate clearance between pipe and adjacent walls and hangers or between pipes for insulation installation. Use sleeves through walls or ceilings, sized to permit installation of full-thickness insulation.
- G. Belowground, install copper tubing in protective conduit. Vent conduit outdoors.
- H. Slope refrigerant piping as follows:
 - 1. Install horizontal suction lines with a uniform slope downward to compressor.
 - 2. Liquid lines may be installed level.
- I. Manufacturers installation instructions shall supercede contract drawings where a conflict may occur. Notify Architect before proceeding if a conflict does occur.
- J. Install unions to allow removal of solenoid valves, pressure-regulating valves, and expansion valves and at connections to compressors and evaporators.
- K. When brazing, remove solenoid-valve coils and sight glasses; also remove valve stems, seats, and packing, and accessible internal parts of refrigerant specialties. Do not apply heat near expansion valve bulb.

- L. Hanger, support, and anchor products are specified in Division 20 Section 20 05 29 "Hangers and Supports."
- M. Install the following pipe attachments:
 - 1. Adjustable steel clevis hangers for individual horizontal runs less than long.
 - 2. Install hangers for copper tubing with the following maximum spacing and minimum rod sizes:

3.5 PIPE JOINT CONSTRUCTION

- A. Braze joints according to Division 20 Section 20 02 13 "Basic Piping."
- B. Fill pipe and fittings with an inert gas (nitrogen or carbon dioxide) during brazing to prevent scale formation.

3.6 FIELD QUALITY CONTROL

- A. Test and inspect refrigerant piping according to ASME B31.5, Chapter VI.
- B. Test refrigerant piping, specialties, and receivers. Isolate compressor, condenser, evaporator, and safety devices from test pressure.

3.7 ADJUSTING

- A. Adjust thermostatic expansion valve to obtain proper evaporator superheat requirements.
- B. Adjust high- and low-pressure switch settings to avoid short cycling in response to fluctuating suction pressure.
- C. Adjust set-point temperature of the conditioned air to the system design temperature.
- D. Perform the following adjustments before operating the refrigeration system, according to manufacturer's written instructions:
 - 1. Check compressor oil level above center of sight glass.
 - 2. Open compressor suction and discharge valves.
 - 3. Open refrigerant valves, except bypass valves that are used for other purposes.
 - 4. Check compressor-motor alignment, and lubricate motors and bearings.

3.8 CLEANING

- A. Before installing copper tubing, clean tubing and fittings with trichloroethylene.
- B. Replace core of filter-dryer after system has been adjusted and design flow rates and pressures are established.

3.9 SYSTEM CHARGING

- A. Charge system using the following procedures:
 - 1. Install core in filter-dryer after leak test but before evacuation.
 - 2. Evacuate entire refrigerant system with a vacuum pump to a vacuum. If vacuum holds for 12 hours, system is ready for charging.
 - 3. Break vacuum with refrigerant gas, allowing pressure to build up.
 - 4. Charge system with a new filter-dryer core in charging line. Provide full-operating charge.
 - 5. Measure amount of refrigerant required for each system. Include on close out documents.

END OF SECTION

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SECTION 23 3100 - METAL DUCTWORK

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification section, apply to this section.
- B. Requirements of the following Division 20 Sections apply to this section:
 - 1. Section 20 01 00 "General Provisions"

1.02 SUMMARY

- A. This section includes rectangular, round, and flat-oval metal ducts and plenums for heating, ventilating, and air conditioning systems in pressure classes from minus 2 inches to plus 10 inches water gage.
- B. Related Sections: The following sections contain requirements that relate to this Section:
 - 1. Section 23 07 00 "Ductwork Insulation" for exterior duct and plenum insulation.
 - 2. Section 23 33 00 "Duct Accessories" for flexible duct materials, dampers, duct-mounted access panels and doors, and turning vanes.
 - 3. Section 23 37 00 "Air Outlets."
 - 4. Section 23 05 93 "Testing, Adjusting, and Balancing."

1.03 DEFINITIONS

- A. Sealing Requirements Definitions: For the purposes of duct systems sealing requirements specified in this Section, the following definitions apply:
 - 1. Seams: A seam is defined as joining of two longitudinally (in the direction of airflow) oriented edges of duct surface material occurring between two joints. All other duct surface connections made on the perimeter are deemed to be joints.
 - 2. Joints: Joints include girth joints; branch and sub-branch intersections; so-called duct collar tap-ins; louver and air terminal connections to ducts; access door and access panel frames and jambs; duct, plenum, and casing abutments to building structures,

1.04 SYSTEM PERFORMANCE REQUIREMENTS

- A. The duct system design, as indicated, has been used to select and size air moving and distribution equipment and other components of the air system. Changes or alterations to the layout or configuration of the duct system must be specifically approved in writing. Accompany requests for layout modifications with calculations showing that the proposed layout will provide the original design results without increasing the system total pressure.

1.05 SUBMITTALS

- A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.
- B. Product data including details of construction relative to materials, dimensions of individual components, profiles, and finishes for the following items:
 - 1. Duct Liner.
 - 2. Sealing Materials.
 - 3. Fire-Stopping Materials.
 - 4. Construction Methods.
- C. Shop drawings from duct fabrication shop, drawn to a scale not smaller than 1/4 inch equals 1 foot, on drawing sheets same size as the Contract Drawings, detailing:
 - 1. Fabrication, assembly, and installation details, including plans, elevations, sections, details of components, and attachments to other work.

2. Duct layout, indicating pressure classifications and sizes in plan review. For exhaust ducts systems, indicate the classification of the materials handled as defined in this Section.
 3. Fittings.
 4. Reinforcing details and spacing.
 5. Seam and joint construction details.
 6. Penetrations through fire-rated and other partitions.
 7. Terminal unit, coil, and humidifier installations.
 8. Hangers and supports, including methods for building attachment, vibration isolation, and duct attachment.
- D. Coordination drawings for ductwork at congested areas or areas of interference shall be prepared to totally describe proposed installation and routings in accordance with Division 20 01 00 General Provisions." show the following:
1. Coordination with ceiling suspension members.
 2. Spatial coordination with other systems installed in the same space with the duct systems.
 3. Coordination of ceiling- and wall-mounted access doors and panels required to provide access to dampers and other operating devices.
 4. Coordination with ceiling-mounted lighting fixtures and air outlets and inlets.
- E. Welding certificates including welding procedures specifications, welding procedure qualifications test records, and welders' qualifications test records complying with requirements specified in "Quality Assurance" below.
- F. Record drawings including duct system routing, fittings details, reinforcing, support, and installed accessories and devices, in accordance with Division 20 01 00 - General Provisions.

1.06 QUALITY ASSURANCE

- A. Qualify welding processes and welding operators in accordance with AWS D1.1 "Structural Welding Code-Steel" for hangers and supports and AWS D9.1 "Sheet Metal Welding Code."
- B. Qualify each welder in accordance with AWS qualification tests for welding processes involved. Certify that their qualification is current.
- C. NFPA Compliance: Comply with the following NFPA Standards:
1. NFPA 90A: "Standard for the Installation of Air Conditioning and Ventilating Systems," except as indicated otherwise.
 2. NFPA 96, "Standard for the Installation of Equipment for the Removal of Smoke and Grease Laden Vapors for Commercial Cooking Equipment," Chapter 3, "Duct System," for kitchen hood duct systems, except as indicated otherwise.
 3. Perform tests specified in "Field Quality Control." Modify mock-up construction and perform additional tests as required to achieve specified minimum acceptable results.
 4. Obtain approval of mock-ups before beginning final fabrication.
 5. Retain and maintain mock-ups during construction in undistributed condition as a standard for judging completed unit of work.
 6. Demolish and remove mock-ups from project site when directed.
 7. Accepted mock-ups that form a part of the actual duct system may remain and become part of completed unit of work.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Deliver sealant and fire-stopping materials to site in original unopened containers or bundles with labels informing about manufacturer, product name and designation, color, expiration period for use, pot life, curing time, and mixing instructions for multi-component materials.

- B. Store and handle sealant fire-stopping materials in compliance with manufacturers' recommendations to prevent their deterioration or damage due to moisture, high or low temperatures, contaminants, or other cause.
- C. Deliver and store stainless steel sheets with mill-applied adhesive protective paper, maintained through fabrication and installation.

PART 2 PRODUCTS

2.01 SHEET METAL MATERIALS

- A. Sheet Metal, General: Provide sheet metal in thickness indicated, packaged and marked as specified in ASTM A 700.
- B. Galvanized Sheet Steel: Lock-forming quality, ASTM A 653/A653M, A924/A924M. Provide mill phosphatized finish for exposed surfaces of ducts exposed to view.
- C. Carbon Steel Sheets: ASTM A 366, cold-rolled sheets, commercial quality, with oiled, exposed matte finish.
- D. Stainless Steel: ASTM A 480/A 480M, Type 316 & 304, and having a No. 2D finish for concealed ducts and No. 4 for exposed ducts.
- E. Reinforcement Shapes and Plates: Unless otherwise indicated, provide galvanized steel reinforcing where installed on galvanized sheet metal ducts. For aluminum and stainless steel ducts provide reinforcing of compatible materials.
- F. Tie Rods: Galvanized steel, 1/4-inch minimum diameter for 36-inch length or less; 3/8-inch minimum diameter for lengths longer than 36 inches.
- G. Aluminum Sheets: ASTM B 209, alloy 3003, temper H14; with mill finish for concealed ducts and standard, 1-side bright finish for exposed ducts.
- H. In general, the contract drawings are diagrammatic and are not intended to be scaled, nor indicate all details such as offsets, transitions, etc. for the fabrication/installation of work. It will be the responsibility of the contractor to completely coordinate with other trade systems, and all construction documents for the actual location and elevation of final install. The Mechanical Contractor means and methods of installation shall provide for operating efficiency, neatness of appearance, and ease of maintenance. Where information required to provide a complete working system is omitted or unclear, the contractor is responsible for requesting a clarification from the engineer prior to submission of bids. Bidding contractors must review all construction documents and be knowledgeable of all referenced codes and ordinances prior to submitting bids. The contractor should expect minor deviations from the contract documents and include additional labor & material for offsets and elbows including straight duct in his sheet metal bid. The sheet metal contractor should expect, and include in his bid, at least 5% in poundage (but not less than 500 pounds) of the total project poundage estimated. The contractor shall also include any required external insulation (material & labor) that may be required. All deviations shall be discussed and submitted to the engineer for approval. The contractors shall install his work in a manner so that interferences between the various trades are avoided. All deviations from sizes, locations, and from all other methods of the installation, shall be recorded.
 - 1. All uses of this allowance should be submitted to the mechanical engineer for record.
 - 2. All uses of this allowance are to be approved by the mechanical engineer prior to construction of ductwork.

2.02 DUCT INSULATION

- A. Refer to specification 23 07 00 for Duct Insulation specification.

2.03 FIRE-STOPPING

- A. Refer to Division 7 Section "Joint Sealers" for fire-stopping.

2.04 FIRE-STOPPING

- A. Fire-Resistant Sealant: Provide two-part, foamed-in-place, fire-stopping silicone sealant formulated for use in through-penetration fire-stop system for filling openings around duct

penetrations through walls and floors, having fire-resistance ratings indicated as established by testing identical assemblies per ASTM E 814 by Underwriters Laboratory, Inc. or other testing and inspecting agency acceptable to authorities having jurisdiction.

- B. Fire-Resistant Sealant: Provide one-part elastomeric sealant formulated for use in a through-penetration fire-stop system for filling openings around duct penetrations through walls and floors, having fire-resistance ratings indicated as established by testing identical assemblies per ASTM E 814 by Underwriter's Laboratory, Inc. or other testing and inspecting agency acceptable to authorities having jurisdiction.
- C. Available Products: Subject to compliance with requirements, products that may be incorporated in the Work include, but are not limited to, the following:
- D. Products: Subject to compliance with requirements, provide one of the following:
 - 1. "Dow Corning Fire Stop Foam"; Dow Corning Corp.
 - 2. "Pensil 851"; General Electric Co.
 - 3. "Dow Corning Fire Stop Sealant"; Dow Corning Corp.
 - 4. "3M Fire Barrier Caulk CP-25"; Electrical Products Div./3M.
 - 5. "RTV 7403"; General Electric Co.
 - 6. "Fyre Putty"; Standard Oil Engineered Materials Co.

2.05 HANGERS AND SUPPORTS

- A. Building Attachments: Concrete inserts, powder actuated fasteners, or structural steel fasteners appropriate for building materials. Do not use powder actuated fasteners for lightweight aggregate concretes or for slabs less than 4 inches thick.
- B. Hangers: Galvanized sheet steel, or round, uncoated steel, threaded rod.
 - 1. Hangers Installed In Corrosive Atmospheres: Electro-galvanized, all-thread rod or hot-dipped-galvanized rods with threads painted after installation.
 - 2. Straps and Rod Sizes: Conform to Table 4-1 in SMACNA HVAC Duct Construction Standards, 1985 Edition, for sheet steel width and gage and steel rod diameters.
- C. Duct Attachments: Sheet metal screws, blind rivets, or self-tapping metal screws; compatible with duct materials.
- D. Trapeze and Riser Supports: Steel shapes conforming to ASTM A 36.
 - 1. Where galvanized steel ducts are installed, provide hot-dipped-galvanized steel shapes and plates.
 - 2. For stainless steel ducts, provide stainless steel support materials.
 - 3. For aluminum ducts, provide aluminum support materials, except where materials are electrolytically separated from ductwork.

2.06 RECTANGULAR DUCT FABRICATION

- A. General: Except as otherwise indicated, fabricate rectangular ducts with galvanized sheet steel, in accordance with SMACNA "HVAC Duct Construction Standards," Tables 1-3 through 1-19, including their associated details. Conform to the requirements in the referenced standard for metal thickness, reinforcing types and intervals, tie rod applications, and joint types and intervals.
 - 1. Fabricate rectangular ducts in lengths appropriate to reinforced and rigidity class required for pressure classification.
 - 2. Provide materials that are free from visual imperfections such as pitting, seam marks, roller marks, stains, and discolorations.
- B. Static Pressure Classifications: Except where otherwise indicated, construct duct systems to the following pressure classifications:
 - 1. Supply Ducts: 2 inches water gage.
 - 2. Return Ducts: 2 inches water gage, negative pressure.

3. Exhaust Ducts: 2 inches water gage, negative pressure.
- C. Cross breaking or Cross Beading: Cross break or bead duct sides that are 19 inches and larger and are 20 gage or less, with more than 10 sq. ft. of un-braced panel area, as indicated in SMACNA "HVAC Duct Construction Standard," Figure 1-4, unless they are lined or are externally insulated.

2.07 RECTANGULAR DUCT FITTINGS

- A. Fabricate elbows, transitions, offsets, branch connections, and other duct construction in accordance with SMACNA "HVAC Metal Duct Construction Standard," Current Edition, Figures 2-1 through 2-10.

2.08 ROUND DUCT FABRICATION

- A. Round Ducts: Fabricate round supply ducts using seam types identified in SMACNA "HVAC Duct Construction Standards," Most Current Edition, Figure 3-1, RL-1, RL-4, or RL-5. Seams Types RL-2 or RL-3 may be used if spot-welded on 1-inch intervals. Comply with SMACNA "HVAC Duct Construction Standards," Table 3-2 for galvanized steel gages.

2.09 ROUND SUPPLY AND EXHAUST FITTINGS FABRICATION

- A. 90-Degree Tees and Laterals and Conical Tees: Fabricate to conform to SMACNA "HVAC Duct Construction Standards," Most Current Edition, Figures 3-4 and 3-5 and with metal thickness specified for longitudinal seam straight duct.
- B. Diverging-Flow Fittings: Fabricate with a reduced entrance to branch taps with no excess material projecting from the body onto branch tap entrance.
- C. Elbows: Fabricate in die-formed, gored, pleated, or mitered construction. Fabricate the bend radius of die-formed, gored, and pleated elbows 1.5 times the elbow diameter. Unless elbow construction type is indicated, provide elbows meeting the following requirements:
1. Mitered Elbows: Fabricate mitered elbows with welded construction in gages specified below.
 - a. Mitered Elbows Radius and Number of Pieces: Unless otherwise indicated, construct elbow to comply with SMACNA "HVAC Duct Construction Standards," Table 3-1.
 - b. Round Mitered Elbows: Solid welded and with metal thickness listed below for pressure classes from minus 2 inches to plus 2 inches:
 - 1) 3 to 36 inches: 24 gage.
 - 2) 27 to 36 inches: 22 gage.
 - 3) 37 to 50 inches: 20 gage.
 - 4) 52 to 60 inches: 18 gage.
 - 5) 62 to 84 inches: 16 gage.
 - c. Round Mitered Elbows: Solid welded and with metal thickness listed below for pressure classes from 2 inches to 10 inches:
 - 1) 3 to 14 inches: 24 gage.
 - 2) 15 to 26 inches: 22 gage.
 - 3) 27 to 50 inches: 20 gage.
 - 4) 52 to 60 inches: 18 gage.
 - 5) 62 to 84 inches: 16 gage.
 - d. 90-Degree, 2-Piece, Mitered Elbows: Use only for supply systems, or exhaust systems for material handling classes A and B; and only where space restrictions do not permit the use of 1.5 bend radius elbows. Fabricate with a single-thickness turning vanes.
 2. Round Elbows - 8 Inches and Smaller: Die-formed elbows for 45- and 90-degree elbows and pleated elbows for 30, 45, 60, and 90 degrees only. Fabricate nonstandard bend

angle configurations of ½-inch-diameter (e.g. 3 ½ - and 4 ½ - inch) elbows with gored construction.

3. Round Elbows - 9 Through 14 Inches: Gored or pleated elbows for 30, 45, 60, and 90 degrees, except where space restrictions require a mitered elbow. Fabricate nonstandard bend angle configurations or ½ - inch-diameter (e.g. 9 ½ - and 10 ½ -inch) elbows with gored construction.
4. Round Elbows: Larger Than 14 Inches and All Flat Oval Elbows: Gored elbows, except where space restrictions require a mitered elbow.
5. Round Gored Elbows Gages: Same as for non-elbow fittings specified above.
6. Flat Oval Elbows Gages: Same as longitudinal seam flat oval duct.
7. Pleated Elbows Sizes Through 14 Inches and Pressures Through 10 Inches:

26 gage.

2.10 AUXILIARY DRAIN PAN

- A. Auxiliary Drain Pans: Fabricate of min. 16 gauge 304 stainless steel turned up four (4) inches all around and extend six (6) inches beyond all sides of equipment. All joints and seams to be of welded construction. This is applicable for all auxiliary drain pans under air handling units, hot water heaters, etc.
 1. Provide float switch in auxiliary drain line, unit to de-energize when float switch is tripped.
 2. Pipe safety pans to nearest floor drain.
 3. In air handling unit drain pan, provide ball valve in safety pan condensate drain line.

2.11 KITCHEN HOOD EXHAUST DUCT

- A. Exhaust duct shall be constructed of 16 gauge, Type 316 stainless steel with No. 4 finish on exposed surfaces and welded joints. All seam and joints shall be of welded construction. Provide a 2" wide stainless steel ceiling collar around the duct at penetration through the ceiling. Contractor shall wrap exhaust duct with 3.0" thk. "Fyrewrap" fiberglass insulation, foil faced, installed in strict accordance with manufacturer's recommendations.

2.12 JOINT AND SEAM SEALANT

- A. Joint and Seam Sealants, General: The term "sealant" is not limited to materials of adhesive or mastic nature but includes tapes and combinations of open-weave fabric strips and mastics.
 1. All sealants shall be UL181A compliant.
- B. All ductwork joints and seams to be sealed with joint and seam hardcast. Water Based Duct Sealant to be Versa-Grip 102 as manufactured by HardCast, Miracle Kingco D-619 Water Based Duct Sealant or prior approved equal.
 1. All seams on exposed ductwork shall be neatly caulked with HardCast Iron-Grip 601 or prior approved equal. Contractor to seal one (1) duct joint/seam for aesthetic approval by architect prior to sealing entire duct system.
- C. Flange Gaskets Joints: Butyl rubber or EPDM polymer with polyisobutylene plasticizer to be installed at joint connection and then sealed with joint and seam hardcast.

2.13 DUCT LINER

- A. Fibrous-Glass Liner: Comply with NFPA 90A or NFPA 90B and with NAIMA AH124.
 1. Materials: ASTM C 1071; surfaces exposed to airstream shall be coated to prevent erosion of glass fibers.
 - a. Thickness: 1 inch, 1.5lb.density
 - b. Thermal Conductivity (k-Value): 0.26 at 75 deg F mean temperature.
 - c. Fire-Hazard Classification: Maximum flame-spread index of 25 and smoke-developed index of 50 when tested according to ASTM E 84.
 - d. Liner Adhesive: Comply with NFPA 90A or NFPA 90B and with ASTM C 916.

- e. Mechanical Fasteners: Galvanized steel suitable for adhesive attachment, mechanical attachment, or welding attachment to duct without damaging liner when applied as recommended by manufacturer and without causing leakage in duct.
 - 1) Tensile Strength: Indefinitely sustain a 50-lb- tensile, dead-load test perpendicular to duct wall.
 - 2) Fastener Pin Length: As required for thickness of insulation and without projecting more than 1/8 inch into airstream.
 - 3) Adhesive for Attaching Mechanical Fasteners: Comply with fire-hazard classification of duct liner system.

2.14 APPLICATION OF LINER IN RECTANGULAR DUCTS

- A. Adhere a single layer of indicated thickness of duct liner with at least 100 percent adhesive coverage at liner contact surface area. Attaining indicated thickness with multiple layers of duct liner is prohibited.
- B. Apply adhesive to transverse edges of liner facing upstream that do not receive metal nosing.
- C. Butt transverse joints without gaps and coat joint with adhesive.
- D. Fold and compress liner in corners of rectangular ducts or cut and fit to ensure butted-edge overlapping.
- E. Do not apply liner in rectangular ducts with longitudinal joints, except at corners of ducts, unless duct size and standard liner product dimensions make longitudinal joints necessary.
- F. Secure liner with mechanical fasteners 4 inches from corners and at intervals not exceeding 12 inches transversely; at 3 inches from transverse joints and at intervals not exceeding 18 inches longitudinally.
- G. Secure transversely oriented liner edges facing the airstream with metal nosings that have either channel or "Z" profiles or are integrally formed from duct wall. Fabricate edge facings at the following locations:
 - 1. Fan discharges.
 - 2. Intervals of lined duct preceding unlined duct.
 - 3. Upstream edges of transverse joints in ducts where air velocities are greater than 2500 fpm (12.7 m/s) or where indicated.
- H. Secure insulation between perforated sheet metal inner duct of same thickness as specified for outer shell. Use mechanical fasteners that maintain inner duct at uniform distance from outer shell without compressing insulation.
 - 1. Sheet Metal Inner Duct Perforations: 3/32-inch diameter, with an overall open area of 23 percent.
 - 2. Applicable where perforated liner is specified on drawings.
- I. Terminate inner ducts with buildouts attached to fire-damper sleeves, dampers, turning vane assemblies, or other devices. Fabricated buildouts (metal hat sections) or other buildout means are optional; when used; secure buildouts to duct walls with bolts, screws, rivets, or welds.

PART 3 EXECUTION

3.1 DUCT INSTALLATION, GENERAL

- A. Construct and install ducts according to SMACNA's "HVAC Duct Construction Standards--Metal and Flexible," unless otherwise indicated. All ducts shall be galvanized steel (G90) unless otherwise noted.
- B. Duct System Pressure Class: Construct and install each system for the specific duct pressure classification indicated.

Static-Pressure Classes: Unless otherwise indicated, construct ducts according to the following:

1. Supply Ducts: 2 inch wg.
 2. Return Ducts (Negative Pressure): 2 inch wg.
 3. Exhaust Ducts (Negative Pressure): 2 inch wg.
- C. Install ducts with the fewest possible joints.
 - D. Use fabricated fittings for all changes in directions, changes in size and shape, and connections.
 - E. Install couplings tight to duct wall surface with a minimum of projections into duct. Secure couplings with sheet metal screws. Install screws at intervals of 12 inches, with a minimum of 3 screws in each coupling.
 - F. Locate ducts, except as otherwise indicated, vertically and horizontally, parallel and perpendicular to building lines; avoid diagonal runs. Install duct systems in shortest route that does not obstruct useable space or block access for servicing building and its equipment.
 - G. Install ducts close to walls, overhead construction, columns, and other structural and permanent enclosure elements of building.
 - H. Provide clearance of 1 inch where furring is shown for enclosure or concealment of ducts, plus allowance for insulation thickness, if any.
 - I. Install insulated ducts with 1-inch clearance outside of insulation.
 - J. Conceal ducts from view in finished and occupied spaces by locating in mechanical shafts, hollow wall construction, or above suspended ceilings. Do not encase horizontal runs in solid partitions, except as specifically shown.
 - K. Coordinate layout with suspended ceiling, fire- and smoke-control dampers, lighting layouts, and similar finished work.
 - L. Electrical Equipment Spaces: Route ductwork to avoid passing through transformer vaults and electrical equipment spaces and enclosures.
 - M. Non-Fire-Rated Partition Penetrations: Where ducts pass interior partitions and exterior walls, and are exposed to view, conceal space between construction opening and duct or duct insulation with sheet metal flanges of same gage as duct. Overlap opening on 4 sides by at least 1 ½ inches.
 - N. Fire-Rated Partition Penetrations: Where ducts pass through interior partitions and exterior walls, install appropriately rated fire dampers, sleeves, and firestopping sealant. Fire and smoke dampers are specified in Division 23 Section "Duct Accessories." Firestopping materials and installation methods are specified in Division 7 Section "Through-Penetration Firestop Systems."
 - O. Install round and flat-oval ducts in lengths not less than 12 feet unless interrupted by fittings.
 - P. Seal all joints and seams. Apply sealant to male end connectors before insertion, and afterward to cover entire joint and sheet metal screws.
 - Q. Install ducts with hangers and braces designed to withstand, without damage to equipment, seismic force required by applicable building codes.
 - R. Protect duct interiors from the elements and foreign materials until building is enclosed. Follow SMACNA's "Duct Cleanliness for New Construction."
 - S. Paint interiors of metal ducts that do not have duct liner, for 24 inches upstream of registers and grilles. Apply one coat of flat, black, latex finish coat over a compatible galvanized-steel primer. Paint materials and application requirements are specified in Division 9 painting Sections.
 - T. All sections of duct work (Supply, Return, Exhaust, Fresh Air) are to be supplied to project in maximum lengths of 4'-0" as to allow for ease of field modifications and rerouting of ductwork.

3.02 SEAM AND JOINT SEALING

- A. General: Seal all duct seams and joints as follows:

- B. Pressure Classifications Greater Than 3 Inches Water Gage: All transverse joints, longitudinal seams and penetrations.
- C. Pressure Classifications Greater than 2 to 3 Inches Water Gage: All transverse joints and longitudinal seams.
 - 1. Pressure Classification Less than 2 Inches Water Gage: All transverse joints and longitudinal seams.
- D. Seal externally insulated ducts prior to insulation installation.
- E. Self-adhesive foil faced tape not acceptable as a means of ductwork sealant.
- F. Cover all sheet metal screws.
- G. Joint and Seam Sealants, General: The term "sealant" is not limited to materials of adhesive or mastic nature but includes tapes and combinations of open-weave fabric strips and mastics.
 - 1. All sealants shall be UL181A compliant.
- H. All ductwork joints and seams to be sealed with joint and seam hardcast. Water Based Duct Sealant to be Versa-Grip 102 as manufactured by HardCast, Miracle Kingco D-619 Water Based Duct Sealant or prior approved equal.
 - 1. All seams on exposed ductwork shall be neatly caulked with HardCast Iron-Grip 601 or prior approved equal. Contractor to seal one (1) duct joint/seam for aesthetic approval by architect prior to sealing entire duct system.
- I. Flange Gaskets Joints: Butyl rubber or EPDM polymer with polyisobutylene plasticizer to be installed at joint connection and then sealed with joint and seam hardcast.

3.03 HANGING AND SUPPORTING

- A. Install rigid round, rectangular, and flat oval metal duct with support systems indicated in SMACNA "HVAC Duct Construction Standards (Most Current Edition)," Tables 4-1 through 4-3 and Figures 4-1 through 4-8.
- B. Support horizontal ducts with 2 feet of each elbow and withing 4 feet of each branch intersection.
- C. Support vertical ducts at a maximum interval of 16 feet and at each floor.
- D. Upper attachments to structures shall have an allowable load not exceeding 1/4 of the failure (proof test) load but are not limited to the specified methods indicated.
- E. Install concrete insert prior to placing concrete.
- F. Install powder actuated concrete fasteners after concrete is placed and completely cured.

3.04 CONNECTIONS

- A. Equipment Connections: Connect equipment with flexible connectors in accordance with Division 23 Section "Duct Accessories."
- B. Branch Connections: Comply with SMACNA "HVAC Duct Construction Standards" (Most Current Edition), Figures 2-7 and 2-8.
- C. Outlet and Inlet Connections: Comply with SMACNA "HVAC Duct Construction Standards" (Most Current Edition), Figures 2-16 through 2-18.
- D. Terminal Units Connections: Comply with SMACNA "HVAC Duct Construction Standards" (Most Current Edition), Figure 2-19.

3.05 FIELD QUALITY CONTROL

- A. Disassemble, reassemble, and seal segments of the systems as required to accommodate leakage testing, and as required for compliance with test requirements.
- B. Conduct tests, in the presence of the Architect, at static pressures equal to the maximum design pressure of the system or the section being tested. If pressure classifications are not indicated, test entire systems at the maximum system design pressure. Do not pressurize systems above the maximum design operating pressure. Give 7 days advanced notice for

- C. Determine leakage from entire system or section of the system by relating leakage to the surface area of the test section.
- D. Maximum Allowable Leakage: As described in ASHRAE (most current edition) Handbook, "Fundamentals" Volume, Chapter 32, Table 6 and Figure 10. Comply with requirements for leakage classification 3 for round and flat oval ducts, leakage classification 12 for rectangular ducts in pressure classifications less than and equal to 2 inches water gage (both positive and negative pressures), and leakage classification 6 for pressure classifications greater than 2 inches water gage and less than and equal to 10 inches water gage.
- E. Remarks leaking joint as required and apply sealants to achieve specified maximum allowable leakage.
- F. Leakage Test: Perform volumetric measurements and adjust air systems as described in ASHRAE (most current edition) "HVAC Systems and Applications" Volume, Chapter 57 and ASHRAE (most current edition) "Fundamentals" Volume, Chapter 13, and Division 15 Section "TESTING, ADJUSTING, AND BALANCING."
- G. Leakage tests shall be performed for the main trunk line up to the terminal units of each air handling unit. The tests shall be concluded as a requirement of Test and Balance Contract.

3.06 ADJUSTING

- A. Adjust volume control devices as required by the testing and balancing procedures to achieve required air flow. Refer to Division 23 Section "TESTING, ADJUSTING, AND BALANCING" for requirements and procedures for adjusting and balancing air systems.

3.07 CLEANING NEW SYSTEMS

- A. Mark position of dampers and air-directional mechanical devices before cleaning, and perform cleaning before air balancing.
- B. Use service openings, as required, for physical and mechanical entry and for inspection.
 - 1. Create other openings to comply with duct standards.
 - 2. Disconnect flexible ducts as needed for cleaning and inspection.
 - 3. Remove and reinstall ceiling sections to gain access during the cleaning process.
- C. Vent vacuuming system to the outside. Include filtration to contain debris removed from HVAC systems, and locate exhaust down wind and away from air intakes and other points of entry into building.
- D. Clean the following metal duct systems by removing surface contaminants and deposits:
 - 1. Air outlets and inlets (registers, grilles, and diffusers).
 - 2. Supply, return, and exhaust fans including fan housings, plenums (except ceiling supply and return plenums), scrolls, blades or vanes, shafts, baffles, dampers, and drive assemblies.
 - 3. Air-handling unit internal surfaces and components including mixing box, coil section, air wash systems, spray eliminators, condensate drain pans, humidifiers and dehumidifiers, filters and filter sections, and condensate collectors and drains.
 - 4. Coils and related components.
 - 5. Return-air ducts, dampers, and actuators except in ceiling plenums and mechanical equipment rooms.
 - 6. Supply-air ducts, dampers, actuators, and turning vanes.
- E. Mechanical Cleaning Methodology:
 - 1. Clean metal duct systems using mechanical cleaning methods that extract contaminants from within duct systems and remove contaminants from building.
 - 2. Use vacuum-collection devices that are operated continuously during cleaning. Connect vacuum device to downstream end of duct sections so areas being cleaned are under negative pressure.

3. Use mechanical agitation to dislodge debris adhered to interior duct surfaces without damaging integrity of metal ducts, duct liner, or duct accessories.
4. Clean fibrous-glass duct liner with HEPA vacuuming equipment; do not permit duct liner to get wet.
5. Clean coils and coil drain pans according to NADCA 1992. Keep drain pan operational. Rinse coils with clean water to remove latent residues and cleaning materials; comb and straighten fins.

F. Cleanliness Verification:

1. Visually inspect metal ducts for contaminants.
2. Where contaminants are discovered, re-clean and reinspect ducts.

G. All ductwork shall be in accordance to SMACNA's (current edition) "Duct Cleanliness for New Construction Guidelines". All supply ducts should be considered intermediate level. If upon inspection or during construction it is deemed that the criteria per section 3 of SMACNA's "Cleanliness Guidelines" were violated and the contamination has been identified, NADCA (current edition) "Cleaning New Systems" shall be followed.

3.08 HOOD EXHAUST DUCTS, SPECIAL INSTALLATION REQUIREMENTS

1. Install ducts to allow for thermal expansion through 2000 deg F temperature range.
2. Install ducts without dips or traps that may collect residues unless traps have continuous or automatic residue removal.
3. Install access openings at each change in direction and at intervals defined by NFPA 96; locate on sides of duct a minimum of 1-1/2 inches from bottom; and fit with grease-tight covers of same material as duct.
4. Do not penetrate fire-rated assemblies except as permitted by applicable building codes.
5. Perform grease duct test in accordance with IMC 2021 section 506.3.2.5 Grease duct test. Prior to the use or concealment of any portion of a grease duct system, a leakage test shall be performed. Ducts shall be considered to be concealed where installed in shafts or covered by coatings or wraps that prevent the ductwork from being visually inspected on all sides. The permit holder shall be responsible to provide the necessary equipment and perform the grease duct leakage test. A light test shall be performed to determine that all welded and brazed joints are liquid tight. A light test shall be performed by passing a lamp having a power rating of not less than 100 watts through the entire section of ductwork to be tested. The lamp shall be open so as to emit light equally in all directions perpendicular to the duct walls. A test shall be performed for the entire duct system, including the hood-to-duct connection. The duct work shall be permitted to be tested in sections, provided that every joint is tested. For listed factory-built grease ducts, this test shall be limited to duct joints assembled in the field and shall exclude factory welds.

END OF SECTION

4-14-25

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SECTION 23 3300 - DUCTWORK ACCESSORIES

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. This Section includes the following:
 - 1. Backdraft dampers.
 - 2. Volume dampers.
 - 3. Motorized control dampers.
 - 4. Fire dampers.
 - 5. Turning Vanes.
 - 6. Duct-mounting access doors.
 - 7. Flexible connectors.
 - 8. Flexible Duct.
 - 9. Round Branch Takeoff to Diffusers.
 - 10. Cable Control System & Balancing Dampers.
 - 11. Misc Sheetmetal & Duct Accessory Hardware.
 - 12. Smoke Dampers
 - 13. Combination Fire/Smoke Dampers.
- B. Related Sections include the following:
 - 1. Division 26 Section "Fire Alarm" for duct-mounting fire and smoke detectors.
 - 2. Division 23 Section 23 09 00 "Building and Automatic Temperature Controls" for electric and pneumatic damper actuators.

1.03 SUBMITTALS

- A. Product Data: For the following:
 - 1. Backdraft dampers.
 - 2. Volume dampers.
 - 3. Motorized control dampers.
 - 4. Fire dampers.
 - 5. Turning Vanes.
 - 6. Duct-mounting access doors.
 - 7. Flexible connectors.
 - 8. Flexible Duct.
 - 9. Round Branch Takeoff to Diffusers.
 - 10. Cable Control System & Balancing Dampers.
 - 11. Misc Sheetmetal & Duct Accessory Hardware.
 - 12. Smoke Dampers
 - 13. Combination Fire/Smoke Dampers.
- B. Shop Drawings: Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
 - 1. Special fittings.

2. Manual-volume damper installations.
 3. Fire-damper installations, including sleeves and duct-mounting access doors.
 4. Wiring Diagrams: Power, signal, and control wiring.
- C. Coordination Drawings: Reflected ceiling plans, drawn to scale and coordinating penetrations and ceiling-mounting items. Show ceiling-mounting access panels and access doors required for access to duct accessories.

1.04 QUALITY ASSURANCE

- A. Comply with NFPA 90A, "Installation of Air Conditioning and Ventilating Systems," and NFPA 90B, "Installation of Warm Air Heating and Air Conditioning Systems."

1.05 EXTRA MATERIALS

- A. Furnish extra materials matching products installed as described below, packaged with protective covering for storage and identified with labels describing contents. Deliver extra materials to Owner.
1. Fusible Links: Furnish quantity equal to 10 percent of amount installed.

PART 2 PRODUCTS

2.01 SHEET METAL MATERIALS

- A. Comply with SMACNA's "HVAC Duct Construction Standards--Metal and Flexible" for acceptable materials, material thicknesses, and duct construction methods, unless otherwise indicated.
- B. Galvanized Sheet Steel: Lock-forming quality; complying with ASTM A 653/A 653M and having G90 coating designation; ducts shall have mill-phosphatized finish for surfaces exposed to view.
- C. Stainless Steel: ASTM A 480/A 480M.
- D. Aluminum Sheets: ASTM B 209, alloy 3003, temper H14; with mill finish for concealed ducts and standard, 1-side bright finish for exposed ducts.
- E. Extruded Aluminum: ASTM B 221, alloy 6063, temper T6.
- F. Reinforcement Shapes and Plates: Galvanized-steel reinforcement where installed on galvanized sheet metal ducts; compatible materials for aluminum and stainless-steel ducts.
- G. Tie Rods: Galvanized steel, 1/4-inch minimum diameter for lengths 36 inches or less; 3/8-inch minimum diameter for lengths longer than 36 inches.

2.02 BACKDRAFT DAMPERS

- A. Description: Multiple-blade, parallel action gravity balanced, with center-pivoted blades of maximum 6-inch width, with sealed edges, assembled in rattle-free manner with 90-degree stop, steel ball bearings, and axles; adjustment device to permit setting for varying differential static pressure.
- B. Frame: 0.052-inch- thick, galvanized sheet steel, with welded corners [and mounting flange].
- C. Blades: 0.050-inch- thick aluminum sheet.
- D. Blade Seals: Felt, Vinyl or Neoprene.
- E. Blade Axles: Nonferrous or Galvanized steel.
- F. Tie Bars and Brackets: Aluminum or Galvanized steel.
- G. Return Spring: Adjustable tension.

2.03 VOLUME DAMPERS

- A. General Description: Factory fabricated, with required hardware and accessories. Stiffen damper blades for stability. Include locking device to hold single-blade dampers in a fixed position without vibration. Close duct penetrations for damper components to seal duct consistent with pressure class.
1. Pressure Classes of 3-Inch wg or Higher: End bearings or other seals for ducts with axles full length of damper blades and bearings at both ends of operating shaft.

- B. Standard Volume Dampers: Multiple- or single-blade, parallel- or opposed-blade design as indicated, standard leakage rating,[with linkage outside airstream,] and suitable for horizontal or vertical applications.
 - 1. Steel Frames: Hat-shaped, galvanized sheet steel channels, minimum of 0.064 inch thick, with mitered and welded corners; frames with flanges where indicated for attaching to walls and flangeless frames where indicated for installing in ducts.
 - 2. Roll-Formed Steel Blades: 0.064-inch- thick, [galvanized] [stainless] sheet steel.
 - 3. Aluminum Frames: Hat-shaped, 0.10-inch- thick, aluminum sheet channels; frames with flanges where indicated for attaching to walls; and flangeless frames where indicated for installing in ducts.
 - 4. Roll-Formed Aluminum Blades: 0.10-inch- thick aluminum sheet.
 - 5. Extruded-Aluminum Blades: 0.050-inch- thick extruded aluminum.
 - 6. Blade Axles: [Galvanized steel] [Stainless steel] [Nonferrous].
 - 7. Bearings: Oil-impregnated bronze or Molded synthetic sleeve].
 - 8. Tie Bars and Brackets: Aluminum.
 - 9. Tie Bars and Brackets: Galvanized steel.
- C. Low-Leakage Volume Dampers: Multiple- or single-blade, parallel- or opposed-blade design as indicated, low-leakage rating,[with linkage outside airstream,] and suitable for horizontal or vertical applications.
 - 1. Steel Frames: Hat, U or Angle-shaped, galvanized sheet steel channels, minimum of 0.064 inch thick, with mitered and welded corners; frames with flanges where indicated for attaching to walls and flangeless frames where indicated for installing in ducts.
 - 2. Roll-Formed Steel Blades: 0.064-inch- thick, galvanized sheet steel.
 - 3. Aluminum Frames: Hat, U or Angle-shaped]-shaped, 0.10-inch- thick, aluminum sheet channels; frames with flanges where indicated for attaching to walls and flangeless frames where indicated for installing in ducts.
 - 4. Roll-Formed Aluminum Blades: 0.10-inch- thick aluminum sheet.
 - 5. Extruded-Aluminum Blades: 0.050-inch- thick extruded aluminum.
 - 6. Blade Axles: Galvanized steel, Stainless steel or Nonferrous.
 - 7. Bearings: Oil-impregnated bronze or Molded synthetic thrust or ball.
 - 8. Blade Seals: Felt, Vinyl, or Neoprene.
 - 9. Jamb Seals: Cambered stainless steel.
 - 10. Tie Bars and Brackets: Galvanized steel.
- D. Jackshaft: 1-inch- diameter, galvanized-steel pipe rotating within pipe-bearing assembly mounted on supports at each mullion and at each end of multiple-damper assemblies.
 - 1. Length and Number of Mountings: Appropriate to connect linkage of each damper in multiple-damper assembly.
- E. Damper Hardware: Zinc-plated, die-cast core with dial and handle made of 3/32-inch- thick zinc-plated steel, and a 3/4-inch hexagon locking nut. Include center hole to suit damper operating-rod size. Include elevated platform for insulated duct mounting.

2.04 MOTORIZED CONTROL DAMPERS

- A. Dampers shall bear the AMCA Certified Ratings Seal for Air Performance Air Leakage in accordance with AMCA 511 (Greenheck VCD-23).
- B. Dampers shall have a maximum leakage of Class 1 (8 cfm/sq. ft @ 4 in. wg at -40°F) as defined by AMCA and shall be tested in accordance with AMCA standard 500-D.
- C. Dampers shall have a maximum differential pressure rating of 5 in. wg. and a maximum velocity rating of 3000 FPM.

- D. Damper frame shall be 16 ga. galvanized steel formed into a 5" x 1" structural hat channel. Top and bottom frame members on dampers less than 17" high shall be low profile design to maximize the free area of these smaller dampers. Frame shall be 4-piece construction with 1 ½" (minimum) integral overlapping gusset reinforcements in each corner to assure square corners and provide maximum resistance to racking.
- E. Damper blades shall be 16 ga. Galvanized steel strengthened by three longitudinal 1" deep Vee grooves running the entire length of each blade. Each blade shall be symmetrical relative to its axle pivot point, presenting identical performance characteristics with air flowing in either direction through the damper. Provide symmetrical blades of varying size as required to completely fill the damper opening. Blade orientation shall be horizontal and shall be opposed blade or parallel blade as required.
- F. Each blade stop at the top and bottom of the damper frame shall occupy no more than ½" of the damper opening area.
- G. Provide TPE blade seals mechanically fastened to each blade, and flexible stainless steel jamb seals.
- H. All linkage shall be stainless steel, and concealed in the jamb. A stainless steel axle with stainless steel axle bearings shall be provided.
- I. Damper actuator to be quick acting, 24vac.
- J. Control dampers shall be equal to Greenheck # VCD-23 with all options specified.

2.05 FIRE DAMPERS

- A. Fire dampers shall be labeled according to UL 555.
- B. Fire Rating: 1-1/2 hours.
- C. Frame: Curtain type with blades outside airstream; fabricated with roll-formed, 0.034-inch- thick galvanized steel; with mitered and interlocking corners.
- D. Mounting Sleeve: Factory- or field-installed, galvanized sheet steel.
 - 1. Minimum Thickness: 16 GA (0.0635) inch thick as indicated and of length to suit application.
- E. Mounting Orientation: Vertical or horizontal as indicated.
- F. Blades: Roll-formed, interlocking, 0.034-inch- thick, galvanized sheet steel. In place of interlocking blades, use full-length, 0.034-inch- thick, galvanized-steel blade connectors.
- G. Horizontal Dampers: Include blade lock and stainless-steel closure spring.
- H. Fusible Links: Replaceable, 165 deg F rated. General Description: Labeled according to UL 555C; comply with construction details for tested floor- and roof-ceiling assemblies as indicated in UL's "Fire Resistance Directory."
- I. Frame: Galvanized sheet steel, round or rectangular, style to suit ceiling construction.
- J. Blades: Galvanized sheet steel with refractory insulation.
- K. Fusible Links: Replaceable, 165 deg F rated.
- L. Fire dampers to be factory sealed Class "A", suitable to 4" static pressure.
- M. Contractor to provide fire dampers at all wall fire wall/floor/partition penetration, refer to architect life safety plan for rating of respective walls and contractor to provide 1-1/2 hr fire damper (3 hour fire damper at 3 & 4 hour rated wall/floor/partition) at all floor penetrations of ductwork (supply, return and/or exhaust).
- N. All ductwork housing fire dampers shall be equipped with access door of sufficient size to reset and change out fusible link as necessary. All fire dampers have to be check and tested every three (3) years, access doors of sufficient size are mandatory to reset the fusible link, refer to paragraph 3.1 of this specifications for require sizes of access doors, this will be based in actual size of ductwork.
- O. All fire dampers are to be dynamic type.

- A. Fabricate to comply with SMACNA's "HVAC Duct Construction Standards--Metal and Flexible" for vanes and vane runners. Vane runners shall automatically align vanes.
- B. Manufactured Turning Vanes: Fabricate 1-1/2-inch- wide, double-vane, curved blades of galvanized sheet steel set 3/4 inch o.c.; support with bars perpendicular to blades set 2 inches o.c.; and set into vane runners suitable for duct mounting.
- C. Acoustic Turning Vanes: Fabricate airfoil-shaped aluminum extrusions with perforated faces and fibrous-glass fill.

2.07 DUCT-MOUNTING ACCESS DOORS

- A. General Description: Fabricate doors airtight and suitable for duct pressure class.
- B. Door: Double wall, duct mounting, and rectangular; fabricated of galvanized sheet metal with insulation fill and thickness as indicated for duct pressure class. Include vision panel where indicated. Include 1-by-1-inch butt or piano hinge and cam latches.
 - 1. Frame: Galvanized sheet steel, with bend-over tabs and foam gaskets.
 - 2. Provide number of hinges and locks as follows:
 - a. Less Than 12 Inches Square: Secure with two sash locks.
 - b. Up to 18 Inches Square: Two hinges and two sash locks.
 - c. Up to 24 by 48 Inches: Three hinges and two compression latches[with outside and inside handles].
 - d. Sizes 24 by 48 Inches and Larger: One additional hinge.
- C. Door: Double wall, duct mounting, and round; fabricated of galvanized sheet metal with insulation fill and 1-inch thickness. Include cam latches.
 - 1. Frame: Galvanized sheet steel, with spin-in notched frame.
- D. Pressure Relief Access Door: Double wall and duct mounting; fabricated of galvanized sheet metal [with insulation fill and thickness] as indicated for duct pressure class. Include vision panel where indicated, latches, and retaining chain.
 - 1. Frame: Galvanized sheet steel, with bend-over tabs and foam gaskets.
- E. Seal around frame attachment to duct and door to frame with neoprene or foam rubber.
- F. Insulation: 1-inch- thick, fibrous-glass or polystyrene-foam board.

2.08 FLEXIBLE CONNECTORS

- A. General Description: Flame-retardant or noncombustible fabrics, coatings, and adhesives complying with UL 181, Class 1.
- B. Metal-Edged Connectors: Factory fabricated with a fabric strip 3-1/2 inches wide attached to two strips of 2-3/4-inch- wide, 0.028-inch- thick, galvanized sheet steel or 0.032-inch- thick aluminum sheets. Select metal compatible with ducts.
- C. Indoor System, Flexible Connector Fabric: Glass fabric double coated with neoprene.
 - 1. Minimum Weight: 26 oz./sq. Yd..
 - 2. Tensile Strength: 480 lbf/inch in the warp and 360 lbf/inch in the filling.
 - 3. Service Temperature: Minus 40 to plus 200 deg F.
- D. Outdoor System, Flexible Connector Fabric: Glass fabric double coated with weatherproof, synthetic rubber resistant to UV rays and ozone.
 - 1. Minimum Weight: 24 oz./sq. Yd..
 - 2. Tensile Strength: 530 lbf/inch in the warp and 440 lbf/inch in the filling.
 - 3. Service Temperature: Minus 50 to plus 250 deg F.
- E. High-Temperature System, Flexible Connectors: Glass fabric coated with silicone rubber.
 - 1. Minimum Weight: 16 oz./sq. Yd..
 - 2. Tensile Strength: 285 lbf/inch in the warp and 185 lbf/inch in the filling.

3. Service Temperature: Minus 67 to plus 500 deg F.

F. High-Corrosive-Environment System, Flexible Connectors: Glass fabric with chemical-resistant coating.

1. Minimum Weight: 14 oz./sq. Yd..

2. Tensile Strength: 450 lbf/inch in the warp and 340 lbf/inch in the filling.

3. Service Temperature: Minus 67 to plus 500 deg F.

2.09.01 LOW PRESSURE FLEXIBLE DUCT

A. Core material shall be an acoustical transparent CPE fabric supported by helically wound galvanized steel. The fabric shall be mechanically fastened to the steel helix without the use of adhesive.

B. The internal working pressure rating shall be at least as follows with a bursting pressure of at least 2-1/2 times the working pressure.

1. Positive: 10 inches W.G.

2. Negative: 5 inches W.G.

C. The duct shall be rated for a velocity of at least 5500 feet per minute.

D. Suitable for operating temperatures of at least 250 degrees F.

E. Minimum Acoustic Performance:

1. The insertion loss (dB) of a 10 foot length of duct when tested in accordance with ASTM E 477 at a velocity of 2500 feet per minute shall be at least:

	<u>125 Hz</u>	<u>250 Hz</u>	<u>500 Hz</u>	<u>1000 Hz</u>	<u>2000 Hz</u>	<u>4000 Hz</u>
<u>8 inch dia.</u>	12	31	40	38	38	23
<u>12 inch dia.</u>	17	35	31	31	28	13

2. The radiated noise reduction (dB) of a 10 foot length of duct when tested in accordance with ASTM E 477 at a velocity of 2500 feet per minute shall be at least:

	<u>125 Hz</u>	<u>250 Hz</u>	<u>500 Hz</u>	<u>1000 Hz</u>	<u>2000 Hz</u>	<u>4000 Hz</u>
<u>8 inch dia.</u>	10	7	7	8	10	13
<u>12 inch dia.</u>	9	6	6	5	9	13

3. The self generated sound power levels (dB re: 10-12 watts) of a 10 foot length of duct when tested in accordance with ASTM E 477 at a velocity of 1000 feet per minute shall not exceed:

	<u>125 Hz</u>	<u>250 Hz</u>	<u>500 Hz</u>	<u>1000 Hz</u>	<u>2000 Hz</u>	<u>4000 Hz</u>
<u>8 inch dia.</u>	41	34	27	19	18	21
<u>12 inch dia.</u>	54	45	38	31	27	23

F. Factory insulate the flexible duct with flexible fiberglass insulation. The R value shall be at least 6.0 at a mean temperature of 75 degrees F.

G. Cover the insulation with a reinforced aluminum pigmented vapor barrier jacket having a permeance of not greater than 0.05 perms when tested in accordance with ASTM E96, procedure A.

H. The ductwork shall be UL listed, Class 1 Air Duct and comply with NFPA 90A and 90B.

I. Manufacturer: Flexmaster Type 1M, 8M, 1B Thermaflex #MKE with Thermaflex #Flexflow Elbow, or prior approved equal. Sample required for prior approval.

2.09.02 ACOUSTICAL LOW PRESSURE FLEXIBLE DUCT

A. Core material shall be an acoustical Spun Bond Nylon inner film supported by helically wound galvanized steel. The fabric shall be mechanically fastened to the steel helix without the use of adhesive. The core shall maintain its free area and a center line radius of 1.0 or better.

B. The internal working pressure rating shall be at least as follows with a bursting pressure of at least 2-1/2 times the working pressure.

1. Positive: 6 inches W.G.
 2. Negative: 5 inches W.G.
- C. The duct shall be rated for a velocity of at least 5500 feet per minute.
- D. Suitable for operating temperatures of at least 250 degrees F.
- E. Minimum Acoustic Performance:
1. Sound Attenuation - Straight Duct

Flexmaster U.S.A. Flexible Duct	Dia (in.)	Length (ft.)	Insertion Loss, dB Octave Band Center Frequency, Hz						
			63	125	250	500	1,000	2,000	4,000
Type 6	6	12	6.9	36	43	45	47	53	46
		9	5.5	24	28	29	30	33	29
		6	4.0	13	15	15	16	17	16
		3	2.3	4.9	5.3	5.3	5.5	5.8	5.4
		1	0.85	1.36	1.51	1.44	1.55	1.51	1.45
Type 6	8	12	11.3	39	37	46	49	55	49
		9	8.5	25	24	29	31	34	31
		6	5.7	14	13	15	16	18	16
		3	2.9	5.0	4.9	5.4	5.6	5.8	5.6
		1	0.98	1.39	1.37	1.45	1.48	1.52	1.48
Type 6	12	12	10.0	35	33	43	44	55	36
		9	8.1	23	22	28	28	34	24
		6	5.5	13	12	15	15	18	13
		3	2.8	4.8	4.7	5.3	5.3	5.8	4.9
		1	0.96	1.34	1.33	1.43	1.44	1.53	1.36

2. Sound Attenuation - 90° Elbow

Flexmaster U.S.A. Flexible Duct	Dia (in.)	Length (ft.)	Insertion Loss, dB Octave Band Center Frequency, Hz						
			63	125	250	500	1K	2K	4K
Type 6	6	12	21	46	47	52	56	55	55
		9	14	29	30	32	35	34	35
		6	9	15	16	17	18	17	18
		3	3.8	5.4	5.5	5.7	5.9	5.8	5.9
Type 6	8	12	25	44	50	55	50	56	57
		9	17	28	32	34	32	35	36
		6	10	15	16	17	16	18	18
		3	2.4	5.3	5.6	5.8	5.6	5.9	6.0
Type 6	12	12	29	40	43	47	46	49	43
		9	19	26	28	30	29	31	28
		6	11	14	15	16	15	16	15
		3	4.4	5.1	5.3	5.5	5.4	5.6	5.3

- F. Factory insulate the flexible duct with flexible fiberglass insulation. The R value shall be at least 6.0 at a mean temperature of 75 degrees F. (R4.2 not acceptable)
- G. Cover the insulation with a reinforced aluminum pigmented vapor barrier jacket having a permeance of not greater than 0.05 perms when tested in accordance with ASTM E96, procedure A.
- H. The ductwork shall comply with UL Standard 181, as a Class 1 Air Duct and comply with NFPA 90A and 90B.
- I. Manufacturer: Flexmaster Type 6M, with Thermaflex #Flexflow Elbow, or prior approved equal. Sample required for prior approval.
 - 1. Maximum length: 12'0".

2.09.03 FLEXIBLE DUCT ELBOW SUPPORTS

- A. Flexible Duct Elbow Supports: "FlexRight" (Durable Elbow Support).
 - 1. Universal-mount, 1-piece, fully adjustable, radius-forming brace to support 4-inch (102-mm) through 16-inch (406-mm) diameter flexible air ducts.
 - 2. Classified: UL 2043.
 - 3. Material: 100 percent recycled copolymer polypropylene.
 - 4. Support Frame Radius: 8 inches.
 - 5. Compliance for Flexible Duct Radius:
 - a. SMACNA HVAC Duct Construction Standards.
 - b. ASHRAE Advanced Energy Design Guides.
 - c. ADC Flexible Duct Performance and Installation Standards.
- B. Manufacturer: Build Right Products (www.BuildRightProducts.com) or prior approved equal.

2.10 ROUND BRANCH TAKEOFF W/ DAMPER TO DIFFUSERS

- A. Furnish and install Flexmaster #STOD-BO3 45, Hamlin Sheetmetal, Spiral Pipe of Texas or approved equal degree side take off fittings with dampers for all round ducts connecting to the side of rectangular ducts. Construction shall be 26 gauge, G-90 galvanized steel. Mounting flanges must be pre-punched, 1" wide, and provided with corner clips and adhesive gaskets. Dampers shall have full length 3/8" square shafts connected with U-Bolts, nylon bearings, 2" insulation build outs and Duro Dyne #KR-3, Elgin Quadrant or approved equal heavy duty locking hand quadrants. Spin collar with wing nut dampers not allowed.

2.11 REMOTE ELECTRONIC BALANCING DAMPER ASSEMBLY FOR INACCESSIBLE MANUAL VOLUME DAMPERS

- A. Dampers above a hard ceiling, dampers located more than 10'-0" above finished floor, or in any inaccessible location shall be controlled with a remote electronic balancing damper positioner (EBDP). Damper positioner shall include an LCD visual indicator meter that shows blade position modulating over a range of 0-100% open via a voltage signal that is proportional to the blade angle. A non-rechargeable 9v lithium battery powers the positioner. Provide multiple EBDP Positioner as noted on drawing detail.
- B. The Electronic Balancing Damper (EBD) shall include a 12V DC motor and a positive feedback control system. When used for shut off, damper shall be provided with blade seals. Damper actuator shall not require electrical power connection.
- C. Round dampers shall be constructed of galvanized steel and shall be available in the following sizes and gages:
 - 4" through 9" (24 gage)
 - 10" through 16" (20 gage)
- D. Rectangular dampers shall be constructed of .050 aluminum extrusion frames and blades with reinforcing channels. Dampers shall be available in the following sizes:
 - Min size = 4" x 3"
 - Max size = 24" x 24"

- E. Damper actuator shall be connected to a wall plate available in 1,2,4,6, and 12 ports. This wall plate shall be installed in an accessible space, preferably above a lay in ceiling, or as noted on drawings. Connecting cable shall be plenum rated 5 conductor wire. This cable shall be provided by the manufacturer of the remote damper system. Field connection between 12V DC motor (Delphi end) and termination wall plate (RJ-12 end) shall be accomplished by connectors installed on the cable by the factory. Standard cable lengths shall be 10', 25', and 50' with longer lengths up to 1000' where required.
- F. The remote electronic balancing damper, wall plate, cable, and remote positioner shall be as manufactured by Young Regulator EBD series.

2.12 MISCELLANEOUS SHEETMETAL AND DUCT ACCESSORY HARDWARE

- A. Instrument Test Holes: Cast iron or cast aluminum to suit duct material, including screw cap and gasket. Size to allow insertion of pitot tube and other testing instruments and of length to suit duct insulation thickness.
- B. Adhesives: High strength, quick setting, neoprene based, waterproof, and resistant to gasoline and grease.
- C. Auxiliary Drain Pans: Fabricate of 16-gauge 304 stainless steel iron turned up four (4) inches all around and extend six (6) inches beyond all sides of equipment (air handling units, hot water heaters, etc.). Size of auxiliary drain pans to be based on equipment size maintaining minimum 6" clearance all around. All auxiliary drain pans to be 304 stainless steel. Provide float switch in auxiliary drain pan, unit to de-energize when tripped.

2.13 SMOKE DAMPERS

- A. General: Smoke Dampers meeting the following specifications shall be furnished and installed where shown on plans and/or as described in schedules, and at all rated wall duct penetrations (refer to architectural life safety plan). Dampers shall meet the requirements of NFPA 92A, 92B, 101 & 105 and further shall be tested, rated, and labeled in accordance with the latest edition of UL Standards 555S. Dampers shall have a low leakage design qualified to UL555S Leakage Class I.
- B. Each damper /actuator combination shall have a UL555S elevated temperature rating of 350 F degree minimum and shall be operational at maximum design air flow at its installed location. Each damper shall be supplied with an appropriate actuator installed by the damper manufacturer at the time of damper fabrication. Damper actuator shall be electric type for 24 volt AC, 2-position operation.
- C. Damper blades shall be 16 ga galvanized steel 3V type with three longitudinal grooves for reinforcement. Damper frame shall be galvanized steel formed into a structural hat channel shape with reinforced corners. Bearings shall be sintered bronze sleeve type rotating in polished extruded holes in the damper frame. Blade edge seals shall be silicone rubber designed to inflate and provide a tighter seal against leakage as pressure on either side of the damper increases. Jamb seals shall be stainless steel compression type. Blades shall be completely symmetrical relative to their axle pivot point, presenting identical resistance to airflow in either direction or pressure on either side of the damper. Airfoil blades shall be provided for all dampers with airflow velocities greater than 2000 FPM.
- D. The Damper Manufacturer's submittal data shall certify all air performance pressure drop data is licensed in accordance with the AMCA Certified Ratings Program for Test Figures 5.2, 5.3, and 5.5. Damper air performance data shall be developed in accordance with the latest edition of AMCA Standard 500-D. Dampers shall be labeled with the AMCA Air Performance Seal.
- E. Damper must be rated for mounting vertically (with blades running horizontal) or horizontally and be UL 555S rated for leakage and airflow in either direction through the damper.
- F. The basis of design is Greenheck Model SMD-201 (for ducts with velocities up to 2000 FPM and systems with pressure ratings of 4" w.g. or 6" w.g.) or Greenheck Model SMD-301 (for ducts with velocities greater than 2000 FPM and up to 4000 FPM and systems with pressure ratings of 4" w.g., 6" w.g. and up to 8" w.g.) or prior approved equal.
- G. All smoke dampers shall be provided with the following:

1. Minimum 20 gauge galvanized sleeve.
2. All ductwork housing smoke dampers shall be equipped with access door of sufficient size for damper maintenance and to reset and test actuation of smoke damper. All smoke dampers located in facility have to be check and tested every three (3) years, access doors of sufficient size are mandatory to check operation of smoke dampers, refer to paragraph 3.1 of this specifications for require sizes of access doors, this will be based in actual size of ductwork.
3. Smoke dampers/sleeves must be sealed to a seal class A.
4. All smoke dampers must be rated to 4" w.g. or 6" w.g. (depending on the duct system construction specified) and include velocity ratings that meet or exceed the actual velocity at the smoke damper.
5. Unless otherwise noted, all smoke dampers must fail to the closed position.
6. All smoke dampers must be supplied with single point wiring for damper and specified test switches.
7. All smoke dampers shall be provided with model OCI blade position indicator. Actuator end switches are not a replacement for blade position indicator switches.
8. All smoke dampers must be provided with a factory wired and installed Greenheck #GTS-3 test switch with open/closed LED lights to enable one person to test the damper. Contractor must ensure test switch is accessible.
9. Step-Down transformers: Include to transform from available voltage, single phase to 24V, single phase which comply with UL, FM NFPA Requirements for smoke control systems. Coordinate with Electrical Contractor prior to bid as to ensure a complete and working system.
10. Smoke dampers located in all round ducts and in oval ducts with a minor axis less than 14" shall be supplied as square or rectangular dampers. The minimum damper size shall be 14" x 14" to allow for a minimum 12x12 duct access door for service and maintenance of internal smoke damper components. The sheet metal contractor shall provide and install square/rectangle to round/oval transitions as required.
11. Smoke dampers located in square/rectangular ducts 12x12 and smaller shall be supplied as 14x14 dampers. The sheet metal contractor shall provide transitions from the damper to the duct size shown, as required.
12. Where required for complete access to all damper components, sheet metal contractor shall provide an easily removable section of duct, length as required.
13. Provide a smoke damper schedule with submittal data to include the following information:
 - a. Plan Page
 - b. Room Number
 - c. Duct system served (Exhaust, supply, primary supply, return)
 - d. Damper Tag
(Example #1: SMD-1-AHU 1-Rm #___)
(Example #2: SMD-2-EF-1-Rm #___)
 - e. Damper Size
 - f. Manufacturer's Model #_____
 - g. Install Arrangement (Vertical or Horizontal)
 - h. Wall/Floor thickness
 - i. Sleeve Length
 - j. Sleeve gage
 - k. Actuator voltage/action - 24 volt AC / PO/SR (Power Open/Spring Closed)

- m. Duct airflow velocity
 - n. Damper velocity rating
 - o. Duct access door size
- H. Contractor to coordinate with electrical contractor and fire alarm contractor (prior to bid and after award of project) to ensure a complete working and accessible system is installed. Smoke detectors shall be provided & installed by the fire alarm contractor to notify the fire alarm panel in the event of an alarm. Control of smoke damper is by the fire alarm contractor.

2.14 COMBINATION FIRE/SMOKE DAMPERS

- A. Combination Fire Smoke Dampers meeting the following specifications shall be furnished and installed where shown on plans and/or as described in schedules and at all rated wall duct penetrations (refer to architectural life safety plan). Dampers shall meet the requirements of NFPA 80, 90A, 92A, 92B, 101 & 105 and further shall be tested, rated, and labeled in accordance with the latest edition of UL Standards 555 and 555S. Dampers shall have a UL555 fire rating of 1 1/2 hours and be of low leakage design qualified to UL 555S Leakage Class I.
- B. Each damper /actuator combination shall have a UL555S elevated temperature rating of 350 F minimum and shall be operational and dynamic rated to operate at maximum design air flow at its installed location. Each damper shall be supplied with an appropriate actuator installed by the damper manufacturer at the time of damper fabrication. Damper actuator shall be electric type for 24 volt AC, 2-position operation.
- C. Damper blades shall be 16 ga galvanized steel 3V type with three longitudinal grooves for reinforcement. Damper frame shall be 16 ga. galvanized steel formed into a 5" x 1" structural hat channel. Dampers less than 17" high shall utilize low profile geometry and 20 ga. galvanized steel for the top and bottom frame members to maximize free area. Frame shall be 4-piece construction with 1 1/2" (minimum) integral overlapping gusset reinforcements in each corner to assure square corners and provide maximum resistance to racking. No welding of damper frames shall be permitted. Bearings shall be stainless steel sleeve type rotating in polished extruded holes in the damper frame. Blade edge seals shall be silicone rubber designed to inflate and provide a tighter seal against leakage as pressure on either side of the damper increases. Jamb seals shall be stainless steel compression type. Blades shall be completely symmetrical relative to their axle pivot point, presenting identical resistance to airflow in either direction or pressure on either side of the damper. Airfoil blades shall be provided for all dampers with airflow velocities greater than 2000 FPM.
- D. The Damper Manufacturer's submittal data shall certify all air performance pressure drop data is licensed in accordance with the AMCA Certified Ratings Program for Test Figures 5.2, 5.3, and 5.5. Damper air performance data shall be developed in accordance with the latest edition of AMCA Standard 500-D. Dampers shall be labeled with the AMCA Air Performance Seal.
- E. Damper must be rated for mounting vertically (with blades running horizontal) or horizontally and be UL 555S rated for leakage and airflow in either direction through the damper. Each damper shall be supplied with a 165 F RRL/OCI (reusable resettable link with blade position indicator package). Actuator end switches are not a replacement for blade position indicator switches.
- F. The basis of design is Greenheck model FSD-211 (for ducts with velocities up to 2000 FPM and systems with pressure ratings of 4" w.g. or 6" w.g.) or Greenheck Model FSD-311 (for ducts with velocities greater than 2000 FPM and up to 4000 FPM and systems with pressure ratings of 4" w.g., 6" w.g. and up to 8" w.g.) or prior approved equal. Combination fire/smoke dampers located in 3 hour or greater walls shall be Greenheck #FSD-311 or prior approved equal.
- G. All combination/fire smoke dampers shall be provided with the following:
 - 1. Minimum 16 gauge galvanized sleeve for sizes up to 36" wide and/or 24" high. Minimum 14 gauge galvanized sleeve for sizes over 36" wide and/or 24" high.
 - 2. All ductwork housing smoke/fire dampers shall be equipped with access door of sufficient size for damper maintenance and to reset and test actuation of smoke damper and/or reset the fusible link. All smoke dampers located in facility have to be check and tested every

three (3) years, access doors of sufficient size are mandatory to check operation of smoke dampers, refer to paragraph 3.1 of this specifications for require sizes of access doors, this will be based in actual size of ductwork. Where required for complete access to all damper components, sheet metal contractor shall provide an easily removable section of duct, length as required.

3. Combination fire/smoke dampers and sleeves must be sealed to a seal class A.
4. Combination fire/smoke dampers must be rated to 4" w.g. and include velocity ratings that meet or exceed the actual velocity at the smoke damper.
5. Unless otherwise noted, all combination fire/smoke dampers must fail to the closed position.
6. All combination fire/smoke dampers must be supplied with single point wiring for damper and specified test switches.
7. All combination fire/smoke dampers shall be provided with model RRL/OCI (reusable resettable link with blade position indicator package). Actuator end switches are not a replacement for blade position indicator switches.
8. All combination fire/smoke dampers must be provided with a factory wired and installed Greenheck #GTS-3 test switch with open/closed LED lights to enable one person to test the damper. Contractor must ensure test switch is accessible.
9. Step-Down transformers: Include to transform from available voltage, single phase to 24V, single phase which comply with UL, FM NFPA Requirements for smoke control systems. Coordinate with Electrical Contractor prior to bid as to ensure a complete and working system.
10. Combination fire/smoke dampers located in all round ducts and oval ducts with a minor axis less than 14" shall be supplied as square or rectangular dampers. The minimum damper size shall be 14" x 14" to allow for a minimum 12x12 duct access door for service and maintenance of internal smoke damper components. The sheet metal contractor shall provide and install square/rectangle to round/oval transitions as required.
11. Smoke dampers located in square/rectangular ducts 12x12 and smaller shall be supplied as 14x14 dampers. The sheet metal contractor shall provide transitions from the damper to the duct size shown, as required.
12. Where required for complete access to all damper components, sheet metal contractor shall provide an easily removable section of duct, length as required.
13. Provide a combination fire/smoke damper schedule with submittal data to include the following information:
 - a. Plan Page
 - b. Room Number
 - c. Duct system served (Exhaust, supply, primary supply, return)
 - d. Damper Tag
(Example #1: SMD-1-AHU 1-Rm #___)
(Example #2: SMD-2-EF-1-Rm #___)
 - e. Damper Size
 - f. Manufacturer's Model #_____
 - g. Install Arrangement (Vertical or Horizontal)
 - h. Wall/Floor thickness
 - i. Sleeve Length
 - j. Sleeve gage
 - k. Actuator voltage/action - 24 volt AC / PO/SR (Power Open/Spring Closed)
 - l. CFM through damper

- m. Duct airflow velocity
 - n. Damper velocity rating
 - o. Duct access door size
- H. Contractor to coordinate with electrical contractor and fire alarm contractor (prior to bid and after award of project) to ensure a complete working and accessible system is installed. Smoke detectors shall be provided & installed by the fire alarm contractor to notify the fire alarm panel in the event of an alarm. Control of smoke damper is by the fire alarm contractor.

PART 3 EXECUTION

3.01 APPLICATION AND INSTALLATION

- A. Install duct accessories according to applicable details in SMACNA's "HVAC Duct Construction Standards--Metal and Flexible" for metal ducts and in NAIMA AH116, "Fibrous Glass Duct Construction Standards," for fibrous-glass ducts.
- B. Provide duct accessories of materials suited to duct materials; use galvanized-steel accessories in galvanized-steel and fibrous-glass ducts, stainless-steel accessories in stainless-steel ducts, and aluminum accessories in aluminum ducts.
- C. Install backdraft dampers on exhaust fans or exhaust ducts nearest to outside and where indicated.
- D. Install volume dampers in ducts with liner; avoid damage to and erosion of duct liner.
- E. Provide balancing dampers at points on supply, return, and exhaust systems where branches lead from larger ducts as required for air balancing. Install at a minimum of two duct widths from branch takeoff.
- F. Provide test holes at fan inlets and outlets and elsewhere as indicated.
- G. Install fire and smoke dampers, with fusible links, according to manufacturer's UL-approved written instructions.
- H. Where applicable, Install duct silencers independent of ducts with flexible duct connectors.
- I. Install duct access doors to allow for inspecting, adjusting, and maintaining accessories and terminal units as follows:
 - 1. On both sides of duct coils.
 - 2. Downstream from volume dampers, turning vanes, and equipment.
 - 3. Adjacent to fire or smoke dampers, providing access to reset or reinstall fusible links.
 - 4. To interior of ducts for cleaning; before and after each change in direction, at maximum 40-foot spacing.
 - 5. On sides of ducts where adequate clearance is available.
 - 6. Install the following sizes for duct-mounting, rectangular access doors:
 - a. One-Hand or Inspection Access: 8 by 5 inches.
 - b. Two-Hand Access: 12 by 6 inches.
 - c. Head and Hand Access: 18 by 10 inches.
 - d. Head and Shoulders Access: 21 by 14 inches.
 - e. Body Access: 25 by 14 inches.
 - f. Body Plus Ladder Access: 25 by 17 inches.
 - 7. Install the following sizes for duct-mounting, round access doors:
 - a. One-Hand or Inspection Access: 8 inches in diameter.
 - b. Two-Hand Access: 10 inches in diameter.
 - c. Head and Hand Access: 12 inches in diameter.
 - d. Head and Shoulders Access: 18 inches in diameter.

- e. Body Access: 24 inches in diameter.
- 8. Install the following sizes for duct-mounting, pressure relief access doors:
 - a. One-Hand or Inspection Access: 7 inches in diameter.
 - b. Two-Hand Access: 10 inches in diameter.
 - c. Head and Hand Access: 13 inches in diameter.
 - d. Head and Shoulders Access: 19 inches in diameter.
- 9. Label access doors according to Division 20 05 53 Section "Mechanical Identification."
- J. Install flexible connectors immediately adjacent to equipment in ducts associated with fans and motorized equipment supported by vibration isolators.
- K. For fans developing static pressures of 5-inch wg and higher, cover flexible connectors with loaded vinyl sheet held in place with metal straps.
- L. Low Pressure Flexible Duct Length Limitation: Connect diffusers to low pressure ducts with maximum 36-inch lengths of flexible duct clamped or strapped in place.
- M. Connect flexible ducts to metal ducts with draw bands.
- N. Install duct test holes where required for testing and balancing purposes (coordinate with test & balance contractor prior to bid).
- O. Install flexible duct elbow supports at all flexible duct connections to air devices, typical entire project. Install in accordance with manufacturer's instructions. Install over outer flexible ducts to form smooth, 90° bends to eliminate flexible duct kinks and airflow restrictions. Ake bends in flexible ducts with minimum of 1-duct diameter centerline radius.

3.02 ADJUSTING

- A. Adjust duct accessories for proper settings.
- B. Adjust fire and smoke dampers for proper action.
- C. Final positioning of manual-volume dampers is specified in Division 23 Section 23 05 93 "Testing, Adjusting and Balancing."

3.03 FIRE, SMOKE, FIRE/SMOKE DAMPER FIELD VERIFICATION

- A. Fire dampers, smoke dampers, & combination fire/smoke dampers shall not be ordered and delivered to the site until field measurements have been taken and ceiling space has been coordinated with other trades. Figure in bid rush delivery for all fire, smoke, & combination fire/smoke dampers in bid in order to accommodate construction schedule. No exception.

END OF SECTION

4-14-25

SECTION 23 34 00 - AIR DISTRIBUTION EQUIPMENT (FANS)

PART 1 - GENERAL

1.1 GENERAL

- A. Fan Accessories
- B. Cabinet Fans

1.2 RELATED WORK

- A. Section 20 0100: General Provisions
- B. Section 23 3100: Metal Ductwork

1.3 QUALITY ASSURANCE

- A. Conform to AMCA bulletins regarding construction and testing and bear AMCA certified rating seal.

1.4 SUBMITTALS

- A. Submit shop drawings and product data.
- B. Submit curves showing operating point plotted on curve.
- C. Submit manufacturer's printed installation instructions.

PART 2 - PRODUCTS

2.1 GENERAL

- A. Drives: V-belt drives shall be designed for not less than 150% of connected driving capacity and motor sheaves shall be adjustable to provide not less than 20% speed variation. Sheaves shall be selected to drive the fan at a speed to produce the scheduled capacity indicated on the drawings when set at the approximate midpoint of the sheave adjustment. Motors with V-belt drives shall be provided with adjustable bases.
- B. Disconnects: Safety disconnect switches shall conform to requirements of division 26 - Electrical.

2.2 SELECTING AND BALANCING

- A. Provide fans capable of accommodating static pressure variations of plus or minus ten percent.
- B. Statically and dynamically balance fans to eliminate vibration or noise transmission to occupied areas of building.
- C. Provide safety grille where inlet or outlet is exposed of aluminum wire guard construction. Provide belt guards on all belt-driven fans where drive is exposed.
- D. Integral roof mounted and/or wall mounted fans to have aluminum dome type housing, and of all aluminum construction.
- E. Fans shall be tested and rated in accordance with AMCA 210.

2.3 CABINET TYPE FANS

- 1. Provide cabinet type fan of type, size and capacity as scheduled in the plans and herein specified. Fans shall be A.M.C.A. certified and all fans shall bear the A.M.C.A. Certified Rating Seal. Centrifugal Fan Unit: V-belt or direct driven, with galvanized steel housing lined with 1/2" acoustic insulation, resilient mounted motor, gravity backdraft damper in discharge.
- 2. Disconnect Switch: Factory wired, non-fusible, in housing for thermal

overload protection motor and solid state speed controller.

3. Grille (Ceiling Mount Fans): Molded white aluminum grille with baked white enamel finish.
4. Sheaves: Cast iron or steel, dynamically balanced, bored to fit shafts and keyed; variable and adjustable pitch motor sheaves selected so required rpm is obtained with sheaves set at mid-position; fan shaft with self-aligning pre-lubricated ball bearings. Fan motor shall be suitably grounded and mounted on vibration isolators.
5. Direct drive fans shall be provided with an electronic speed controller.
6. Fan to be Greenheck model SP-A or approved equal.

PART 3 - EXECUTION

3.1 INSTALLATION:

1. Install fans as per manufacturer's recommendations.
2. Provide complete structural, mechanical, and electrical connections and install in strict accordance with manufacturer's recommendations.

3.02. MANUFACTURER'S INSTRUCTIONS

- A. Compliance: Comply with manufacturer's product data, including technical bulletins, product catalog installation instructions

3.03. EXAMINATION

- A. Examine areas to receive fans. Notify the Engineer of conditions that would adversely affect installation or subsequent utilization and maintenance of fans. Do not proceed with installation until unsatisfactory conditions are corrected

3.04. PREPARATION

- A. Ensure openings are square, accurately aligned, correctly located, and in tolerance
- B. Ensure duct is plumb, sized correctly, and to proper elevation. Install duct as specified in Air Distribution (Division 23)

3.05. INSTALLATION

- A. Install fans system as indicated on the Installation, Operation and Maintenance Manual (IOM) and contract drawings
- B. Install fans in accordance with manufacturer's instructions

3.06. SYSTEM STARTUP

- A. Refer to Installation, Operation, and Maintenance Manual (IOM)

3.07. ADJUSTING

- A. Adjust exhaust fans to function properly

- B. Adjust Belt Tension
- C. Lubricate bearings
- D. Adjust drive for final system balancing
- E. Check wheel overlap

3.7. CLEANING

- A. Clean as recommended by manufacturer. Do not use material or methods which may damage finish surface or surrounding construction

3.8. PROTECTION

- A. Protect installed product and finished surfaces from damage during construction
- B. Protect installed exhaust fans to ensure that, except for normal weathering, fans will be without damage or deterioration at time of substantial completion

END OF SECTION
4-14-25

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SECTION 23 35 00 - AIR PURIFICATION SYSTEM

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

- A. This section describes the design, performance and installation of an air purification system intended for use as part of another manufacturer's air handling unit or mounted on the duct as shown on the plans, details and/or equipment schedules.

1.2 REFERENCED CODES & STANDARDS

- A. The following codes and standards are referenced through out. The edition to be used is that currently enforced by the authority having jurisdiction (AHJ) or in absence of such direction that referenced by the current enforceable IBC code or as indicated by the contract documents, except where specifically referenced by this section of the specifications.
 - 1. ASHRAE Standards 62 & 52
 - 2. National Electric Code NFPA 70
 - 3. UL 867 including ozone chamber test required as of December 21, 2007
 - 4. UL 2998 Environment – No Ozone Certification
 - 5. The cold plasma equipment and power supply shall be UL listed.
 - 6. The technology shall have been tested to DO-160 by an independent lab and successfully passed all requirements for shock, vibration, EMF and line noise. Manufacturers not tested to DO-160 shall not be acceptable. DO-160 is normally used to test devices in aviation applications, but this standard is applicable to confirm EMF and line noise in HVAC applications.

1.3 RELATED WORK

- A. Testing, Adjusting and Balancing
- B. Facility Access and Protection
- C. Ductwork
- D. Filters
- E. Water and Refrigerant Piping
- F. Electrical Wiring
- G. Control Wiring

1.4 QUALITY & IP ASSURANCE

- A. Basis of design is Global Plasma Solutions. All other manufacturers requesting prior approval must submit product drawings, specifications and test results specified in section 2.2 at least four weeks prior to bid date.
- B. The Air Purification System shall be a product of an established manufacturer within the USA. Direct Current (DC) Ion modules manufactured outside the USA and assembled in the USA on mounting plates or formed channels shall not be acceptable.
- C. A qualified representative from the manufacturer shall be available to inspect the installation of the air purification system to ensure installation in accordance with manufacturer's recommendation.
- D. Technologies that do not address gas disassociation such as UV Lights, Powered Particulate Filters and/or polarized media filters shall not be considered. Uni-polar ion generators shall not be acceptable. "Plasma" particulate filters shall not be acceptable. Any system containing titanium dioxide (TiO₂), which has been listed by the CDC as a known carcinogen, shall not be acceptable.
- E. Projects designed using ASHRAE Standard 62, IAQ Procedure shall require the manufacturer to provide Indoor Air Quality calculations using the formulas within ASHRAE Standard 62.1-2007 to validate acceptable indoor air quality at the quantity of outside air scheduled with the technology submitted. The manufacturer shall provide independent test data on a previous installation performed within the last two years and in a similar application, that proves compliance to ASHRAE 62 and the accuracy of the calculations. The data shall be based on the manufacturer's use of the same make and model number as the equipment submitted on this project.

- F. The Air Purification Technology shall have been tested by UL to prove conformance to UL 867-2007 including the ozone chamber testing and peak ozone test for electronic devices. Manufacturers that achieved UL 867 prior to December 21, 2007 and have not been tested in accordance with the newest UL 867 standard with the ozone amendment shall not be acceptable. All manufacturers requesting prior approval shall submit their independent UL 867 test data with ozone results to the engineer for preliminary review and during the submittal process. All manufacturers shall submit a copy with their quotation. Contractors shall not accept any proposal without the proper ozone testing documentation.
- G. The maximum allowable ozone concentration per the UL 867-2007 chamber test shall be 0.001 PPM. The maximum peak ozone concentration per the UL 867-2007 peak test as measured 2 inches away from the electronic air cleaner's output shall be no more than 0.001 PPM. Manufacturers with ozone output exceeding these ozone values shall not be acceptable.
- H. All manufacturers shall have their product tested to UL 2998 Environmental Standard for confirmation of no ozone with certificate available. The final report shall indicate the ozone levels and high voltage output the device's electrode(s) were operating during the test. Reports that do not include high voltage output during the UL 2998 testing shall not be acceptable.

1.5 SUBMITTALS

- A. Product Data: Submit manufacturer's technical product data for ion generators including:
 - 1. Schedule of plasma generators indicating unit designation, number of each type required for each unit/application.
 - 2. Data sheet for each type of plasma generator, and accessory furnished; indicating construction, sizes, and mounting details.
 - 3. Performance data for each type of plasma device furnished.
 - 4. Indoor Air Quality calculations using the formulas within ASHRAE Standard 62.1-2007 to validate acceptable indoor air quality at the quantity of outside air Scheduled (when projects are designed with outside air reduction).
 - 5. Product drawings detailing all physical, electrical and control requirements.
 - 6. Copy of UL 867 independent ozone test.
 - 7. Copy of UL 2998 conformance certificate.
 - 8. Statement on the manufacturer's letterhead stating that the technology contains no titanium dioxide (TiO₂).
- B. Operating & Maintenance Data: Submit O&M data and recommended spare parts lists.

1.6 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Deliver in factory fabricated shipping containers. Identify on outside of container type of product and location to be installed. Avoid crushing or bending.
- B. Store in original cartons and protect from weather and construction work traffic.
- C. Store indoors and in accordance with the manufacturers' recommendation for storage.

1.7 WARRANTY

- A. Equipment shall be warranted by the manufacturer against defects in material and workmanship for a period of thirty-six months after shipment or eighteen months from owner acceptance, whichever occurs first. Labor to replace equipment under warranty shall be provided by the owner or installing contractor.

PART 2 - PRODUCTS

2.1 GENERAL

- A. The air purification system(s) shall be of the size, type, arrangement and capacity indicated and required by the unit furnished and shall be of the manufacturer specified.
- B. Basis of Design: Global Plasma Solutions
- C. All other Suppliers of comparable products requesting prior approval shall:
 - 1. Submit for prior approval four weeks in advance in accordance with the requirements of Section 20 0100.

2. In addition, manufacturers submitting for prior approval for Bi-Polar Ionization must as part of the prior approval request provide their ASHRAE 62.1-2007 calculations that prove conformance to the ASHRAE Standard with the reduction of outside air to the scheduled values. A letter on the manufacturer's letterhead requesting prior approval must accompany the request for prior approval stating their calculations are ASHRAE compliant. A third party validation study performed on a previous installation of the same application using the same make and model equipment shall also be included.
3. Submit independent test data from UL showing ozone levels produced during the UL 867 ozone chamber test. Manufacturers without this test data shall not be acceptable.
4. Submit UL 2998 Environmental Claim Certificate proving no ozone output.
5. Submit pathogen testing per section 2.2.
6. Submit at least two other end user references in the same application with contact phone number, email, equipment used and application for the equipment at that facility. Manufacturers not having the above references in similar applications using the same equipment models as proposed on the current project shall not be acceptable.
7. Ionization bars manufactured using DC output ionization modules shall not be permitted due to corrosion, ion short-circuiting, and intermittent coil coverage and shock hazard.
8. Ionization bars manufactured using ion modules not having epoxy coating all circuit boards and internal components shall not be acceptable.
9. Manufacturers submitting as an alternate shall include their DO-160 test results.
10. It is the responsibility of any alternate manufacturer and mechanical contractor proposing an alternate to the basis of design to confirm any proposed substituted product does not infringe on the patented intellectual property of the basis of design. The engineer and owner recognize the basis of design holds multiple patents and multiple patents are pending.

2.2 BI-POLAR IONIZATION DESIGN & PERFORMANCE CRITERIA

- A. Each piece of air handling equipment, so designated on the plans, details, equipment schedules and/or specifications shall contain a Plasma Generator with Bi-polar Ionization output as described here within.
- B. The Bi-polar Ionization system shall be capable of:
 1. Effectively killing microorganisms downstream of the bi-polar ionization equipment (mold, bacteria, virus, etc.).
 2. Controlling gas phase contaminants generated from human occupants, building structure, furnishings and outside air contaminants.
 3. Capable of reducing static space charges.
 4. Effectively reducing space particle counts.
 5. When mounted to the air entering side of a cooling coil, keep the cooling coil free from pathogen and mold growth.
 6. All manufacturers shall provide documentation by an independent NELEC accredited laboratory that proves the product has minimum kill rates for the following pathogens given the allotted time and in a space condition:
 - A. MRSA - >96% in 30 minutes or less
 - B. E.coli - > 99% in 15 minutes or less
 - C. TB - > 69% in 60 minutes or less
 - D. C. diff - >86% in 30 minutes or less
 - E. Noro Virus -> 93.5% in 30 minutes or less
 - F. Legionella -> 99.7% in 30 minutes or less

Manufacturers not providing the equivalent space kill rates shall not be acceptable. All manufactures requesting prior approval shall provide to the engineer independent test data from a NELAC accredited independent lab confirming kill rates and time meeting the minimum requirements stated in section 2.2 B, points 6A, 6B and 6C. Products tested only on Petri dishes to prove kill rates shall not be acceptable. Products being sold under different trade names than those tested shall not be acceptable.

7. Capable of modular field assembly in six inch (150mm) sections.

- C. The bi-polar ionization system shall operate in a manner such that equal amounts of positive and negative ions are produced. Uni-polar ion devices shall not be acceptable. Ionizers with positive and negative output (DC type) shall not be acceptable. All ionizers provided shall be AC type ionizers with one electrode pulsing between positive and negative.
 - 1. Air exchange rates may vary through the full operating range of a constant Volume or VAV system. The quantity of air exchange shall not be increased due to requirements of the air purification system.
 - 2. Velocity Profile: The air purification device shall not have maximum velocity profile.
- D. Humidity: Plasma Generators shall not require preheat protection when the relative humidity of the entering air exceeds 85%. Relative humidity from 0 - 100%, condensing, shall not cause damage, deterioration or dangerous conditions within the air purification system. Air purification system shall be capable of wash down duty.
- E. Equipment Requirements:
 - 1. Electrode Specifications (Bi-polar Ionization):
 - a. Each alternating current (AC) Ionization Bar with Bi-polar Ionization output shall include a minimum of eighteen carbon fiber cluster ion needles per foot of coil face width shall be provided. The entire cooling coil width shall have equal distribution of ionization across the face. Systems without ion needles at least 0.50" (12.5mm) apart shall not be acceptable. The plasma electrode shall require no more than 1.0" (25mm) in the direction of airflow for mounting. All hardware required for mounting shall be provided by the air purification manufacturer except self-tapping screws for the power supply. Bi-polar ionization tubes manufactured of glass and steel mesh shall not be acceptable due to replacement requirements, maintenance, and performance output reduction over time, ozone production and corrosion.
 - b. Electrodes shall be provided in 6.0" (150mm) increments, epoxy filled for an IP55 rating and utilizing brass connection hardware that is recessed into the connection joint once fully engaged and assembled.
 - c. Electrodes shall be energized when the main unit disconnect is turned on.
 - d. The ionization output shall be a minimum of 60 million ions/cc per inch of cooling coil width as measured 1 inch from the cold plasma needles.
 - e. Ionization bars shall be provided with magnet mounting kits to prevent penetration into cooling coils.
 - f. Ionization bars shall be constructed of UL 94VO and UL746C composite material.
- F. HVAC Air Units & Gas Furnaces:
 - 1. Plasma Generator(s) shall be supplied and installed at all air handling systems. The mechanical contractor shall mount the Plasma Generator and wire it to the AHU control power (24VAC) as instructed by the Air Purification Manufacturer's instructions or line voltage subject to power available. Each unit shall be designed with a molded casing, self-cleaning system, weather proof housing with clear cover, integral digital display that provides unit status, self-cleaning test button, power status LED and dry contacts to prove ion output is operating properly. The dry contacts shall close to prove the ion generator is working properly and may be daisy chained in series such that only one dry contact per AHU is required to interface to the BAS or the DDC controller. Dry contacts proving power has been applied in lieu of the ion output is actually operating, are not acceptable. Manufacturers providing multiple ion modules that have alarm status wired in parallel, and not in series, shall not be acceptable.
- G. Ionization Requirements:
 - 1. Plasma Generators with Bi-polar ionization output shall be capable of controlling gas phase contaminants and shall be provided for all equipment listed above.
 - a. The Bi-polar ionization system shall consist of Bi-Polar Plasma Generator and integral power supply. The Bi-polar system shall be installed at all air handling

systems. The device shall be capable of being powered by 18VAC to 260VAC without the use of an external transformer. Ionization systems requiring isolation transformers shall not be acceptable.

- b. Ionization Output: The ionization output shall be controlled such that an equal number of positive and negative ions are produced. Imbalanced levels shall not be acceptable.
- c. Ionization output from each electrode shall be a minimum of 200 million ions/cc when tested at 2" from the ionization generator.
- d. All manufacturers shall provide documentation by an independent NELAC accredited laboratory that proves the product has minimum kill rates for the following pathogens given the allotted time and in a space condition:
 - A. MRSA - >96% in 30 minutes or less
 - B. E.coli - > 99% in 15 minutes or less
 - C. TB - > 69% in 60 minutes or less
 - D. C. diff - >86% in 30 minutes or lessManufacturers not providing the equivalent space kill rates shall not be acceptable. All manufactures requesting prior approval shall provide to the engineer independent test data from a NELEC accredited independent lab confirming kill rates and time meeting the minimum requirements stated in section 2.2 B, points 6A, 6B and 6C. Products tested only on Petri dishes to prove kill rates shall not be acceptable.

2. Ozone Generation:

- a. The operation of the electrodes or Bi-polar ionization units shall conform to UL 867-2007 with respect to ozone generation. There shall be no ozone generation during any operating condition, with or without airflow.

J. Electrical Requirements:

- 1. Wiring, conduit and junction boxes shall be installed within housing plenums in accordance with NEC NFPA 70. Plasma Generator shall accept an electrical service of 18VAC to 260VAC, universal input, 1 phase, 50/60 Hz. The contractor shall coordinate electrical requirements with air purification manufacturer during submittals.

K. Control Requirements:

- 1. All Plasma Generators shall have internal short circuit protection, overload protection, and automatic fault reset circuit breakers. Systems with manual fuses shall not be allowed.
- 2. Integral airflow sensing shall modulate the Plasma output as the airflow varies or stops. A mechanical airflow switch shall not be acceptable as a means to activate the Plasma device due to high failure rates and possible pressure reversal.
- 3. The installing contractor shall mount and wire the Plasma device within the air handling unit specified or as shown on the plans. The contractor shall follow all manufacturer IOM instructions during installation.
- 4. All Plasma devices shall have a means to interface with the BAS system. Dry contacts shall be provided to prove there are ions being produced. Systems providing indication that power is applied to the Plasma device, but not directly sensing the power at the ion output, shall not be acceptable.

PART 3 - EXECUTION

3.1 GENERAL

- A. The Contractor shall be responsible for maintaining all air systems until the owner accepts the building (Owner Acceptance).

3.2 ASSEMBLY & ERECTION: PLASMA GENERATOR WITH BI-POLAR IONIZATION

- A. All equipment shall be assembled and installed in a workman like manner to the satisfaction of the owner, architect, and engineer.

- B. Any material damaged by handling, water or moisture shall be replaced, by the mechanical contractor, at no cost to the owner.
- C. All equipment shall be protected from dust and damage on a daily basis throughout construction.

3.3 TESTING

- A. Provide the manufacturers recommended electrical tests.

3.4 COMMISSIONING & TRAINING

- A. A manufacturer's authorized representative shall provide start-up supervision and training of owner's personnel in the proper operation and maintenance of all equipment.

END OF SECTION

4-14-25

SECTION 23 3700 - AIR OUTLETS AND INLETS

PART 1 GENERAL

1.01 GENERAL

- A. Grilles and Diffusers
- B. Louvers

1.02 RELATED WORK

- A. Section 20 01 00: General Provisions
- B. Section 23 31 00: Metal Ductwork

1.03 REFERENCES

- A. ADC 1062 - Certification, Rating and Test Manual.
- B. AMCA 500 - Test Method for Louvers, Dampers and Shutters.
- C. ANSI/NFPA 90A - Installation of Air Conditioning and Ventilating Systems.
- D. ARI 650 - Air outlets and inlets.
- E. ASHRAE 70 - Method of Testing for Rating the Air Flow Performance of Outlets and Inlets.
- F. SMACNA - Low Pressure Duct Construction Standard.

1.04 QUALITY ASSURANCE

- A. Test and rate performance of air outlets and inlets in accordance with ADC Equipment Test Code 1062 and ASHRAE 70.
- B. Test and rate performance of louvers in accordance with AMCA 500.

1.05 REGULATORY REQUIREMENTS

- A. Conform to ANSI/NFPA 90A.

1.06 SUBMITTALS

- A. Submit product data under provisions of Section 01300.
- B. Provide product data for items required for this project.
- C. Submit schedule of outlets and inlets indicating type, size, application, and noise level.
- D. Review requirements of outlets and inlets as to size, finish, and type of mounting prior to submitting product data and schedules of outlets and inlets.
- E. Submit diffuser, grille and register color data to Architect of approval.

1.07 JOB CONDITIONS

- A. Review requirements of outlets as to size, finish and type of mounting prior to submitting shop drawings and schedules of outlets.
- B. Check location of outlets and make sure necessary adjustments in position to conform with architectural features, symmetry, and lighting arrangement.

PART 2 PRODUCTS

2.01 APPLICATIONS

- A. Base air outlet application of space noise level of NC 35 maximum.
- B. Provide supply outlets with sponge rubber seal around edge.
- C. Provide appropriate frame for all outlets compatible with ceiling/wall construction.
- D. Finish
 - 1. Aluminum grilles, registers, and diffusers which are ceiling mounted shall be provided with a factory applied white baked enamel finish unless otherwise, herein or on the drawings.
 - 2. Aluminum grilles and registers which are wall or floor mounted shall be factory etched to a satin finish and coated with a clear lacquer.

E. Mounting

1. Model numbers indicated herein are for surface mounting in exposed tee-bar grids or for integral mounting in exposed tee-bar grids. Where grilles, registers or diffusers are to be installed in concealed spine ceilings or plaster ceilings the mounting frame shall be adjusted to match the ceiling requirements. In plaster ceilings, provide plaster frames.

2.02 LOUVER FACE CEILING DIFFUSER

- A. Ceiling diffuser shall be round, square or rectangular with to provide 1, 2, 3, or 4-way air patterns as indicated on the drawings. All items to be of aluminum construction. Frame and directional core to have baked white enamel finish.
- B. Frame style for fixed ceiling shall be raised "V" type. Frame style for lay-in ceilings shall be lay-in matching frames, panel size 24-inch x 24-inch unless otherwise required. For spline or other type ceiling systems, use appropriate matching frame styles. Diffusers shall be sized as indicated on the drawings.

2.03 SIDEWALL SUPPLY GRILLES

- A. Provide sidewall supply grilles with streamlined and individually adjustable blades, maximum 3/4" spacing. Provide spring tension or other device to set blades. Provide units with vertical face, double Deflection bar style grilles.
- B. Provide 1/4" margin frame with counter sunk screw holes.
- C. Fabricate of steel 20 gage minimum frames and 22 gage blades, or of all aluminum with 20 gauge for frames and blades.
- D. Provide grille with integral gang-operated opposed blade dampers with removable key operators, operable from face.
- E. Finish for steel construction in standard baked enamel finish.

2.04 RETURN GRILLES

- A. Provide sidewall and ceiling return grilles having fixed vee blades. Provide units with horizontal face.
- B. Provide 1/4" margin frame countersunk screw holes.
- C. Fabricate of steel with 20 gage minimum frames and 22 gage minimum blades, or all aluminum construction, 20 gage minimum for frames and blades.
- D. Provide return grilles, where not individually connected to return fans, with integral, gang-operated opposed blade dampers with removable key operator, operable from face.
- E. Finish steel outlets in factory baked enamel finish.

2.05 DOOR GRILLES

- A. Door grilles shall be inverted bee shaped on 1/2 inch centers with telescoping frame. Louvers and frame to be steel construction with prime coat or aluminum as indicated on Air distribution Schedule in the drawings.
- B. Where required on drawings, contractor shall provide filter housing on back side of door grille.

2.06 OUTSIDE LOUVERS

- A. Greenheck #ESD-435X:
 1. Construction Features: Louvers shall be model #ESD-435X as manufactured by Greenheck. Louver frame shall be 4 inch deep channel style with 0.081 inch extruded aluminum wall thickness. Louver blades shall be horizontal stationary drainable style and shall be located on 3 1/4 inch centers and 37.5 degree angles with 0.081 inch extruded aluminum wall thickness. Bird screen shall be internally mounted 3/4 inch x 0.051 inch flattened expanded aluminum unless specified otherwise. Finish of all materials shall be mill aluminum only unless specified otherwise.
 2. Performance Requirements: Louvers shall be AMCA Licensed when tested in accordance with AMCA 500-L Air Performance and Water Penetration. Free area for a size 48 inch louver shall not be less than 9.98 square feet. Airflow resistance at 1000 feet per minute

free area intake velocity shall not be greater than 0.163 inches water gauge. Airflow resistance at 1000 feet per minute. Beginning point of water penetration shall not be less than 1151 feet per minute area intake velocity.

3. Louvers shall be Florida Product Approved and shall be approved for use in Florida's High Velocity Hurricane Zone. Louvers shall be AMCA Licensed when tested in accordance with AMCA 540 (Basic Protection, Missile Level D). Louvers shall be tested in accordance with and pass the following Florida test protocols: TAS 201 (Large Missile Impact), TS 202 (Uniform Static Air Pressure) and TAS 203 (Cyclic Wind-Loading). Louvers must be designed to withstand the wind loads specified on the structural drawings. Structural drawings must indicated all applicable positive and negative wind loads using methods prescribed by ASCE 7 (version 05 or 10 where applicable) in pound per square foot units. All lovers must be installed in accordance with the manufacturer's published installation instructions.
4. Louvers shall be supplied with a 70% Kynar finish applied following a thorough cleaning and pretreatment of the metal surface. Dry film thickness of the Kynar shall be approximately 1.2 mils after baking at 450 F. Color shall be custom, selected by architect.
5. Refer to plans for type louvers and controls, fixed, hand (crank) operated, motor operated, etc.
6. Provide heavy duty screen/mesh in front of unit (inside) for louver protection, color same as louver. Screen to be 0.5" square constructed of stainless steel.
7. Refer to schedules for louvers required flanges & louvers requiring channel frames with sub sills. Provide blankoffs panels as noted within contract documents.
8. Ruskin approved equal.

B. Greenheck #EHV-901D:

1. Louvers shall be stationary high velocity wind driven rain style with Horizontal front blades and Vertical rear blades and shall have Florida Product Approval and/or Miami-Dade Notice of Acceptance to ensure a tested and qualified installation. Louver blades shall be contained within a 9-inch frame and shall be fully factory assembled. Extended sill pans shall be provided to capture and drain water to exterior of building. Louver components (heads, jambs, sill and blades) shall be factory assembled by the louver manufacturer.
2. Louver performance shall be certified in accordance with the AMCA 511 Certified Ratings Program for AMCA 500-L Air Performance, Water Penetration and Wind Driven Rain and shall be licensed to bear the AMCA Seal. Free area for a size 48 in. x 48 in. louver shall not be less than 8.32 Sq. Ft. (52.0%).
3. Louvers shall allow for sizes up to 60" wide x 120" high. Openings larger than the maximum section width may comprise of multiple individual louver panels without the need for additional structural reinforcing members as per the manufacturers installation instructions. Where louvers are required to be multiple sections high, adequate structural supports shall be provided in order to install the louver in accordance with the manufacturers installation instructions. Structural supports for multi-high assemblies, if required, shall be considered as part of the building structure and not provided by the louver manufacturer.
4. Vertical mullions shall be visible for openings wider than the maximum allowable single section width. Recessed mullions for continuous blade appearance shall be provide where noted on drawings.
5. Static pressure drop shall not be greater than 0.34 in. WG at 8500 cfm intake through a 48" x 48" louver.
6. Any manufacturer that has a higher pressure drop shall be responsible for resizing the louvers to meet the specified pressure drop, or the pressure drop scheduled on drawings.
7. Beginning point of water penetration shall not be less than 1250 FPM free area intake velocity.

8. Louvers shall maintain Class A wind driven rain performance up to 900 FPM core velocity with an external wind speed of 29 MPH and an external rainfall rate of 3 in. per hour. Louvers shall maintain Class A wind driven rain performance up to 900 FPM core velocity with an external wind speed of 50 MPH and an external rainfall rate of 8 in. per hour.
9. Louvers shall comply with Florida test protocols TAS 201 (Large Missile Impact), TAS 202 (Uniform Static Air Pressure) and TAS 203 (Cyclic Wind Loading). Louvers shall be AMCA 540 Listed for Enhanced Protection Impact Resistance of Missile Level E and AMCA 550 Listed for High Velocity Wind Driven Rain. Louvers shall be capable of withstanding both positive and negative wind pressure loads up to 130 PSF when installed in accordance with the manufacturer's published installation instructions.
10. Louvers shall be Greenheck #EHV-901D, Construction Specialties #DC-9614, or prior approved equal, extruded aluminum alloy shall be 6063T5 construction, or as required to meet the louvers structural requirements as follows:
 - a. Frame: 0.081 inch (minimum) wall thickness, caulking surfaces provided.
 - b. Front Blades: 0.081 inch (minimum) wall thickness, installed horizontally on approximately 4" inch centers.
 - c. Rear Blades: 0.063 inch (minimum) wall thickness, installed vertically on approximately 1.5" inch centers.
 - d. Extended Sill Pan: 0.060 inch (minimum) aluminum sheet wall thickness, with upturned side panels to help prevent water leakage.
 - e. Screen: 1/2" x .063" aluminum mesh bird screen in removable frame, mounted on interior (rear) of louver.
 - f. Finish: 70% 2-coat baked Kynar, custom color, color as selected by Architect.
11. Provide "blank-off" panel(s) where noted within contract documents. Panel shall consist of 1" thick mineral wool insulation sandwiched between sheet metal panels. Exterior and Interior (facing) panels shall be 0.032 inch (minimum) thickness aluminum; conceal edges of insulation with sheet metal or heavy plastic closure. Insulation shall comply with ASTM C612, with a minimum R-value of 4.2 at 75° F.
12. Exterior side shall have a black kynar finish.

2.07 EXHAUST GRILLES

- A. Register (Wall): 35 degree deflection register with horizontal bars, opposed blade damper and plaster frame. All items to be aluminum construction. Register and plaster frame to have an anodized finish.
- B. Register (Ceiling): Grid core register with 1/2x1/2x1/2 inch core spacing and opposed blade damper. All items to be of aluminum construction. Register to have an anodized finish. Frames shall be appropriate to type ceiling used in project.

2.08 LINEAR DIFFUSERS

- A. Linear diffuser shall be extruded aluminum. Diffuser face shall be natural anodized aluminum with narrow surface mounted border. Interior air pattern controller shall be painted flat black. Diffusers shall be furnished in one piece up to a maximum of four feet; where diffuser exceeds four feet, multiple sections shall be butted with hairline joints and provided with alignment spines. Diffusers shall have concealed fastening. Linear diffusers shall be furnished in lengths, and number of 1 inch slots, as required for CFM as indicated on the drawings.
- B. Contractor to figure in bid field fabrication of internally insulated plenum on rear of linear slot diffuser in the event the structure does not allow for the proper installation of the factory fabricated plenum boxes. Verify exact locations of plenum boxes with structure prior to ordering plenums.

2.09 SQUARE PLAQUE CEILING DIFFUSER

- A. Ceiling diffuser shall be round, square or rectangular with to provide 1,2,3, or 4-way air patterns as indicated on the drawings. All items to be of aluminum construction. Frame and directional core to have baked white enamel finish.

- B. Frame style for fixed ceiling shall be raised "V" type. Frame style for lay-in ceilings shall be lay-in matching frames, panel size 24-inch x 24-inch unless otherwise required. For spline or other type ceiling systems, use appropriate matching frame styles. Diffusers shall be sized as indicated on the drawings.

2.10 PERFORATED CEILING DIFFUSERS

- A. Ceiling diffusers shall be aluminum with removable perforated face panel, adjustable diffusion louvers, and round neck or round neck adapter. Face panel shall fit 24" x 24" lay-in tee-bar ceiling grid. Throw pattern assembly shall be removed, air shall drop/dump into space.. Perforated ceiling diffusers to be located in kitchen cooking area only.

2.11 THERMALLY POWERED VAV DIFFUSERS

- A. Thermally powered variable air volume diffusers shall be Therma-Fuser™ model ST manufactured by Acutherm, and shall have separate set points for VAV Heating and VAV Cooling.
- B. Thermally powered VAV diffusers shall be a complete VAV terminal and thermostat self-contained in nominal 24"x24"/600mm square diffuser. They shall be thermally powered with one room thermostat/actuator and one changeover thermostat/actuator. External wiring or pneumatics shall not be allowed.
- C. The VAV diffusers shall have a thumbwheel and temperature scale to adjust the cooling set point and a separate thumbwheel and temperature scale for the heating set point. The adjustment shall be right above the hinged appearance panel and shall not require tools. Each set point shall be separately adjustable between 70°F/21°C and 78°F/26°C. The initial set point shall be factory set at 74°F/23°C..
- D. In the cooling mode the VAV diffusers shall open on a rise in room temperature and in the heating mode they shall close on a rise in room temperature. The changeover thermostat shall be factory installed and adjusted to engage the heating mode when the supply air temperature rises above 80°F/27°C and return to the cooling mode when the supply air temperature falls below 68°F/20°C. During changeover the diffuser shall close or, if a minimum flow is set, go to the minimum. Nothing including the changeover mechanism shall extend above the inlet of the diffuser.
- E. All VAV diffusers shall have a dial and scale to adjust minimum flow between 5 cfm/2.4 l/s and 50% of maximum flow without tools. Minimum flow shall be factory set at 10%. A fixed maximum flow stop shall be factory set for the full open air flow of the specified inlet size.
- F. All VAV diffusers shall have a lever which will open the damper for balancing without tools. The balancing lever shall be accessible from the outside of the diffuser without folding down the appearance panel or removing any part of the diffuser.
- G. All VAV diffusers shall have a solid (no holes or slots), hinged appearance panel that can be unlatched and folded down to hang allowing hands to be free for adjusting temperature set points. Instructions for the VAV diffuser shall be on the inside of the appearance panel.
- H. The VAV diffusers shall have positive induction of secondary room air over the room thermostat/actuator at all flows from fully closed to fully open.
- I. The manufacturer shall warrant that all VAV diffusers shall be free from defects in materials and workmanship for a period of ten years from date of shipment.
- J. Supply air to the VAV diffuser shall be constant temperature (may be reset to another constant temperature). Supply air shall be limited to no lower than 50°F/10°C on cooling and no higher than 120°F/49°C on heating. The heating high limit shall be as low as possible but no lower than 80°F/27°C.

2.12 BRICK VENTS

- A. Brick vents to be Greenheck model BVE or prior approved equal.

- B. Brick vents shall be sized as noted on schedule with 0.125 in (3.175 mm) mortar ribs top and bottom. Brick vents to have 45 degree blades overlap for optimum visual screening. Maximum free area shall be 39 percent. Extruded construction provides a quality finished appearance. Provide a high water stop at the rear and deep overlapping blades with storm stops provide maximum resistance to rain and weather.
- C. Provide birdscreen (heavy duty screen/mesh in front of unit (inside) for protection, color same as brick vent. Screen to be 0.5" square constructed of stainless steel.).
- D. Brick vents shall be supplied with a 70% Kynar finish applied following a thorough cleaning and pretreatment of the metal surface. Dry film thickness of the Kynar shall be approximately 1.2 mils after baking at 450 F. Color shall be custom, selected by architect.
- E. Provide factory mounted straight duct (0.063" aluminum for up to 18" wall thickness) on rear of brick vent.
- F. Frame: Heavy gauge extruded 6063T5 aluminum, 4"x0.125" nominal wall thickness.
- G. Blades: Heavy gauge extruded 6063T5 aluminum, 0.125" nominal wall thickness, positioned at 45 degree angles.
- H. Mechanically fastened construction.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install items in accordance with manufacturer's recommendations.
- B. Paint ductwork visible behind air outlets flat black, if not inherently black.
- C. Install items in accordance with manufacturer's instructions.
- D. Check location of outlets and inlets and make necessary adjustments in position to conform with architectural features, symmetry, and lighting arrangement.
- E. Install diffusers to ductwork with air tight connection.
- F. Provide balancing dampers on duct take-off to diffusers, and grilles and register, regardless of whether dampers are specified as part of the diffuser, or grille and register assembly.
- G. Furnish and install necessary frames, bucks, sponge rubber gasketed, etc. to make a neat setting job.
- H. Diffusers shall be placed to insure that air does not blast against columns and lights.
- I. All diffusers, registers etc. shall have external volume controls and deflecting grids.
- J. Ceilings in areas where plaster or gypsum board ceiling are used, shall be surfaced mounted.

3.02 AIR OUTLET SCHEDULE

- A. Refer to schedules within contract documents.

END OF SECTION

4-14-25

SECTION 23 5123 - BREECHINGS, CHIMNEY AND STACKS FOR CONDENSING APPLIANCES

PART 1 – GENERAL

1. SCOPE

- 1.1. The provisions of Applicable Sections & Specifications, Mechanical General specifications apply to all work in this Section.
- 1.2. This Section includes all specifications relating to the furnishing and installing of Single Wall Positive Pressure Vent Systems.

1.3. SUBMITTALS

- 1.3.1. Submit the following items in accordance with Division 01:

- 1.3.1.1. Catalogue cuts / Diagrams / Descriptions
- 1.3.1.2. Sizing calculations
- 1.3.1.3. Installation Instructions
- 1.3.1.4. Installation Drawings
- 1.3.1.5. Copy of product warranties

1.4. CODES AND APPLICABLE STANDARDS

- 1.4.1. All products furnished under this Section shall conform to the requirements of The National Fuel Gas Code, ANSI Z223.1 to the Canadian Standard ULC-S636, as a Class IIA, IIB and IIC, Type BH vent system. Components coming in direct contact with products of combustion shall carry the appropriate ULC listing.

PART 2 PRODUCTS

2. POLYPROPYLENE POSITIVE PRESSURE VENT

- 2.1. The vent shall be of rigid single wall, factory-built type, designed for use in conjunction with Category II or IV condensing or non-condensing gas fired appliances or as specified by the heating equipment manufacturer.
- 2.2. Maximum continuous flue gas temperature shall not exceed 110°C (230°F).
- 2.3. Vent shall be listed for a minimum positive pressure rating of 6" W.C. and shall have passed at 15" W.C.
- 2.4. The vent system shall be continuous from the appliance's flue outlet to the vent termination outside the building. All outside vent components must be UV rated if exposed to the atmosphere. All system components shall be ULC listed and supplied from the same manufacturer.
- 2.5. All cascade (common vented) systems must be approved by the manufacturer of the appliance and conform to CSA approval.
- 2.6. PolyPro concentric vent systems shall require an adapter where the appliance being used has an outlet diameter of 110mm.
- 2.7. The vent shall be constructed from polypropylene, with a minimum wall thickness of 2.2mm for 60mm (2"), 80mm (3"), 100mm (4"), 130mm (5"), 150mm (6") and 200mm (8") diameter vents.
- 2.8. All system components such as vent supports, roof or wall penetrations, terminations, appliance connectors and drain fittings required to install the vent system shall be ULC listed and provided by the vent manufacturer.
- 2.9. Vent layout shall be designed and installed in compliance with manufacturer's installation instructions and all applicable local codes.

3. VENT SYSTEM LAYOUT

- 3.1. The vent system shall be routed to maintain minimum clearance to combustibles as specified by the manufacturer.
- 3.2. Vent installation shall conform to the manufacturer's installation instructions, its ULC listing and local codes.
- 3.3. The vent system and breechings shall be inspected and cleaned before the final connection to the appliances.

3.4. MECHANICAL EQUIPMENT

- 3.4.1. If dampers or fans are installed in conjunction of the vent system, such equipment shall be supported independently from the vent system. Protect the vent system from twisting or movement due to fan torque or vibration.

PART 4 – WARRANTIES

4. WARRANTIES

- 4.1. The Manufacturer shall warrant the Positive Pressure Vent System against defects in material and workmanship for a period of 10 years from the date of original installation. Any portion of the vent repaired or replaced under the warranty shall be warranted for the remainder of the original warranty period.

PART 5 – PRODUCTS

5. AVAILABLE MANUFACTURERS

- 5.1. Specification requirements shall be met by using DuraVent PolyPro. Equivalent submittals shall demonstrate that the alternate material is in compliance with all specification requirements.

END OF SECTION

4-14-25

SECTION 23 54 00 - GAS FIRED FURNACE

PART 1 - GENERAL

1.1 SECTION INCLUDE

- A. Gas Furnaces

1.2 RELATED SECTIONS

1.3 REFERENCES

- A. Air-Conditioning, Heating, and Refrigeration Institute (AHRI) certified
- B. Canadian Standards Association (CSA) certified
- C. Rated in accordance to Department of Energy (DOE) test procedures
- D. ISO 9001 manufacturer quality system
- E. Energy Star Certified
- F. California Energy Commission approved
- G. Meets
 - 1. California seasonal efficiency requirements
 - 2. California Nitrogen Oxides (NOx) Standards

1.4 PERFORMANCE REQUIREMENTS

- A. Nominal gas heat input: Refer to schedules.
- B. Annual Fuel Utilization Efficiency (AFUE): Up to 99%
- C. High Static: 0.80 in. w.g.
- D. Fuel Requirements: Natural Gas
- E. Electrical Characteristics
 - 1. 60 HZ
 - 2. 120 V
 - 3. Single Phase
 - 4. 120V/24V Transformer

1.5 SUBMITTALS

- A. General: Submit listed submittals in accordance with Conditions of the Contract and Division 1 Submittal Procedures
- B. Product Data: Submit product data, including manufacturer's SPEC-DATA® product sheet, for specified products

C. Shop Drawings:

1. Submit shop drawings in accordance with "Submittal Procedures" specification.
2. Indicate:
 - a. Equipment, piping and connections, together with valves, strainers, control assemblies, thermostatic controls, auxiliaries and hardware and recommended ancillaries which are mounted, wired and piped ready for final connection to building system, its size and recommended bypass connections.
 - b. Piping, valves and fittings shipped loose showing final location in assembly
 - c. Control equipment shipped loose, showing final location in assembly
 - d. Field wiring diagrams
 - e. Dimensions, internal and external construction details, installation clearances, recommended method of installation, sizes and location of mounting bolt holes
 - f. Detailed composite wiring diagrams for control systems showing factory installed wiring and equipment on packaged equipment or required for controlling devices or ancillaries, accessories, controllers.

D. Quality Assurance:

1. Test Reports: Certified test reports showing compliance with specified performance characteristics and physical properties
2. Certificates: Product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements
3. Manufacturer's Instructions: Manufacturer's installation instructions

E. Manufacturer's Field Reports: Manufacturer's field reports specified herein

F. Closeout Submittals: Submit the following:

1. Warranty: Warranty documents specified herein
2. Operation and Maintenance Data: Operation and maintenance data for installed products in accordance with Division 1 Closeout Submittals (Maintenance Data and Operation Data) Section. Include methods for maintaining installed products and precautions against cleaning materials and methods detrimental to finishes and performance. Include names and addresses of spare part suppliers.
3. Provide brief description of unit, with details of function, operation, control and component service
4. Commissioning Report: Submit commissioning reports, report forms and schematics of all manufacturer startups of equipment.

1.6 QUALITY ASSURANCE

A. Qualifications:

1. Installer experienced in performing work of this section who has specialized in installation of work similar to that required for this project

2. Manufacturer Qualifications: Manufacturer capable of providing field service representation during construction and approving application method
- B. Preinstallation Meetings: Conduct preinstallation meeting to verify project requirements, manufacturer's installation instructions and manufacturer's warranty requirements. Comply with Division 1 Project Management and Coordination (Project Meetings).

1.7 DELIVERY, STORAGE & HANDLING

- A. General: Comply with Division 1 Product Requirements
- B. Ordering: Comply with manufacturer's ordering instructions and lead time requirements to avoid construction delays
- C. Packing, Shipping, Handling and Delivery:
 1. Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact
 2. Ship, handle and unload units according to manufacturer's instructions
- D. Storage and Protection:
 1. Store materials protected from exposure to harmful weather conditions
 2. Factory shipping covers to remain in place until installation

1.8 WARRANTY

- A. Project Warranty: Refer to Conditions of the Contract for project warranty provisions
- B. Manufacturer's Warranty: Submit, for Owner's acceptance, manufacturer's standard warranty document executed by authorized company official. Manufacturer's warranty is in addition to, and not a limitation of, other rights Owner may have under Contract Documents
- C. Warranty: Commencing on Date of substantial completion.
 1. Duralok Plus™ Aluminized Steel Heat Exchanger – 10 years in non-residential applications
 2. All other covered components – 1 year in non-residential applications

PART 2 - PRODUCTS

2.1 GAS FURNACE

- A. Product: Upflow/Horizontal Heat Furnaces
- B. Manufacturer: Lennox Industries
 1. Contact: 2140 Lake Park Blvd.; Richardson, TX 75080; Telephone: (800) 453-6669; website: www.lennoxcommercial.com or prior approved equal.
 2. Trane, RUUD, Daikin approved manufacturers
- C. Proprietary Products/Systems:
 1. Cabinet:
 - a. Low-profile, narrow width cabinet allows easy installation

- b. Heavy gauge cold rolled steel construction
 - c. Pre-painted finish
 - d. Flanges provided on supply air opening for ease of plenum connection or alignment with indoor coil
 - e. Foil faced insulation on sides and back of heating compartment, mat faced insulation in blower compartment
 - f. Gas piping inlets and electrical inlets in both sides
 - g. Door can be removed without any tools for complete service access
 - h. Sealed blower compartment
 - i. Safety interlock switch to automatically shut off power to unit when blower compartment access door removed
 - j. Inner blower compartment access panel seals air leakage
 - k. Coil match-up
 - l. Return air entry
2. Heating System:
- a. Silent Comfort® Technology
 - b. Lennox Duralok Plus ® Heat Exchanger Assembly
 - 1. Heavy gauge aluminized steel
 - 2. Multi-pass crimped seam design clamshell
 - 3. Secondary heat exchanger condenser coil constructed of aluminum fins fitted to stainless steel tubes
 - 4. Coil is factory tested for leaks
 - 5. Laboratory life-cycle tested
 - 6. Condensate drain header box assembly located in front of coil
 - c. Lennox designed header box
 - 1. Collects flue condensate for disposal through drains
 - 2. Drains are located on each side of cabinet
 - 3. Condensate drain trap is included for field installation
 - d. Lennox designed flue condensate trap assembly
 - 1. Mounted outside the conditioned air stream on either side of cabinet in upflow and downflow applications
 - 2. Mounted below the cabinet in horizontal applications (or remotely up

to 5ft away from unit)

3. Drain cap on trap for easy cleaning and winterizing.
4. 90 degree street elbow furnished for ease of drain trap installation
5. Connections can be made with field provided PVC pipe, PVC coupling, or vinyl tubing with hose clamp

e. Inshot Burners

1. Aluminized steel
2. Burner assembly to be removable from the unit as single component

f. SureLight® Hot Surface Ignitor

1. Tough, reliable, long life, trouble-free performance
2. Silicon nitride ignitor
3. Ignition leads are constructed of nickel plated copper, enclosed in high temperature Teflon® insulation
4. Cemented to steatite block for leakage protection

g. Variable Capacity Gas Control Valve

1. Adjusts capacity outputs in increments as small as 1% or as large as needed.
2. 24 V Redundant combination valve
3. Compact Control combines manual shutoff, automatic electric valve (dual) and gas pressure regulation into a compact combination control

h. Variable Speed Combustion Air Inducer

1. Variable speed inducer motor.
2. Controlled by SureLight® Control
3. Overload protected (auto reset)
4. Heavy duty blower prepurges heat exchanger and safety vents flue products
5. Dual pressure switch (low fire/high fire)

i. Flame Rollout Switches (2)

1. Factory installed on burner box with manual reset for protection from abnormal operating conditions

j. Pressure Switches (two stage)

k. Limit control

3. Venting

a. Direct Vent Sealed combustion system

1. Furnace features a “sealed combustion”
2. Can only be installed in direct vent (two pipe) applications
3. Combustion air is supplied from outdoors
4. Flue gases are discharged outdoors

4. Blower

- a. Variable speed direct drive blower
- b. Variable speed blower motor

5. Controls

- a. Surelight® Integrated Furnace Control (icomfort® Compatible)
 1. Communicates information to the optional icomfort Wi-Fi™ Thermostat or icomfort Touch® Communicating Thermostat
- b. Thermostat Control
- c. Surelight® Ignition Control
 1. Monitors line voltage
 2. Maintain igniter power at a constant level
- d. Safety Controls
- e. Display LED
- f. DIP Switch Settings
 1. Select Thermostat used (Variable Speed)
 2. Heating and Cooling Speeds
 3. Dehumidification (Active)
 4. Dual-Fuel Operation
 5. Variable Stage Compressor Operation
 6. Blower On/Off Time (Heating/Cooling)
 7. Blower speed ramping (cooling mode) – DIP switch settings allow four blower speed profiles during cooling operation
 8. Accessory Terminal (control is factory installed in the unit control box)
 9. Continuous blower speed [there are four selectable options (via DIP

switch settings) of 28%, 38% (default setting), 70% and 100%]

10. Lennox system operations monitor connection - monitors outdoor unit operation (communicating mode)

g. 24 Volt Transformer

1. Furnished and factory installed in control box
2. 40VA transformer has circuit breaker wired in series

h. Field Wiring Make-up Box

1. For line voltage wiring
2. Factory installed internally on left side of furnace
3. Box may be installed internally or externally on either

6. Accessories:

a. Venting:

1. Termination kits
 1. Concentric termination kit (direct vent)
 2. Close Couple (direct vent)
 3. Roof Termination Flashing Kit

b. Controls:

1. Night Service Kit
2. Universal Service Kit – Switches
3. Thermostat: Lennox iComfort S30 Smart Thermostat.

c. Filter:

1. Air Filter and Rack Kit for Horizontal Return Air (End) Applications
 1. Washable/vacuum cleanable polyurethane frame type filter and external end return air rack available for field installation
 2. Rack has door for servicing
 3. Flanges on rack for duct connection
2. Air Filter and Rack Kit for Upflow Side Return Air Applications
 1. Not for use with Return Air Base
 2. Washable/vacuum cleanable polyurethane frame type filter and external end return air rack available for field installation
 3. Available in single and ten pack kits

4. Rack has door for servicing
5. Flanges on rack for duct connection
6. Field installs on either side of unit cabinet

2.2 PRODUCT SUBSTITUTIONS

- A. Refer to Architectural Specifications.

PART 3 - EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

- A. Compliance: Comply with manufacturer's written data, including product technical bulletins, product catalog installation instructions and product carton installation instructions

3.2 EXAMINATION

- A. Site Verification of Conditions: Verify substrate conditions, which have been previously installed under other sections, are acceptable for product installation in accordance with manufacturer's instructions.

3.3 INSTALLATION

- A. Install in accordance with the manufacturer's instructions and regulations of authorities having jurisdiction.

- B. Provide float switch in auxiliary drain pan, respective air unit & condensing unit to deenergize when float switch is tripped.

C. SHIPPING

- a. Paper copies of the IOM shall also be shipped with each unit.
- b. To protect equipment during shipment and delivery, all indoor units shall be completely stretch or shrink wrapped. Wrap shall be a minimum of 7 mil plastic. Pipe ends and pipe connection holes in the casing shall be capped or plugged prior to shipment

D. ON-SITE STORAGE

- a. If equipment is to be stored for a period of time prior to installation, the Contractor shall remove all stretch or shrink wrap from units upon receipt to prevent unit corrosion and shall either place the units in a controlled indoor environment or shall cover the units with canvas tarps and place them in a well-drained area. Covering units with plastic tarps shall not be acceptable.

E. FIELD EXAMINATION

- a. The Contractor shall verify that the mechanical room and/or attic are ready to receive work and the opening dimensions are as indicated on the shop drawings and contract documents.
- b. The Contractor shall verify that the proper power supply is available prior to starting of the fans.

F. INSTALLATION

- a. The Contractor shall be responsible to coordinate ALL of his installation requirements.
- b. The unit manufacturer shall provide all screws and gaskets for joining of sections in the field.
- c. The Contractor shall verify that the following items have been completed prior to scheduling the unit manufacturer's final inspection and start up:
 - d. All spring-isolated components have had their shipping restraints removed and the components have been leveled.
 - e. On all field-joined units, that all interconnections have been completed, i.e., electrical and control wiring, piping, casing joints, bolting, welding, etc.
 - f. All pipe connections have been completed and tested.
 - g. All ductwork connections have been completed and all ductwork has been pressure tested for its intended service.
 - h. All power wiring, including motor starters and disconnects, serving the unit has been completed.
 - i. All automatic temperature and safety controls have been completed.
 - j. All dampers are fully operational.
 - k. All shipping materials have been removed.

G. LEVELING

- a. The Contractor shall level all unit sections in accordance with the unit manufacturer's instructions. The Contractor shall provide and install all necessary permanent shim material to ensure individual sections and entire assembled units are level.

END OF SECTION

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SECTION 23 8126 - SPLIT-SYSTEM AIR-CONDITIONERS

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Split System Air Conditioners, including:
 - 1. Cabinet
 - 2. Compressor
 - 3. Refrigerant system
 - 4. Controls
 - 5. Refrigerant line connectors, electrical inlets and service valves

1.2 RELATED SECTIONS

1.3 REFERENCES

- A. Air-Conditioning and Refrigeration Institute (ARI):
 - 1. ARI 210/240 – 2005, Unitary Air-Conditioning and Air-Source Heat Pump Equipment
 - 2. ARI 270-2008/370-2001, Sound Rating of Outdoor Unitary Equipment
- B. Servicing Standards and Codes:
 - 1. Underwriters Laboratories, Inc.® (UL)
 - 2. Canadian Electric Code (CEC)
 - 3. Underwriters Laboratories of Canada® (ULC)
- C. Department of Energy (DOE), units rated to
- D. ISO 9001 registered manufacturing quality system
- E. Units to Be Energy Star® compliant

1.4 PERFORMANCE REQUIREMENTS

- A. Refer to schedules for system performance.
- B. Electrical Characteristics:
 - 1. Refer to schedules.

1.5 SUBMITTALS

- A. General: Submit listed submittals in accordance with Conditions of the Contract and Division 01 Submittal Procedures
- B. Product Data: Submit product data for specified products
- C. Shop Drawings:
 - 1. Submit shop drawings to indicate:
 - a. Equipment, piping and connections, together with valves, strainers, control assemblies, thermostatic controls, auxiliaries and hardware, and recommended ancillaries that are mounted, wired and piped ready for final connection to building system, its size and recommended bypass connections
 - b. Piping, valves and fittings shipped loose showing final location in assembly
 - c. Control equipment shipped loose, showing final location in assembly
 - d. Field wiring diagrams

- e. Dimensions, internal and external construction details, installation clearances, recommended method of installation, sizes and location of mounting bolt holes
- f. Detailed composite wiring diagrams for control systems showing factory installed wiring and equipment on split systems or required for controlling devices or ancillaries, accessories, controllers
- D. Quality Assurance:
 - 1. Test Reports: Certified test reports showing compliance with specified performance characteristics and physical properties
 - 2. Certificates: Product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements
 - 3. Manufacturer's Instructions: Manufacturer's installation instructions
- E. Closeout Submittals: Submit the following:
 - 1. Warranty: Warranty documents specified herein
 - 2. Operation and Maintenance Data: Operation and maintenance data for installed products in accordance with Division 01 Closeout Submittals (Maintenance Data and Operation Data) Section. Include methods for maintaining installed products, and precautions against cleaning materials and methods detrimental to finishes and performance. Include names and addresses of spare part suppliers

1.6 QUALITY ASSURANCE

- F. Qualifications:
 - 1. Installer experienced in performing work of this section who has specialized in installation of work similar to that required for this project
- G. Pre-installation Meetings: Conduct pre-installation meeting to verify project requirements, manufacturer's installation instructions and manufacturer's warranty requirements. Comply with Division 01 Project Management and Coordination (Project Meetings).

1.7 DELIVERY, STORAGE & HANDLING

- A. Ordering: Comply with manufacturer's ordering instructions and lead time requirements to avoid construction delays
- B. Packing, Shipping, Handling and Delivery:
 - 1. Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact
 - 2. Ship, handle and unload units according to manufacturer's instructions
- C. Storage and Protection:
 - 1. Store materials protected from exposure to harmful weather conditions
 - 2. Factory shipping covers to remain in place until installation

1.8 WARRANTY

- A. Project Warranty: Refer to Conditions of the Contract for project warranty provisions
- B. Manufacturer's Warranty: Submit, for Owner's acceptance, manufacturer's standard warranty document executed by authorized company official. Manufacturer's warranty is in addition to, and not a limitation of, other rights Owner may have under Contract Documents
- C. Warranty: Commencing on Date of Substantial Completion.
 - 1. Compressor: 5 year parts, labor, refrigerant, material.
 - 2. Other Covered Components: 5 year parts, labor, refrigerant, material.

PART 2 – PRODUCTS

2.1 AIR CONDITIONERS/SPLIT SYSTEM UNITS

- A. Manufacturer: Lennox Industries (Trane, RUUD, Daikin approved manufacturer's).
- B. XC20, Elite® Split System Air Conditioner Units, including the following equipment:
 - 1. All units to be factory assembled, wired and piped
 - 2. All units to be assembled in the USA
 - 3. All units to be factory tested prior to shipping
 - 4. Cabinet:
 - a. Heavy-gauge steel construction
 - b. Corrosion free pre-painted cabinet finish
 - c. Corrosion free durable zinc-coated base section
 - d. Control box with controls factory wired
 - e. Large removable service access panel
 - f. Base drainage holes for moisture removal
 - g. High density polyethylene unit support feet
 - h. Coil protection panels
 - 1) SmartHinge
 - 2) Steel
 - 3) Hinged
 - 4) Louvered
 - 5) May be removable
 - i. Refrigerant Line Connections, Electrical Inlets, Service Valves:
 - 1) Sweat connection vapor and liquid lines located on cabinet corner
 - 2) Fully serviceable brass service valves
 - 3) Full shutoff Vapor valve
 - 4) Liquid valve can be front seated to manage refrigerant charge while servicing system
 - 5) Suction and Liquid line service valve to be located inside unit
 - 6) Suction and Liquid line gauge ports to be located inside unit
 - 7) Refrigerant line connections and field wiring inlets to be located in one central area
 - 5. Controls:
 - a. Low Ambient Kit (down to 30° F)
 - b. Contractor to provide Lennox thermostats (one per HVAC system), icomfort S30 smart thermostat for each unit with smart hub controller
 - 6. Compressor
 - a. Variable capacity
 - b. Inverter control to vary the capacity based on cooling load required
 - c. Scroll type
 - d. Resiliently mounted on rubber mounts for vibration isolation
 - e. Internal excessive current and temperature protection
 - f. Crankcase heater
 - 7. Refrigerant System:
 - a. Refrigerant: R410-A
 - b. Outdoor Coil Fan:
 - 1) Direct drive variable speed fan
 - 2) Vertical air discharge
 - 3) Totally enclosed fan motor with sleeve bearings
 - 4) Fan motor to be inherently protected
 - 5) Corrosion resistant PVC coated steel fan guard
 - 6) Removable fan guard for fan service access

- c. Copper Tube/Fin Coil:
 - 1) Copper tube construction
 - 2) Flared shoulder connections
 - 3) Silver solder construction
 - 4) Lanced, ripple-edged aluminum fins
 - 5) Coil is leak tested at factory
 - 6) Entire coil to be accessible for cleaning
- d. Factory installed standard features:
 - 1) High pressure switch
 - 2) Low pressure switch
 - 3) High capacity liquid line drier
- 8. Installer must:
 - 1) Set air conditioner
 - 2) Connect refrigerant lines
 - 3) Make electrical connections

2.2 PRODUCT SUBSTITUTIONS

- A. Refer to Architectural specifications.

PART 3 - EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

- A. Compliance: Comply with manufacturer's written data, including product technical bulletins, product catalog installation instructions and product carton installation instructions.

3.2 EXAMINATION

- A. Site Verification of Conditions: Verify that substrate conditions, which have been previously installed under other sections, are acceptable for product installation in accordance with manufacturer's instructions.

3.3 INSTALLATION

- A. Install air conditioner in strict accordance with manufacturer's instructions and regulations of authorities having jurisdiction.

END OF SECTION

4-14-25

SECTION 23 82 16 - REFRIGERANT COIL (5 TONS & UNDER)

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Direct Expansion Refrigerant Coil (5 Tons & Under)

1.02 RELATED WORK

- A. Section 23 00 00 - General Provisions.
- B. Section 23 07 00 - Ductwork Insulation.
- C. Section 23 31 00 - Metal Ductwork.
- D. Section 23 81 26 - Split-System Air-Conditioners
- E. Section 23 54 00 - Gas-Fired Furnace

1.03 REFERENCES

- A. ANSI/UL 883 - Safety Standards for Fan Coil Units and Room Fan Heater Units
- B. ARI 210/240 - Unitary Air-Conditioning and Air-Source Heat Pump Equipment.
- C. ANSI/UL 465/559 - Central Cooling Air Conditioners and Heat Pumps.

1.04 QUALITY ASSURANCE

- A. Refrigerant Coil: Product of manufacturer regularly engaged in production of components who issues complete catalog data on total product.

1.05 SUBMITTALS

- A. Submit drawings indicating assembly, unit dimensions and weights, required clearances, construction details, and field connection details.
- B. Submit product data shall indicate dimensions, weights, capacities, ratings, performance, finishes of materials.

1.06 OPERATION AND MAINTENANCE DATA

- A. Submit operation and maintenance data.
- B. Include manufacturer's descriptive literature for start-up instructions, installation instructions, and maintenance procedures.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Comply with manufacturer's installation instructions for rigging, unloading, and transporting units.
- B. Store in clean dry place and protect from weather and construction traffic. Handle carefully to avoid damage to components, enclosures, and finish.

1.08 ENVIRONMENTAL REQUIREMENTS

- A. Do not operate units for any purpose, temporary or permanent, until ductwork is clean, filters are in place, bearings lubricated, and fan has been test run under observation.

1.07 WARRANTY

- A. Provide one year parts warranty.

PART 2 PRODUCTS

2.01 SUMMARY

- A. The contractor shall furnish and install direct expansion refrigerant coil(s) as shown as scheduled on the contract documents. The unit(s) shall be installed in accordance with this specification and perform at the specified conditions as scheduled.

Manufacturer: Lennox CHX Series or prior approved equal.
-Trane, RUUD, Daikin approved manufacturers.

2.02 GENERAL

- A. Provide indoor-mounted, vertical installation direct expansion refrigerant coil. Coil(s) shall be factory assembled. Direct-expansion evaporator coil shall also include, expansion valve(s), check valves, condensate drain pan, mounting bracket, and electrical controls. Units shall be suitable for vertical airflow configuration and be used with ductwork.

2.03 CASING

- A. Unit casing shall be constructed of zinc coated, heavy gauge, galvanized steel. Exterior surfaces shall be cleaned, phosphatized and finished with a baked enamel finish.
- B. Unit casing shall be completely insulated with fire-retardant, permanent, odorless glass fiber material.
- C. Unit casing shall be provided with flanges.
- D. Unit casing shall be provided with removable panels for complete service access.
- E. Unit casing refrigerant lines shall extend outside of cabinet.

2.04 COILS

- A. The coil shall be 3/8" seamless aluminum tubing mechanically bonded to aluminum plate fin. Enclose coils with headers and return bends fully contained within casing. Coil shall be provided with a factory installed expansion/check valve kit (TXV to be non-bleed) and additional Schrader Valve for service. Coils shall be factory pressure and leak tested at 375 psig.
- B. Coil shall have ripple-edged lanced aluminum fins, rifled tubing, twin coil construction assembled in an "A" configuration for large surface area, sweat connections on both liquid and suction lines, 90° liquid line elbow with o-ring shipped with coil
- C. Provide drain pan constructed of UV-resistant polymer with external dual drain connections.

2.06 CONTROLS

- A. Provide factory installed and wired controls including fan contactor, low voltage terminal strip and plug in module for accessory electric heat control (if applicable). Power entry shall be single point. Provide factory mounted 24 volt control transformer and indoor fan delay function for increased efficiency.
- B. Provide low ambient controls to operate under down to 30-degrees F.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install in accordance with manufacturer's instructions.

3.02 REFRIGERANT COIL SCHEDULE. [See schedule]

END OF SECTION

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SECTION 26 01 00
BASIC ELECTRICAL REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Conditions and Division 01 Specification Sections, apply to this Section.
- B. Specifications throughout all Divisions of the Project Manual are directly applicable to this Section, and this Section is directly applicable to them.
- C. Consideration shall be given to all alternates, addenda and allowances as they relate to this section and all accommodations shall be included in the bid.

1.2 SCOPE OF WORK

- A. Site: The extent of the site work is generally indicated in the contract documents by E-series drawings and includes but is not limited to the following:
 - 1. Coordinate electrical service with the Utility Company and provide secondary conduit with pull rope to utility tie-in point, metering equipment, service termination junction boxes with splicing hardware and service disconnecting means. Include all Utility Company fees for service connection in bid.
 - 2. Coordinate communications services with the serving utility companies and provide service conduit with pull ropes to utility tie-in points for phone/data service and CATV service.
 - 3. Provide site area lighting including parking pole lights, pedestrian pole lights, bollards and landscape lights.
 - 4. Provide a natural gas emergency generator and automatic transfer switch.
 - 5. Provide temporary construction power; coordinate with the local Utility Co.
- B. Power: The extent of the power work is generally indicated in the contract documents by E-series drawings and includes but is not limited to the following:
 - 1. Provide panels, safety disconnect switches and associated feeder(s).
 - 2. Provide receptacles, special outlets, junction boxes, and floor boxes along with their associated branch circuits.
 - 3. Provide branch circuits associated with all equipment furnished by owner such as copiers, printers, refrigerators, microwaves, coffee pots, etc.
 - 4. Provide branch circuits associated with all mechanical and plumbing equipment.
 - 5. Provide branch circuit to landscaping irrigation system controller.
- C. Lighting: The extent of the lighting work is generally indicated in the contract documents by E-series drawings and includes but is not limited to the following:

1. Provide interior light fixtures, wall switches and wall dimmers along with their associated branch circuits.
 2. Install all light fixtures furnished by others and connect to their associated branch circuits.
 3. Provide all exterior building mounted fixtures along with their associated branch circuits.
- D. Telecommunications: The extent of the telecommunications work is generally indicated in the contract documents by E-series drawings and includes but is not limited to the following:
1. Provide junction boxes and conduit for phone and data outlets. All wiring and equipment by others

1.3 REFERENCE STANDARDS

- A. Materials which are specified by reference to Federal Specifications; ANSI; Federal Standards; or other standard specifications must comply with latest editions, revisions, amendments or supplements in effect on date bids are received. Requirements in reference specifications and standards are minimum for all equipment, material and work. In instances where capacities, size or other feature of equipment, devices or materials exceed these minimums, meet listed or shown capacities.
- B. The latest published edition of a reference shall be applicable to this Project unless identified by a specific edition date.
- C. All reference amendments adopted prior to the effective date of this Contract shall be applicable to this Project.
- D. All materials, installation and workmanship shall comply with the applicable requirements and standards addressed within the Contract Documents. Applicable codes include the following:
1. NFPA 70, National Electrical Code (2020).
 2. Regulations of the Electric Utility Concerning Electrical Installations.
 3. Occupational Safety and Health Regulations (OSHA).
 4. National Fire Codes:
 - a. NFPA 110, Emergency and Standby Power Systems
 5. The NFPA Standards in effect shall be as listed or adopted by the appropriate authority having jurisdiction.
 6. American National Standards Institute (ANSI).
 7. Institute of Electrical and Electronics Engineers (IEEE).
 8. Insulated Power Cable Engineers Association (IPCEA).
 9. National Electrical Manufacturers Association (NEMA).
 10. National Electrical Safety Code (NESC).

11. Underwriters' Laboratories (UL).
12. International Building Code (2012).

1.4 DEFINITIONS

- A. Concealed: Concealed areas are those areas that cannot be seen by building occupants.
- B. Exposed: Exposed areas are all areas that are exposed to view by building occupants, including areas below counter tops, inside cabinets and closets, inside all equipment rooms, and areas outside the building exterior envelope, exposed to the outdoors.
- C. Feeder: Feeder consists of both conduit and wiring installed above or below grade.
- D. Provide: Provide shall indicate furnishing and installing the item or items referenced unless specifically indicated otherwise.

1.5 QUALITY ASSURANCE

- A. General:
 1. It is the intent of the drawings and specifications to obtain a complete, fully functional and satisfactory installation. They are not intended to show ever connection detail or each item essential to the functioning of the systems. The contractor shall be responsible for finishes and structural conditions and coordinate with other trades to avoid interference between the various systems. Additionally, the contractor shall provide all essential options and accessories for a fully functional system as described.
 2. Organize and lay out Work so that it will be concealed in furred chases and suspended ceilings, etc., in finished portions of the building, unless specifically noted to be exposed. Install all Work parallel or perpendicular to building lines unless otherwise noted.
 3. Where there is a conflict between the contract document and an applicable "CODE", the "CODE" shall govern except where the requirements of the contract documents are more stringent; where there is a conflict between the contract drawings and the contract specifications, the most stringent shall govern.
 4. Resolve, in writing, any code violation discovered in contract documents with the Engineer prior to bidding. After award of the contract, Contractor shall make any correction or addition necessary for compliance with applicable codes at no additional cost.
 5. Coordinate the actual locations of electrical outlets and equipment with building features and equipment as indicated on architectural, structural, mechanical, plumbing and landscape Drawings. Review any proposed changes in electrical wiring devices or equipment locations with the Architect prior to rough-in. Architect may direct relocation of outlets before installation, up to five (5) feet from the position indicated, without additional cost. Remove and relocate outlets placed in an unsuitable location when requested by the Architect, at no additional cost

- B. Regulations: Work, materials and equipment shall comply with the latest rules and regulations specified in National Fire Protection Association (NFPA). The installer shall include in the work, without extra cost, any labor, materials, services, apparatus and drawings required to comply with all applicable laws, ordinances, rules and regulations
- C. Discrepancies: The Drawings and Specifications are intended to comply with listed codes, ordinances, regulations and standards. Where discrepancies occur, immediately notify the Architect in writing and ask for an interpretation. Should installed materials or workmanship fail to comply, the Contractor is responsible for correcting the improper installation at no additional cost. Additionally, where sizes, capacities, or other such features are required in excess of minimum code or standards requirements, provide those specified or shown.
- D. Contractor Qualifications: An acceptable Contractor for the Work under this Division must have personnel with experience, training and skill to provide a practical working system with at least 3 years of successful installation experience on projects with installation work similar to that required for the project.
- E. Conditions: Provide new products of manufacturers regularly engaged in production of such equipment. Provide the manufacturer's latest standard design for the type of product specified. Provide equipment whose performances, under specified operating conditions, are certified by manufacturer
- F. NEC and UL: Products shall conform to requirements of the National Electrical Code. Where Underwriters' Laboratories have set standards, listed products and issued labels, products used shall be listed and labeled by UL and meet NEMA standards.
- G. Space Limitations: Equipment selected shall conform to the building features and shall be coordinated with all components. Do not provide equipment that will not meet arrangement and space limitations. Contractor shall submit room layouts with submitted items shown drawn to scale. Submittals will be rejected without floor plan Drawings showing submitted items.
- H. Factory Finish: Equipment shall be delivered with a hard surface, factory-applied finish so that no additional field painting is required except for touch-up.
- I. Common Source: Equipment specified in Sections Dry Type Transformers, Switchboards, Panelboards, Motor Control Centers, Mini-Power Zones and Disconnect Safety Switches shall be provided by the same manufacturer.
- J. Manufacturer's model names and numbers used in this Division of the specifications are subject to change per manufacturer's action. Contractor shall therefore verify them with manufacturer's representative before ordering any product or equipment.

1.6 ADDITIONAL WORK

- A. Design is based on equipment as described in the drawings and specifications. Any required changes in foundation bases, electrical requirements, wiring, conduit, connections, controls, openings, etc., shall be paid for by this Contractor.

1.7 SUBMITTALS

- A. Product Data: Provide coordination Drawings with submittals as required by Division 01.
- B. Provide manufacturer's product data associated with the following:

1. Grounding and Bonding Equipment
 2. Panelboards
 3. Wiring devices
 4. Enclosed Switches and Circuit Breakers
 5. Engine Generators
 6. Transfer Switch
 7. Lighting
- C. Record Documents: In addition to hard copy format, all material submitted as final record products, including approved Shop Drawings and submittals, shall be submitted to the Owner in its original electronic file format on compact disc or DVD. Material may be scanned into electronic file format where necessary.
- 1.8 DELIVERY, STORAGE AND HANDLING
- A. All equipment and materials shall be delivered to the Project Site clean and sealed for protection.
 - B. Moisture: During construction, protect switchgear, transformers, motors, control equipment, and other items from insulation moisture absorption and metallic component corrosion by appropriate use of strip heaters, lamps or other suitable means. Apply protection immediately upon receiving the products and maintain continually.
 - C. Damage: Take such precautions as are necessary to protect apparatus and materials from damage. Failure to protect materials is sufficient cause for rejection of the apparatus or material in question.
 - D. Finish: Protect factory finish from damage during construction operations until acceptance of the Project. Restore any finishes that become stained or damaged to Architects satisfaction.

PART 2 - PRODUCTS

2.1 EQUIPMENT AND DEVICE MARKING

- A. Externally mark all equipment and devices using the same circuit designations as indicated on construction drawings and final as-built documents.
- B. Nameplates shall be white laminated rigid phenolic with black core. Emergency nameplates shall be red laminated phenolic with white cores. Nameplate minimum size shall be 1 inch high by 3 inches long with 1/4 inch high engraved white letters. Supply blank nameplates for spare units and spaces.
- C. Nameplate Fasteners: Fasten nameplates to the front of equipment only by means of stainless steel self-tapping screws. Stick-ons or adhesives are not acceptable unless the NEMA enclosure rating is compromised, then only epoxy adhesive shall be used to attach nameplates.
- D. In general, provide the following information for the types of electrical equipment as listed:
 1. Panelboards: Identify panelboard designation, voltage characteristics, and source designation.

- E. Panelboards: Prepare a neatly typed circuit directory. This directory shall be installed behind clear heat-resistant plastic attached to the inside of the door for each panelboard. Identify circuits by equipment served and by building room numbers where room numbers exist. Indicate spares and spaces with light, erasable pencil marking. Removing and attaching panel schedules from the Drawings is not acceptable.
- F. Panelboards, Pull, Junction and Outlet Boxes:
1. With ½ inch high permanent lettering, identify conduits connected to panelboards, pull, junction and outlet boxes with the complete circuit number of the conductors contained therein. Neutral conductors shall be identified by wire marker tags in the panelboards, pull, junction and outlet boxes. Where multiple circuits are contained in a box, identify the circuit conductors with permanent tags which indicate circuit designation.
- G. Dedicated outlets: Dedicated is understood to be specific equipment listed by equipment number in the panel schedules or identified on the Drawings.

PART 3 - EXECUTION

3.1 DEMOLITION

- A. Obstructions:
1. The drawings indicate certain information pertaining to surface and subsurface obstructions which has been taken from available drawings. Such information is not guaranteed, however, as to accuracy of location or complete information.
 2. Before any cutting or trenching operations are begun, verify with Owner's representative, utility companies, municipalities, and other interested parties that all available information has been provided. Visit the site and verify locations given prior to beginning any work.
 3. Should obstruction be encountered, whether shown or not, alter routing of new work, reroute existing lines, remove obstruction where permitted, or otherwise perform whatever work is necessary to satisfy the purpose of the new work and leave existing services and structures in a satisfactory and serviceable condition.
 4. Assume total responsibility for and repair any damage to existing utilities or construction, whether or not such existing facilities are shown.
- B. Cutting, Patching and Excavation:
1. Cut and patch all walls, partitions, floors, pits and chases in wood and masonry as indicated or required by the contract documents or as directed by the Engineer .
 2. Obtain approval of Engineer prior to cutting of steel, wood or other structural member.
 3. Complete all necessary excavation and backfilling incidental to work of this section.
 4. Openings through concrete structures shall be "core bored"; where 3 or more openings penetrate in the same location the concrete may be sawed. All penetrations shall be re-sealed around conduit with top surface finished smooth.

5. Where paved surfaces are to be removed for installation of materials and equipment as a part of this contract, said paved surfaces shall be removed and replaced to match the existing surface, as originally installed, in all respects. Where trenching is done through and under said paved surfaces, the trench shall be backfilled with clean, dry sand. The fill shall be uniformly compacted in accordance with the site work requirements.
 6. All penetrations made in walls, floors or other building partitions for raceways, cables, equipment, etc. including penetrations in concealed areas (ceilings, chases, etc.) shall be either bore drilled or core drilled as required. Bust/poke-thrus with hand tools shall not be used to penetrate and will not be accepted. Any bust/poke-thru penetrations will be patched and redone with a drilled penetration by the contractor. All penetration work shall be neat and debris cleaned up after completion. Any walls or ceilings damaged due to penetration work shall be repaired. Any penetrations through walls or ceilings in visible finished areas shall be patched and painted, as required, to restore the finish around the penetration to its original condition. Where paint color/texture cannot be matched for an invisible transition from new to existing finish, the entire wall shall be repainted. The Contractor is to verify before starting any penetration work that the item to be penetrated has been checked by the Architect and is free of asbestos
- C. Unless otherwise noted, remove all electrical materials and equipment from areas indicated for demolition. Removal of equipment shall not interfere with existing operations.
 - D. Remove conduit and wire back to panelboards or to nearest junction box that is not being removed and needs to remain in service. Wire shall be removed back to point of origin. Turn off circuit breakers or switches serving abandoned circuits and tag breaker or switch and label in panel schedule as "Spare".
 - E. Materials and equipment to be removed, except items specifically noted to be relocated or delivered to the Owner, become property of the Contractor and shall be immediately removed from the Project Site. If the Owner identifies other items during construction, those items become Owner property and will be turned over to the Owner.
 - F. Electrical services and controls to items being removed shall be disconnected and removed from the Project Site.
 - G. All fluorescent lighting fixtures being removed from the Project Site that will not be turned over to the Owner shall have any PCB-containing ballasts removed from the fixtures for environmental disposal. Ballasts shall remain intact with wire leads at least twelve (12) inches long.
 - H. Contractor shall ensure that light switches within the Work area remain operational. Where temporary 120 volt light strings are installed, a switch shall be provided for the light strings near the Project entry door.

3.2 INSTALLATION

- A. Installation shall meet or exceed all applicable federal, state and local requirements, referenced standards and conform to codes and ordinances of authorities having jurisdiction.
- B. Installation shall be in accordance with manufacturer's published recommendations.
- C. Cooperation with Other Trades: Cooperate with trades of adjacent, related or affected materials or operations, and with trades performing continuations of this Work in order to effect timely and accurate placing of Work and to coordinate, in proper and correct sequence, the Work of such trades.

- D. Workmanship: Work shall be performed by competent workers skilled in their trade. Install materials and equipment in a professional manner. The Architect may direct replacement of items which, in his opinion, do not present a professional appearance. Replace or reinstall items at the expense of the Contractor.
- E. Housekeeping Pads: Unless otherwise noted. Install 3 1/2 inch thick concrete foundation pads for indoor floor-mounted equipment, except where direct floor mounting is required. Pour pads on roughened floor slabs, sized so that outer edges extend a minimum of 3 inches beyond equipment. Trowel pads smooth and chamfer edges to a 1 inch bevel. Secure equipment to pads as recommended by the manufacturer.
- F. Setting of Equipment: Equipment must be leveled and set plumb. Sheet metal enclosures mounted against a wall must be separated from the wall not less than 1/4 inch by means of corrosion-resistant spacers or by 3 inches of air for freestanding units. Use corrosion resistant bolts, nuts and washers to anchor equipment. Provide Drawings and layout Work showing exact size and location of sleeves, openings or inserts for electrical equipment in slabs, walls, partitions and chases in sufficient time to be coordinated with Work under other divisions.
- G. Sealing of Equipment: Seal openings into equipment to prevent entrance of animals, birds and insects.
- H. Motors: Electrical Work includes the electrical connection of all motors, except those that are wired as a part of equipment.
- I. Concealed Work: Conceal all electrical Work in walls, floors, chases, under floors, underground, and above ceilings except:
1. Where shown or specified to be exposed. Exposed is open to view.
 2. Where exposure is necessary to the proper function.
 3. Where size of materials and equipment preclude concealment.
- Installation of all exposed work shall not be allowed, prior to approval by the Architect.
- J. Provide final electrical connections to equipment furnished under other divisions and by the Owner. Furnish detailed Shop Drawings of equipment indicating the exact number and location of rough-in points. Such final Shop Drawings may indicate adjustments in total number and exact location of rough-in points, and in equipment dimensions. Making adjustments to field conditions is considered a part of the Work required.
1. Roughing-in: When roughing-in electrical branch circuits to various items of equipment, terminate at proper points as indicated on detailed equipment Shop Drawings or as directed by Owner. Do not rely on Drawings accompanying these Specifications for rough-in locations, only for general routing of circuiting.
 2. Final Connections: Laboratory casework, medical equipment, and food service equipment will include service fittings such as switches, duplex receptacles, lighting fixtures, etc., on the casework or equipment. Provide branch circuit connections to meet service fitting requirements.
- K. Refer to Divisions 07 and 09 for sealing and firestopping requirements where raceways penetrate smoke, fire, and sound rated walls.

- L. All unused openings such as but not limited to, knockouts on panels and boxes, surface wireway openings, busway openings, circuit breaker empty slots shall be covered with approved cover plates manufactured for the purpose.
- M. Temporary power equipment and distribution for construction shall not occupy building spaces or block pathways that are designated for permanent installation of other trades according to design drawings.

3.3 TESTING

- A. Test Conditions:
 - 1. Place circuits and equipment into service under normal conditions, collectively and separately, as may be necessary to determine satisfactory operation
- B. Retests: If retesting is required due to initial failure, conduct retests of such time duration as may be necessary to assure proper functioning of adjusted or altered parts or items of equipment. Any resultant delay as a result of such necessary retests does not relieve the Contractor of Contractor's responsibility under this Contract.
- C. Circuit Verification: All 120-volt single-phase circuits shall be verified to match the Drawings and panel schedules by "ringing out" each circuit in the presence of the Owner's representative(s).

END OF SECTION 26 01 00

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SECTION 26 05 19
LOW VOLTAGE ELECTRICAL POWER CONDUCTORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Conditions and Division 01 Specification Sections, apply to this Section.
- B. Specifications throughout all Divisions of the Project Manual are directly applicable to this Section, and this Section is directly applicable to them

1.2 SUMMARY

- A. This Section specifies the requirements for 600-volt cable, wire and connectors. It consists of but is not limited to power distribution circuitry, control system circuitry, lighting circuitry, appliance, equipment and motor-branch circuitry and outdoor power and lighting circuitry.

1.3 REFERENCE STANDARDS

- A. The latest published edition of a reference shall be applicable to this Project unless identified by a specific edition date.
- B. All reference amendments adopted prior to the effective date of this Contract shall be applicable to this Project.
- C. All materials, installation and workmanship shall comply with the applicable requirements and standards addressed within the following references:
 - 1. ANSI/UL 83 - Thermoplastic-Insulated Wires.
 - 2. NEMA WC 3: Rubber-Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy.
 - 3. NEMA WC 5: Thermoplastic-Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy.

1.4 SUBMITTALS

- A. Product Data:
 - 1. Submit manufacturer's product data on cable and wire connectors.

1.5 DELIVERY, STORAGE AND HANDLING

- A. Provide factory-wrapped waterproof flexible barrier material for covering wire and cable wood reels, where applicable; and weather resistant fiberboard containers for factory-packaging of cable, wire and connectors, to protect against physical damage in transit. Damaged cable, wire or connectors shall be removed from the Project Site.
- B. In their factory-furnished coverings, store cable, wire and connectors in a clean, dry indoor space which provides protection against the weather.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS

- A. All materials shall meet or exceed all applicable referenced standards, federal, state and local requirements, and conform to codes and ordinances of authorities having jurisdiction.
- B. Provide factory-fabricated wire of the size, rating, material and type as indicated for each service. Where not indicated, provide proper selection as required to comply with installation requirements and with NEC standards. The minimum size wire to be used for power or lighting circuits shall be #12 copper with insulation as noted below. Minimum size for control circuits shall be #14 copper.
- C. All wire #10 and smaller shall be solid, all wire #8 and larger shall be stranded.

2.2 BUILDING WIRE

- A. Feeders and Branch Circuits all sizes: 98 percent conductivity copper, stranded conductor, 600-volt insulation, THHN/THWN. Use XHHW insulation for all isolated power circuits.
- B. Control Circuits: 98 percent conductivity copper, stranded conductor, 600 volt insulation, THHN, THWN
- C. Color Coding:

- 1. Insulation color shall be as follows:

	<u>120/240 Volts</u>
<u>Phase A</u>	<u>Black</u>
<u>Phase B</u>	<u>Red</u>
<u>Phase C</u>	<u>---</u>
<u>Neutral</u>	<u>White</u>
<u>Ground</u>	<u>Green</u>

- 2. Conductors No. 10 and smaller shall have a solid colored insulation throughout the entire length of the wire.
- 3. Conductors No. 8 AWG and larger shall be identified by colored plastic tape that matches the circuit phase color at all visible points when colored insulation is unavailable. Colored tape shall be applied at all accessible locations of the conductor.

2.3 REMOTE CONTROL AND SIGNAL CABLE

- A. Control Cable for Class 1 Remote Control and Signal Circuits: 98 percent conductivity copper conductor, 600-volt insulation, rated 60 degrees C, individual conductors twisted together, shielded and covered with a PVC jacket.
- B. Control Cable for Class 2 or Class 3 Remote Control and Signal Circuits: 98 percent conductivity copper conductor, 300-volt insulation, rated 60 degrees C, individual conductors twisted together, shielded and covered with a nonmetallic jacket; UL listed for use in air handling ducts, hollow spaces used as ducts, and plenums.

2.4 TYPE NM-B (ROMEX) CABLE

- A. Conductors: Solid 12-10 AWG soft, uncoated copper, per ASTM-B3; Stranded 8 AWG conductor and larger uncoated, copper ASTM-B8.
- B. Insulation: Color-coded Polyvinyl Chloride (PVC) compound meeting the required thickness of Type THHN or THWN-2 with a heat-stabilized Nylon jacket rated for 90°C in dry locations.
- C. Grounding Conductor: Soft, uncoated copper per ASTM-B3 and/or ASTM-B8.
- D. Jacket: A 30-mil, color-coded, flame retardant and moisture resistant PVC jacket is applied over the completed assembly as follows: 12 AWG Yellow, 10 AWG Orange, 8 AWG Black, 6 AWG Black.
- E. Assembly: 2-conductor construction has the insulated conductors laid parallel with a bare copper ground wire wrapped in fire-retardant paper and laid parallel between the insulated conductors. The entire assembly is wrapped with a paper separator before applying the PVC outer jacket. 3 and 4 conductor constructions may have the insulated conductors laid parallel or twisted together before applying the nylon outer jacket.
- F. Installation: Type NM-B ampacity limitation shall be in accordance with the 60°C conductor temperature rating, as specified in the NEC. Type NM-B is rated 600-volt for both exposed and concealed work in normally dry locations. Type NM-B may be installed or fished in air voids and joints and in masonry block or tile walls where such walls are not exposed to, nor subject to, excessive moisture or dampness.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Installation shall meet or exceed all applicable federal, state and local requirements, referenced standards and conform to codes and ordinances of authorities having jurisdiction.
- B. All installation shall be in accordance with manufacturer's published recommendations.
- C. General wiring methods:
 - 1. Install electrical cable, wire and connectors as indicated. All installations, temporary or permanent, shall be in accordance with the manufacturer's written instructions, the applicable requirements of NEC, and as required ensuring that products serve the intended functions.
 - 2. Coordinate cable and wire installation work with electrical raceway and equipment installation work, as necessary for proper interface.
 - 3. Cables shall be selected on the basis of their purpose and UL listing. Generally, use Types THWN and XHHW in building interiors and other dry locations. Outdoors and in underground in raceways, use Type THWN or XHHW. Conductors subject to abrasion, such as in lighting poles, shall be Type THWN or THHN.
- D. Install conductor sizes as indicated. Provide No. 10 conductor for single phase, 20 ampere circuits for which the distance from panelboard to the first outlet is more than 100 feet.
- E. Each multi-wire branch circuit shall have a separate neutral conductor. Sharing neutral conductors is not allowed.
- F. Type NM-B (Romex) Cable:
 - 1. Bored holes MUST BE 1-1/4" from the edges of any stud or top plate. NEC 300.4(A)(1).

2. Notches in studs REQUIRE nail plates. NEC 300.4(A)(2).
3. Cable MUST BE stapled at least 1-1/4" inch from the edge of studs. NEC 300.4(B)(2).
4. At least 6 inches of free conductor SHALL BE left at each outlet box for the connection of devices. NEC 300.14.
5. All cable jackets SHALL extend at least 1/4 inch into the box.
6. All cable SHALL BE secured to the box, except for single gang non-metallic boxes, if stapled within 8 inches of the box.
7. Cable SHALL BE secured without damage to the outer covering.
8. Bends in cable SHALL NOT BE less than 5 times (5x) the diameter of the cable.
9. Installed per NEC 334 and applicable sections of NEC 300.

END OF SECTION 26 05 19

SECTION 26 05 23
GROUNDING AND BONDING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Conditions and Division 01 Specification Sections, apply to this Section.
- B. Specifications throughout all Divisions of the Project Manual are directly applicable to this Section, and this Section is directly applicable to them

1.2 SUMMARY

- A. This section specifies furnishing and installing grounding and bonding equipment for electrical systems.

1.3 REFERENCE STANDARDS

- A. The latest published edition of a reference shall be applicable to this Project unless identified by a specific edition date.
- B. All reference amendments adopted prior to the effective date of this Contract shall be applicable to this Project.
- C. All design, materials, installation and testing pertaining to grounding and bonding system shall comply with the latest edition of applicable requirements and standards addressed within the following references
 - 1. ANSI/IEEE Standard 142 - Recommended Practice for Grounding of Industrial and Commercial Power Systems.
 - 2. ANSI/UL 467 - Grounding and Bonding Equipment.
 - 3. ANSI J-STD-607-A – Commercial Building Grounding and Bonding Requirements for Telecommunications.

1.4 SUBMITTALS

- A. Product Data:
 - 1. Submit manufacturer's product data on grounding connections, ground rods and grounding busbars.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS

- A. All materials shall meet or exceed all applicable referenced standards, federal, state and local requirements, and conform to codes and ordinances of authorities having jurisdiction.

2.2 MATERIALS AND EQUIPMENT

- A. Grounding system components shall be as required to comply with the design and construction of the system indicated. Components shall be as indicated in manufacturer's submittal data.
- B. Ground Conductors:

1. Materials:
 - a. Provide 600-volt insulated conductors having a green-colored insulation for grounding electrode and equipment grounding conductors. Use stranded conductors.
 - b. Conduit grounding conductors shall be insulated copper conductor, green in color to size #6 AWG. Insulated conductors larger than #6 AWG shall be same as phase conductors but identified with green tape at each accessible opening or location in raceway.
 - c. Provide bare conductors for bonding jumpers.
 - d. Cable tray grounding conductors shall be a minimum of 1/0 bare copper conductors
- C. Connections:
 1. Materials:
 - a. Unless otherwise noted, for below-grade connections provide exothermic welded type.
 - b. For above-grade connections provide mechanical bolted-type connections utilizing high conductive copper alloy or bronze lugs or clamps.
 - c. Where required, provide plated connectors that will not cause electrolytic action between the conductor and the connector.
- D. Grounding clips shall be O-Z Gedney, Steel City (Thomas & Betts) Type G.
- E. Grounding Electrodes:
 1. Grounding electrodes shall not be smaller than 3/4-inch diameter, with minimum length ten (10) feet.
 2. Grounding electrodes shall be copper-clad steel for corrosion protection.
- F. Electrical Grounding Busbar:
 1. Where a field-provided ground bus or ground bar is required, use round-edge copper bar with 98 percent International Annealed Copper Standard (IACS) conductivity.
 2. Size the bus for not less than 25 percent of the cross-sectional areas of the related feeder. A minimum size of 1/4-inch thick by 2-inch depth by 12-inch length (minimum) is required.
 - a. The ground bar shall be a predrilled copper busbar provided with standard NEMA bolt hole sizing and spacing for the type of connectors to be used.
 - b. The ground bar shall be tin-plated for reduced contact resistance.
 - c. The ground bar shall be insulated from its support. A minimum of 2 inches separation is required. Mount the grounding busbars on insulated standoffs to ensure isolation from ground potential or stray potentials.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Installation shall meet or exceed all applicable federal, state and local requirements, referenced standards and conform to codes and ordinances of authorities having jurisdiction.

- B. All installations shall be in accordance with manufacturer's published recommendations.
- C. Install ground system as indicated, in accordance with the applicable requirements of the NEC.
- D. Install grounding conductors continuous, without splice or connection, between equipment and grounding electrodes.
- E. Size: When grounding and bonding conductors are not sized on Drawings, size the grounding conductors in accordance with NEC. Size bonding jumper so that minimum cross-sectional area is greater than or equal to that of the equivalent grounding conductor as determined from NEC.
- F. Connect grounding electrode conductors to metal water pipe using suitable ground clamp. Provide bonding jumper around water meter.
- G. Provide grounding and bonding at Utility Company's metering equipment in accordance with Utility Company's requirements.
- H. In feeder and branch circuits, provide a separate, green, insulated equipment-grounding conductor with the circuit conductors. Terminate each end of the grounding conductor on a grounding lug, bus, or bushing.

3.2 SYSTEM GROUND

- A. System Neutral. Where a system neutral is used, ground the system neutral conductor as required by NEC Article 250. System neutral must be grounded only at the point of service and must be isolated from ground at all other points in the system.
- B. Separately Derived Systems. Ground neutrals of separately derived systems such as generators, transformers, etc., in accordance with NEC 250-30.
- C. Size. Size the system grounding conductors to comply with NEC Table 250-66.

3.3 EQUIPMENT GROUND:

- A. Raceway Systems and Equipment Enclosures.
 - 1. Ground cabinets, junction boxes, outlet boxes, motors, controllers, raceways, fittings, switchgear, transformer enclosures, and other equipment and metallic enclosures. Ground equipment and enclosures to the continuous grounded, metallic raceway system is required in addition to any other specific grounding shown.
 - 2. Provide bonding jumpers and ground wire throughout to ensure electrical continuity of the grounding system.
 - 3. Provide grounding type insulated bushings for metal conduits terminating in equipment enclosures containing a ground bus and connect the bushing to the ground bus.
 - 4. Provide a green insulated equipment grounding conductor for each feeder, receptacle lighting and power branch circuit.
- B. Size. When grounding and bonding conductors are not sized on drawings, size the grounding conductors in accordance with NEC Table 250-122. Size bonding jumper so that minimum cross-section area is greater than or equal to that of the equivalent grounding conductor as determined from NEC Table 250-122

END OF SECTION 26 05 23

SECTION 260533
RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Conditions and Division 01 Specification Sections, apply to this Section.
- B. Specifications throughout all Divisions of the Project Manual are directly applicable to this Section, and this Section is directly applicable to them

1.2 REFERENCE STANDARDS

- C. The latest published edition of a reference shall be applicable to this Project unless identified by a specific edition date.
- D. All reference amendments adopted prior to the effective date of this Contract shall be applicable to this Project.
- E. All materials, installation and workmanship shall comply with the applicable requirements and standards addressed within the following references:
 - a. ANSI C80.1 - Rigid Steel Conduit, Zinc-Coated.
 - b. ANSI C80.3 - Electrical Metallic Tubing, Zinc Coated.
 - c. ANSI/NEMA FB 1 - Fittings and Supports for Conduit and Cable Assemblies.
 - d. ANSI/NEMA OS 1 - Sheet-Steel Outlet Boxes, Device Boxes, Covers and Box Supports.
 - e. ANSI/UL 1 - Flexible Metal Conduit.
 - f. ANSI/UL 360 - Liquid-tight Flexible Steel Conduit.
 - g. ANSI/UL 467 - Electrical Grounding and Bonding Equipment.
 - h. ANSI/UL 797 - Electrical Metallic Tubing.
 - i. ANSI/UL 870 - Wireways, Auxiliary Gutters and Associated Fittings.
 - j. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).
 - k. UL6 - Standard for Safety, Rigid Metal Conduit.
 - l. UL514B - Standard for Safety, Fittings for Conduit and Outlet Boxes
 - m. ANSI/UL 651 - Schedule 40 and 80 Rigid PVC Conduit.

1.3 QUALITY ASSURANCE

- F. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- G. Comply with NFPA 70

PART 2 - PRODUCTS

2.1 METALLIC CONDUIT, TUBING, AND FITTINGS

- A. Rigid Metal Conduit (RMC)
 - a. Rigid metallic conduit shall be steel conduit manufactured in accordance with ANSI C80.1 and listed to UL 6 with label showing evidence of third party listing. Rigid metallic conduit shall be hot-dipped galvanized and shall be supplied with factory tapered threads. Conduit shall be galvanized after cutting of threads. Manufactured elbows and nipples shall meet the same ASNSI and UL standards.
 - b. Field installed fittings shall be threaded galvanized steel fittings and listed to UL514B.
 - c. Fittings for use in hazardous (classified) locations shall listed to UL 886 and NFPA 70.
- B. Electrical Metallic Tubing (EMT)
 - a. Electrical Metallic Tubing shall be steel conduit manufactured in accordance with ANSI C80.3 and listed to UL 797 with label showing evidence of third party listing. Electrical Metallic Tubing shall be hot-dipped galvanized. Manufactured elbows and nipples shall meet the same ASNSI and UL standards.
 - b. Field installed fittings shall be compression type steel fittings and listed to UL514B. Set screw fittings are not acceptable.
- C. Flexible Metallic Conduit (FMC)
 - a. Flexible Metallic Conduit shall be reduced wall steel conduit listed to UL-1 and UL 1479 with label showing evidence of third party listing. Flexible Metallic Conduit shall be hot-dipped galvanized
 - b. Field installed fittings shall be malleable iron screw fittings manufacturer to NEMA FB-1 and listed to UL514B. Press on or crimp type fittings are not acceptable.
- D. Liquid Tight Flexible Metallic Conduit (LFMC)
 - a. Liquid Tight Flexible Metallic Conduit shall be steel interlocked conduit core with extruded PVC jacket listed to UL-360 with label showing evidence of third party listing. Flexible Metallic Conduit shall be hot-dipped galvanized with a UV sunlight resistant jacket.
 - b. Field installed fittings shall be malleable iron threaded fittings manufacturer to NEMA FB-1 and listed to UL514B.

2.2 NON-METALLIC CONDUIT AND FITTINGS

E. Rigid Schedule 40 PVC Conduit

- a. Rigid Schedule 40 PVC Conduit shall be extruded polyvinyl chloride conduit manufactured in accordance with NEMA TC 2, EPC-40 requirements and listed to UL-651 with label showing evidence of third party listing.
- b. Field installed fittings shall be solvent welded fittings manufacturer to NEMA TC-3 and listed to UL-651.

F. Rigid Schedule 80 PVC Conduit

- a. Rigid Schedule 80 PVC Conduit shall be extruded polyvinyl chloride conduit manufactured in accordance with NEMA TC 2, EPC-80 requirements and listed to UL-651 with label showing evidence of third party listing.
- b. Field installed fittings shall be solvent welded fittings manufacturer to NEMA TC-3 and listed to UL-651

2.3 METAL WIREWAYS AND AUXILIARY GUTTERS

- G. Metal wireways and auxiliary gutters shall be sheet metal not less than 16 gage sheet steel, complying with UL 870 and NEMA 250. Provide NEMA 1 wireways for interior applications and NEMA 3R for exterior applications. Size in accordance with NFPA 70 but not less than 6" x 6" cross section.
- H. Fittings and Accessories: Include covers, couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings to match and mate with wireways as required for complete system. Covers shall be screw on type unless noted otherwise.

2.4 OUTLET BOXES

- I. General: All outlet boxes shall be listed to UL-514. Sheet metal and drawn boxes shall be manufactured to NEMA OS-1. Cast boxes shall be manufactured to NEMA FB 1.
- J. Flush Device Boxes: Provide galvanized steel boxes of sufficient size to accommodate wiring devices to be installed at outlet. Provide an extension ring for the device to be installed. Square or rectangular boxes may be supplied. Unless otherwise noted, provide 1-1/2 inch deep by 4 inch square box. Boxes for use with audio/ visual and telecommunications outlets shall be 4 inch square x 2-1/8" deep minimum.
- K. Exposed Device Boxes: Provide galvanized drawn steel boxes of sufficient size to accommodate wiring devices to be installed at outlet. Provide a surface cover for the device to be installed. Square or rectangular boxes may be supplied. Unless otherwise noted, provide 1-1/2 inch deep by 4 inch square box. Boxes for use with audio/ visual and telecommunications outlets shall be 4 inch square x 2-1/8" deep minimum.
- L. Exterior Locations: For both flush and exposed applications, provide cast, one piece type, listed for use in wet locations. Provide weather proof "while-in-use" cover for the device to be installed. Unless otherwise noted, provide 1-1/2 inch deep by 4 inch square box.

- M. Luminaire Outlet Boxes: Provide galvanized steel octagonal boxes with fixture stud supports and attachments as required to properly support ceiling and bracket-type lighting fixtures. Unless otherwise noted, provide 1-1/2 inch deep by 4 inch box. Boxes shall be of drawn construction for exposed applications.
- N. Paddle Fan Outlet Boxes: Provide boxes designed for attachment of a paddle fan weighing 70 lb. Paddle fan outlet boxes shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

2.5 FLOOR BOXES

- O. Floor boxes shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application. Boxes shall be supplied with all options and accessories for complete and fully functional systems. Contractor shall submit product data on all boxes and accessories prior to ordering material.
- P. Single Service Floor Boxes: Provide non-metallic round box suitable for use with power, data and audio/ visual systems. Box shall be UL scrub water tested for all floor finished in which it is installed. Provide device mounting brackets for the device installed, metal cover adapter, and brass cover. Floor box shall be Carlon E971FB (box); E97ABR2 (cover adaptor); E97BR2 (cover) or Raco 551 (box); 6244 (cover adapter); 6249 (cover).
- Q. Multi-Service Floor Boxes: Provide a non-metallic rectangular box suitable for use with power, data and audio/visual systems. Box shall be gangable and shall include one gang for each different service provided. Box shall be UL scrub water tested for all floor finishes in which it is installed. Provide device mounting brackets for the device installed and recessed service brass cover. Floor box shall be Carlon E976RFB (box); E976*BR (cover), Hubbell PFBRG* (BOX); SB308*W (flange); S3826 (cover) or Wiremold 880MP2; 8*7B (flange); 828GFITC (cover).

2.6 PULL AND JUNCTION BOXES:

- R. Small Sheet Metal Pull and Junction Boxes: Boxes shall be galvanized sheet metal with screw-on cover and welded seams, stainless steel nuts, bolts, screws and washers. Boxes shall be sized in accordance with NEC and shall be manufactured in accordance with NEMA OS 1.
- S. Cast-Metal Access, Pull, and Junction Boxes: Boxes shall be galvanized cast iron with gasketed cover. Boxes shall be sized in accordance with NEC and shall be manufactured in accordance with NEMA FB 1 and UL 1773.

PART 3 - EXECUTION

3.1 CONDUIT, TUBING, AND FITTINGS

- A. General Requirements
 - a. Conduit shall be a minimum trade size of 1/2".

- b. Metallic conduits must be continuous between enclosures such as outlet, junction and pull boxes, panels, cabinets, motor control centers, etc. The conduit must enter and be secured to enclosures so that each system is electrically continuous throughout. Where knockouts are used, provide double locknuts, one on each side. At conduit terminations, provide insulated bushings or insulated throat connectors for conductor protection. Where conduits terminate in equipment having a ground bus, such as in switchgear, motor control centers and panelboards, provide conduit with an insulated grounding bushing and extend a suitable grounding wire to the ground bus.
- c. Run concealed conduit as directly and with the largest radius bends as possible. Run exposed conduit parallel or at right angles to building or other construction lines in a neat and orderly manner. All conduit shall be concealed unless specifically noted otherwise.
- d. Install each entire conduit system complete before pulling in any conductors. Clean the interior of every run of conduit before pulling in conductors to guard against obstruction and omissions.
- e. Cut all joints square, then thread and ream smooth.
- f. Make bends with standard elbows or conduit bent to not less than same radius. Bends must be free from dents or flattening. For power conduits use no more than the equivalent of four 90° bends (for telecommunications conduits use no more than two 90° bends or a total of 180° of bends) in any run between terminals and cabinets, or between outlets and junction boxes or pull boxes.
- g. Conduit bodies may be used in lieu of conduit elbows where ease of installation and appearance warrants their use. Conduit bodies larger than 1 inch may be used only where approved. Conduit bodies may not be used under any circumstances for telecommunications pathways.
- h. Provide a No. 30 nylon pulling line in conduits in which wiring is not installed under this work, such as telephone, signal, and similar systems. Identify both ends of the line by means of labels or tags reading "Pulling Line".
- i. Suitably cap conduit during construction to avoid water, dirt and trash entrance.
- j. Use expansion-deflection fittings on conduit crossing structural expansion joints and on exposed conduit runs where necessary.
- k. Keep raceways at least 6 inches away from parallel runs of flues and steam or hot-water pipes. Install horizontal raceway runs above water and steam piping.
- l. Arrange stub-ups so curved portions of bends are not visible above finished slab.
- m. Install raceways square to enclosures and terminate at enclosures with locknuts. Install locknuts hand tight plus 1/4 turn more. Do not rely on locknuts to penetrate nonconductive coatings on enclosures. Remove coatings in the locknut area prior to assembling conduit to enclosure to assure a continuous ground path
- n. Securely fasten conduit within 12 inches of enclosures to which attached. All fasteners shall be UL listed for use with the conduit installed.

- o. Properly support flexible conduit every 4', EMT every 6', and rigid metal conduit every 8'. All support intervals are listed as maximum.
 - p. Install raceway sealing fittings at accessible locations according to NFPA 70 and fill them with listed sealing compound. For concealed raceways, install each fitting in a flush steel box with a blank cover plate having a finish similar to that of adjacent plates or surfaces. Install raceway sealing fittings according to NFPA 70. Locate seals so no fittings or boxes are between the seal and the following changes of environments. Seal the interior of all raceways at the following points:
 - 1. Where conduits pass from warm to cold locations, such as boundaries of refrigerated spaces.
 - 2. Where conduits pass from non-classified locations to classified locations.
 - 3. Where otherwise required by NFPA 70.
- B. Rigid Metallic Conduit:
- a. Coat field-cut threads on RMC raceway with a corrosion-preventing conductive compound prior to assembly.
 - b. Terminate threaded conduits into threaded hubs or with locknuts on inside and outside of boxes or cabinets. Install bushings on conduits up to 1-1/4-inch trade size and insulated throat metal bushings on 1-1/2-inch trade size and larger conduits terminated with locknuts. Install insulated throat metal grounding bushings on service conduits
- C. Direct-Buried Conduit:
- a. Excavate trench bottom to provide firm and uniform support for conduit. Prepare trench bottom in accordance with the architect and civil engineer's instructions.
 - b. Install backfill as specified in accordance with the architect and civil engineer's instructions.
 - c. Install manufactured rigid steel conduit elbows for stub-ups at poles and equipment and at all transitions from below grade.
 - 1. Couple steel conduits to ducts with adapters designed for this purpose.
 - 2. For stub-ups at equipment mounted on outdoor concrete bases and where conduits penetrate building foundations, extend steel conduit horizontally a minimum of 60 inches from edge of foundation or equipment base. Install insulated grounding bushings on terminations at equipment.
- D. Types according to use and location:
- a. Exposed to rain, condensation, moisture or constant high humidity: RMC.
 - b. Exposed in areas not specified in the preceding paragraphs: RMC or EMT.
 - c. Concealed in exterior or interior walls and ceiling spaces: EMT.
 - d. Embedded in concrete slabs or walls: RMC or rigid non-metallic conduit.

- e. Below grade: RMC or rigid nonmetallic conduit a minimum 24 inches below finished grade.
 - f. Electrical equipment in dry locations and subject to vibration and movement, excluding motors: flexible metal conduit, 36 inches maximum length.
 - g. Electrical equipment in wet locations and subject to vibration and movement, and all motors: liquidtight flexible metal conduit, 36 inches maximum length.
- E. Transitions:
- a. Continue the heavier, more protective type conduit application into the area where lighter, less protective type conduit is permitted.
 - b. For below grade to above grade outdoor locations, provide rigid metal steel conduit elbows and risers.

3.2 OUTLET BOXES:

- F. Electrical box locations shown on Drawings are approximate unless dimensioned. Verify location of outlets prior to rough in. Locate and install boxes to allow access and clearances per NEC.
- G. Provide outlet box accessories as required for each installation, including mounting brackets, wallboard hangers, extension rings, fixture studs, cable clamps, and metal strap for supporting outlet boxes. Accessories shall be compatible with outlet boxes being used and shall meet requirements of individual situations.
- H. Do not install boxes back-to-back in walls. Provide minimum 6-inch separation in non-fire-rated walls. Provide minimum 24-inch horizontal separation in acoustic-rated walls.
- I. Membrane penetration of minimum 1-hour, up to maximum 2-hour fire rating walls and partitions shall be protected by listed putty pads or other listed materials and methods. Refer to the architectural requirements for fire stopping of rated walls.
- J. Secure boxes rigidly to the substrate upon which they are being mounted, or solidly imbed boxes in concrete or masonry. Boxes shall not be permitted to move laterally. Boxes shall be secured between two studs. Boxes connected to one stud are not permitted.
- K. Provide knockout plugs for unused openings.
- L. Use single piece multiple-gang boxes where more than one device is mounted together; do not use gangable boxes. Provide barriers to separate wiring of different voltage systems.
- M. Install boxes in walls without damaging wall insulation.
- N. Locate boxes so that cover or plate will not span different building finishes.
- O. Switch boxes shall not be used as junction boxes.
- P. Typical outlet box centerline heights shall be as listed below. Coordinate outlet heights with Architectural Drawings, millwork details, casework details and equipment installation. Where discrepancies occur, ask for an interpretation from the Architect/Engineer and Owner.

- a. Receptacles 18" AFF
- b. Voice/Data 18" AFF
- c. Outlets at millwork 8" above counter top unless noted otherwise
- d. Light Switches 48" AFF

Q. Outlet boxes supporting fixtures shall be securely anchored in place in an approved manner. Support outlet boxes and fixtures in acoustic ceiling areas from building structures with separate supports, not from acoustic ceiling or ceiling tile wire. Lighting fixture outlets shall be coordinated with mechanical and architectural equipment and elements to eliminate conflicts and to provide a workable neat installation.

R. **All** outlet boxes shall be installed flush mount in the walls unless noted otherwise.

3.3 FLOOR BOXES:

S. Floor box locations shown on Drawings are approximate unless dimensioned. Verify location of outlets prior to rough in.

T. Set floor boxes level, and adjust floor box flush with finish flooring material. For nonmetallic floor boxes, trim after installation to fit flush with finished floor surface.

3.4 JUNCTION AND PULL BOXES:

U. Install boxes as required to facilitate cable installation in raceway systems. Generally provide boxes in conduit runs of more than 100 feet or with more than three 90 degree bends. Locate boxes strategically and make them of such shape to permit easy pulling of wire or cables.

V. Install boxes so that covers are readily accessible and easily removable after completion of the installation. Include suitable access doors for boxes above inaccessible ceilings. Select a practical size for each box and cover.

W. In inaccessible ceiling areas, position outlets and junction boxes within reach of ceiling access panels.

X. Locate pull boxes and junction boxes above accessible ceilings or in unfinished areas unless specifically noted otherwise. **All** junction boxes installed on finished walls shall be flush mount.

Y. Support pull and junction boxes independent of conduit. Combination box/conduit hangers from drop rod (like Caddy B18 Series) are acceptable.

END OF SECTION 26 05 33

SECTION 26 24 16

PANELBOARDS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Conditions and Division 01 Specification Sections, apply to this Section.
- B. Specifications throughout all Divisions of the Project Manual are directly applicable to this Section, and this Section is directly applicable to them

1.2 REFERENCE STANDARDS

- A. The latest published edition of a reference shall be applicable to this Project unless identified by a specific edition date.
- B. All reference amendments adopted prior to the effective date of this Contract shall be applicable to this Project.
- C. All materials, installation and workmanship shall comply with the applicable requirements and standards addressed within the following references:
 - 1. NEMA AB 1 – Molded-Case Circuit Breakers, Molded Case Switches, and Circuit-Breaker Enclosures.
 - 2. NEMA PB 1 - Panelboards.
 - 3. NEMA PB 1.1 – General Instructions for Proper Installation, Operation and Maintenance of Panelboards Rated 600 Volts or Less.
 - 4. Federal Specification W-P-115C – Panel, Power Distribution.
 - 5. Federal Specification W-C-375B – Circuit Breakers, Molded Case; Branch Circuit and Service.
 - 6. National Fire Protection Association NFPA 70 – National Electrical Code.
 - 7. Underwriters Laboratories UL 50 - Enclosures for Electrical Equipment, Non-Environmental Considerations.
 - 8. UL 67 – Panelboards.
 - 9. UL 869A - Reference Standard for Service Equipment
 - 10. UL 489 - Molded-Case Circuit Breakers, Molded-Case Switches and Circuit-Breaker Enclosures.
 - 11. UL 943 - Ground-Fault Circuit-Interrupters

1.3 SUBMITTALS

- A. Product Data:
 - 1. Submit manufacturer's product data for panelboards and circuit breakers.

2. Manufacturer's product data shall be reviewed by the contractor to verify placement in electrical rooms and spaces. Contractor shall verify with the actual dimensions of equipment to be supplied that all working space and equipment space clearances outlined in NEC are met. Notify the Architect in writing of any violations prior to commencing work.

1.4 DELIVERY, STORAGE AND HANDLING

- A. Deliver panelboards in factory-fabricated water-resistant wrapping.
- B. Handle panelboards carefully to avoid damage to material components, enclosure and finish.
- C. Store in a clean, dry space and protected from the weather

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS

- A. Provide deadfront, bolt-on circuit breaker type panelboards as scheduled.
- B. Enclosure shall be NEMA Type 1 for indoor dry locations and NEMA type 3R for exterior and wet locations unless otherwise indicated on the Contract Documents.
- C. Provide cabinet front with one door over the interior and an additional full-height hinged dead front cover over interior and wireway (door-in-door). Cabinet front shall be cleaned and finished with manufacturer's standard finish. Provide flush door locks.
- D. Panelboard NEMA type 1 enclosures shall be galvanized steel with all cut edges galvanized. Boxes shall have standard conduit knockouts on ends of enclosure.
- E. Panelboard NEMA type 3R enclosures shall be painted steel with no pre-punched knockouts. All conduit entries shall be made in the field.
- F. Bus shall be tin-plated copper and braced for the maximum available fault current. Minimum bus ampacity shall be 100 amperes.
- G. Circuit breaker phase connector straps that connect the main bus to individual circuit breakers shall be tin-plated copper.
- H. Provide a 6 inch x ¼ inch tin-plated copper ground bus in all panelboards. The ground bus shall be drilled to accept lugs for all grounding conductors. Mount ground bus on brackets to allow easy installation of bolts, nuts and lockwashers used to attach ground lugs.
- I. Provide a tin-plated copper neutral bus with the same ampacity rating as the phase bus. Neutral bus shall be isolated from the ground bus.
- J. All lugs for phase, neutral and ground buses shall be copper or tin-plated copper.
- K. Provide compression connectors where conductors terminate directly to bus. (MLO panels).
- L. Panelboard electrical ratings and configurations are indicated in the Contract Documents.
- M. Circuit directory shall be typewritten and mounted behind clear, heat-resistant plastic in a metal frame, tack welded on the inside of each panel door. List the minimum circuit breaker ampere interrupting capacity on the circuit directory. List minimum panel required interrupting capacity.

- N. Load center branch overcurrent protection devices shall be plug-in circuit breakers and shall be replaceable without disturbing the adjacent units.

2.2 MANUFACTURERS

- A. Load Centers shall be as follows:

<u>Type</u>	<u>Square D</u>	<u>Siemens</u>	<u>Cutler Hammer</u>
120/240 volt	QO	PL	CH

2.3 OVERCURRENT PROTECTIVE DEVICES

- A. Provide molded case circuit breakers of manufacturer's standard industrial construction, with integral inverse time delay thermal and instantaneous trip. Provide bolt-on circuit breakers for 120/240V panels.
- B. Circuit breakers shall be 240 VAC rated for nominal 120/240V panels. Minimum interrupting ratings shall be 10,000 amperes for 120/240V circuits, unless higher rating noted on the Contract Documents.
- C. Breakers 225 ampere through 400 ampere shall have continuously adjustable magnetic pick-ups of approximately five to ten times trip rating.
- D. Multi-pole breakers shall be two pole as specified. Handle ties are not permitted.
- E. Circuit breaker interrupting rating shall be greater than the available short circuit current listed for the panelboard in which the circuit breaker is installed.
- F. Panels shall be fully rated; combination series rated is not allowed. All overcurrent devices shall be capable of interrupting the available fault current

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Installation shall meet or exceed all applicable federal, state and local requirements, referenced standards and conform to codes and ordinances of authorities having jurisdiction.
- B. All installation shall be in accordance with manufacturer's published recommendations.
- C. Anchor enclosures firmly to walls and structural surfaces, ensuring that they are permanently and mechanically secured.
- D. At the completion of the electrical system, check each phase of all panels under full load and arrange so that all phases shall carry the same load as near as possible.
- E. Install panelboards such that the center of the circuit breaker in the highest position will not be more than 6-1/2 feet above the floor

END OF SECTION 26 24 16

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SECTION 26 27 26 WIRING DEVICES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Conditions and Division 01 Specification Sections, apply to this Section.
- B. Specifications throughout all Divisions of the Project Manual are directly applicable to this Section, and this Section is directly applicable to them

1.2 REFERENCE STANDARDS

- C. The latest published edition of a reference shall be applicable to this Project unless identified by a specific edition date.
- D. All reference amendments adopted prior to the effective date of this Contract shall be applicable to this Project.
- E. All materials, installation and workmanship shall comply with the applicable requirements and standards addressed within the following references:
 - 1. NEMA WD 1 - General-Purpose Wiring Devices.
 - 2. NEMA WD 2 - Semiconductor Dimmers for Incandescent Lamps.
 - 3. NEMA WD 5 - Specific-Purpose wiring Devices.
 - 4. Americans with Disabilities Act (ADA).
 - 5. ANSI/UL 498 - Attachment Plugs and Receptacles.
 - 6. ANSI/UL 943- Ground Fault Circuit Interrupters

1.3 QUALITY ASSURANCE

- F. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- G. Comply with NFPA 70

PART 2 - PRODUCTS

2.1 WALL SWITCHES

- A. Type: Quiet type, back and side wired switches or modular plug-in switches as specified herein.
- B. Rating: 20 amperes, 120/277 volts.
- C. Listing: UL 20 and Federal Specification W-S-896.

D. Back and Side Wired: Provide devices as follows:

<u>Type</u>	<u>Pass & Seymour</u>	<u>Cooper</u>	<u>Leviton</u>
Single Pole	PS20AC1	AH1221	1221-2
3-Way	PS20AC3	AH1223	1223-2
4-Way	PS20AC3	AH1224	1224-2

2.2 MANUAL CONTROLLER (FOR MOTORS)

E. Type: Quiet type, back and side wired as specified herein.

F. Rating: 30 amperes, 600 volts, for single phase motors less than 1 HP.

G. Listing: UL 508.

H. Back and Side Wired: Provide devices as follows:

<u>Type</u>	<u>Pass & Seymour</u>	<u>Cooper</u>	<u>Leviton</u>
Two Pole	7802MD	AH6801	MS302-DS

2.3 FAN SPEED CONTROLLER

I. Type: Rotary style, solid state speed controller as specified herein.

J. Rating: 5 amperes, 120 volts.

K. Listing: UL 1472

L. Provide devices as follows:

<u>Type</u>	<u>Pass & Seymour</u>	<u>Cooper</u>	<u>Dayton</u>
Rotary Style	94601	RFS5	48C172

2.4 DIMMING WALL SWITCHES

M. Type: 0-10 volt slide dimmer with integrated on/off switch for use with LED fixtures.

N. Rating: 1200W, 120 VAC; 1350W, 277 VAC

O. Listing: UL 1472

<u>Type</u>	<u>Pass & Seymour</u>	<u>Cooper</u>	<u>Leviton</u>
0-10V	WS4FBL3PW	WBSD-010SLD	IP710-LFZ
0-10V 3-Way	WS4FBL3PW	WBSD-010SLD	IP710-LFZ

2.5 RECEPTACLES (STANDARD)

P. Type: Back and side wired receptacles, as specified herein.

Q. Rating: Scheduled on Drawings.

- R. Listing: UL 498 and Federal Specification W-C-596.
- S. Provide devices as specified herein.

<u>Type</u>	<u>Pass & Seymour</u>	<u>Arrow Hart</u>	<u>Leviton</u>
Duplex	CR20	AH5352	C5362
GFCI	2095	VGf20	GFTR2
Weather Resistant	2095TRWR	WRVGf20	GFWR2
AFCI	AF20TR	TRAFCI20	AFTR2

2.6 DEVICE COLOR

- T. Supply regular service items in color selected by architect, emergency service items shall be red.

2.7 DEVICE PLATES

- U. Other Wall Finishes: Nylon in color as selected by Architect. Device plate color shall match the device color.
- V. Exterior Locations:
 1. Use weatherproof device plates with extra duty rated while-in-use covers. Covers shall be Pass & Seymour #MIUCAST 1 or 2; Arrow Hart #WIUMV-1

PART 3 - EXECUTION

3.1 DEVICE COORDINATION

- A. The approximate location of switches and receptacles are indicated on the Drawings. These Drawings, however, may not give complete and accurate information in regard to locations of such items. Determine exact locations by reference to the architectural Drawings and by actual measurements during construction of the building before rough-in. Final device locations are subject to the approval of the Architect.
- B. Where items of equipment are provided under other sections of this specification or by the owner, provide a compatible receptacle for the plug and cord of the equipment. Locate device within cord reach of equipment.

3.2 WALL SWITCHES

- C. Location. Set wall switches in a suitable steel outlet box centered at the height of 48 inches from the floor, except as otherwise shown. Install switch on the strike side of the door as finally hung.
- D. Position. Install wall switches in a uniform position so the same direction of operation will open and close the circuits throughout the job. Switches shall be installed such that up or to the left is the ON position.

3.3 RECEPTACLES

- E. Mount receptacles vertically in a suitable steel outlet box centered at the height of 18 inches from the floor or as shown on the drawings. The Engineer reserves the right to make any reasonable changes in receptacle locations without change in the contract sum.
- F. Receptacles shall be wired such that removal of the receptacle shall not disrupt the continuity of the neutral and equipment ground connections to downstream devices.

- G. Wall receptacles shall be installed with the ground pinhole in the down position, unless instructed otherwise by the Architect.
- H. Where quadraplex receptacles are called for on the drawings, provide two (2) duplex receptacles wired in parallel and installed in a 4" square outlet box. All requirements for the installation of duplex receptacles shall apply.

3.4 DEVICE PLATES

- I. Provide device plates for each outlet box of the type required for service and device involved.
- J. Mount ganged devices under a single, one piece, device plate.

END OF SECTION 27 26 27

SECTION 26 28 13

FUSES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Conditions and Division 01 Specification Sections, apply to this Section.
- B. Specifications throughout all Divisions of the Project Manual are directly applicable to this Section, and this Section is directly applicable to them.

1.2 SUMMARY

- A. This section specifies the requirements for 600V fuses rated 0-600 amps and rated 601-6000 amps.

1.3 REFERENCE STANDARDS

- A. The latest published edition of a reference shall be applicable to this Project unless identified by a specific edition date.
- B. All reference amendments adopted prior to the effective date of this Contract shall be applicable to this Project.
- C. All materials, installation and workmanship shall comply with the applicable requirements and standards addressed within the following references:
 - 1. NEMA FU-1
 - 2. ANSI/UL 198E - Class R Fuses.
 - 3. ANSI/UL 198C - High Interrupting-Capacity Fuses, Current Limiting Types, Class L.

PART 2 - PRODUCTS

2.1 GENERAL

- A. All materials shall meet or exceed all applicable referenced standards, federal, state and local requirements, and conform to codes and ordinances of authorities having jurisdiction.

2.2 MATERIALS

- A. Class RK1
 - 1. Provide low peak dual element time delay fuses rated for 600 amps or less at 250 or 600 volts.
 - 2. Fuses shall be Bussmann LP(N or S)-RK; Gould Shawmut A2D or A6D; Littlefuse LL(n or S) RK
- B. Class RK5
 - 1. Provide dual element time delay fuses rated for 600 amps or less at 250 or 600 volts.

2. Fuses shall be Bussmann FR(N or S)-R; Gould Shawmut TR or TRS; Littlefuse FL(N or S)R_ID
- C. Class L
1. Provide low peak time delay fuses rated 601 to 6000 amperes at 600 volts.
 2. Fuses shall be Bussmann KRP-C; Gould Shawmut A4BQ; Littlefuse KLPC.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install fuse such that the rating is easily viewable without removal of the fuse.
- B. Select fuse rating in accordance with the manufacturer's recommendations.

3.2 APPLICATION

- A. Provide class L fuses for all applications over 600 amperes.
- B. Provide class RK1 fuses for feeders to panels and other electrical equipment.
- C. Provide class RK5 fuses for all motors, compressor loads and all other loads not listed above.

END OF SECTION 26 28 13

SECTION 26 28 16
SAFETY SWITCHES AND ENCLOSED CIRCUIT BREAKERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Conditions and Division 01 Specification Sections, apply to this Section.
- B. Specifications throughout all Divisions of the Project Manual are directly applicable to this Section, and this Section is directly applicable to them.

1.2 SUMMARY

- A. This section specifies the requirements for fusible disconnect switches, molded-case circuit breakers and enclosures.

1.3 REFERENCE STANDARDS

- A. The latest published edition of a reference shall be applicable to this Project unless identified by a specific edition date.
- B. All reference amendments adopted prior to the effective date of this Contract shall be applicable to this Project.
- C. All materials, installation and workmanship shall comply with the applicable requirements and standards addressed within the following references:
 - 1. Federal Spec. W-S-865 - Switch, Box (Enclosed), Surface Mounted.
 - 2. UL 98
 - 3. NEMA KS 1 - Enclosed Switches.

PART 2 - PRODUCTS

2.1 GENERAL

- A. All materials shall meet or exceed all applicable referenced standards, federal, state and local requirements, and conform to codes and ordinances of authorities having jurisdiction.

2.2 FUSIBLE SWITCHES

- A. Provide general duty, type GD, single throw, 240 VAC switch with fuse interiors to accommodate fuses as required for the load. Switch shall be provided with a lockable handle that interlocks with the cover in the closed position.
 - 1. General Duty Switches shall be Square D D series; Siemens GF series; Cutler Hammer DG or GE TG series.

B. Accessories:

1. Equipment Ground Kit: Internally mounted and labeled for copper and aluminum ground conductors.
2. Neutral Kit: Internally mounted; insulated, capable of being grounded and bonded; labeled for copper and aluminum neutral conductors.
3. Class R Fuse Kit: Provides rejection of other fuse types when Class R fuses are specified.
4. Service-Rated Switches: Labeled for use as service equipment.

2.3 MOLDED-CASE CIRCUIT BREAKERS

- A. Thermal-Magnetic Circuit Breakers: Provide inverse time-current element for low-level overloads and instantaneous magnetic trip element for short circuits. Provide adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger.
- B. Electronic Trip Circuit Breakers: Field-replaceable rating plug, rms sensing, with the following field-adjustable settings:
1. Instantaneous trip.
 2. Long- and short-time pickup levels.
 3. Long- and short-time time adjustments.
 4. Ground-fault pickup level, time delay, and I^2t response.
- C. Features and Accessories:
1. Application Listing: Appropriate for application; Type SWD for switching fluorescent lighting loads; Type HID for feeding fluorescent and high-intensity discharge lighting circuits; Type HVAC for motor compressor loads.
 2. Shunt Trip: Trip coil energized from separate circuit, with coil-clearing contact.
- D. Enclosed breakers shall be as manufactured by Square D, Siemens Cutler Hammer, or GE.

2.4 ENCLOSURES

- A. Enclosed Switches and Circuit Breakers: NEMA AB 1, NEMA KS 1, NEMA 250, and UL 50, to comply with environmental conditions at installed location.
1. Indoor, Dry and Clean Locations: NEMA 1.
 2. Outdoor Locations: NEMA 3R.
 3. Kitchen, Washdown and other Wet Locations: NEMA 3R.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install individual wall-mounted switches and circuit breakers with tops at uniform height unless otherwise indicated.
- B. Install fuses in fusible devices.
- C. Comply with NECA 1.
- D. Install switches such that the center of the handle in the highest position will not be more than 6-1/2 feet above the floor.
- E. Install enclosed breakers such that the center of the circuit breaker in the highest position will not be more than 6-1/2 feet above the floor.

END OF SECTION 26 28 16

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SECTION 26 32 13
ENGINE GENERATORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Conditions and Division 01 Specification Sections, apply to this Section.
- B. Specifications throughout all Divisions of the Project Manual are directly applicable to this Section, and this Section is directly applicable to them.

1.2 SUMMARY

- A. This Section includes packaged engine-generator sets for emergency and standby power supply with the following features:
 - 1. Gas Engine
 - 2. Unit-mounted cooling system
 - 3. Unit-mounted control and monitoring system

1.3 REFERENCE STANDARDS

- A. The latest published edition of a reference shall be applicable to this Project unless identified by a specific edition date.
- B. All reference amendments adopted prior to the effective date of this Contract shall be applicable to this Project.
- C. The generator set installation and on-site testing shall conform to the requirements of the following codes and standards, as applicable. The generator set shall include necessary features to meet the requirements of these standards:
 - 1. IEEE446 – Recommended Practice for Emergency and Standby Power Systems for Commercial and Industrial Applications
 - 2. NFPA37
 - 3. NFPA70 – National Electrical Code. Equipment shall be suitable for use in systems in compliance to Article 700, 701, and 702.
- D. The generator set and supplied accessories shall meet the requirements of the following standards:
 - 1. NEMA MG1-1998 part 32. Alternator shall comply with the requirements of this standard.
 - 2. UL1236 – Battery Chargers

- E. The control system for the generator set shall comply with the following requirements.
1. FCC Part 15, Subpart B.
 2. IEC8528 part 4. Control Systems for Generator Sets
 3. IEC Std 801.2, 801.3, and 801.5 for susceptibility, conducted, and radiated electromagnetic emissions.
 4. UL508. The entire control system of the generator set shall be UL508 listed and labeled.

PART 2 - PRODUCTS

2.1 GENERATOR SET

A. Ratings:

1. The generator set shall operate at 1800 rpm and at a voltage of: 120/240 Volts AC, single phase, 3-wire, 60 hertz.
2. The generator set shall be rated a minimum 80 kW, 100 kVA at 0.8 PF, stand-by rating, based on site conditions of: Altitude 500 ft., ambient temperatures up to 100 degrees F without derating.
3. The generator set engine gross horsepower shall be 128 HP minimum.
4. The generator set shall be rated for 105-degree C temperature rise.

B. Performance

1. Voltage regulation shall be plus or minus 1.0% for any constant load between no load and rated load for both parallel and non-parallel applications. Random voltage variation with any steady load from no load to full load shall not exceed plus or minus 1.0%.
2. Frequency regulation shall be isochronous from steady state no load to steady state rated load. Random frequency variation with any steady load from no load to full load shall not exceed plus or minus 0.5%.
3. The alternator shall produce a clean AC voltage waveform, with not more than 5% total harmonic distortion at full linear load, when measured from line to neutral, and with not more than 3% in any single harmonic.

C. Construction

1. The engine-generator set shall be mounted on a heavy-duty steel base to maintain alignment between components. The base shall incorporate a battery tray with hold-down clamps within the rails
2. All switches, lamps, and meters in the control system shall be oil-tight and dust-tight, and the enclosure door shall be gasketed. There shall be no exposed points in the control (with the door open) that operate in excess of 50 volts.

D. Connections

1. The generator set load connections shall be composed of silver or tin plated copper bus bars, drilled to accept mechanical or compression terminations of the number and type as shown on the drawings. Sufficient lug space shall be provided for use with cables of the number and size as shown on the drawings.
2. Power connections to auxiliary devices shall be made at the devices, with required protection located at a wall-mounted common distribution panel.
3. Generator set control interfaces to other system components shall be made on a common, permanently labeled terminal block assembly.

E. Manufacturers

1. The generator set shall be as manufactured by Generac, Cummins, Kohler, Caterpillar or approved equal.

2.2 ENGINE AND ENGINE EQUIPMENT

- A. The engine shall be natural gas fueled, radiator and fan cooled.
- B. The engine shall be 2009 EPA SI NSPS EPA Certified.
- C. Complete engine fuel system, including all pressure regulators, strainers, and control valves. The fuel system shall be plumbed to the generator set skid for ease of site connections to the generator set. For dual fuel systems, changeover from primary to secondary fuel shall be automatic.
- D. An electronic governor system shall provide automatic isochronous frequency regulation. The governing system dynamic capabilities shall be controlled as a function of engine coolant temperature to provide fast, stable operation at varying engine operating temperature conditions. The control system shall actively control the fuel rate and excitation as appropriate to the state of the generator set. Fuel rate shall be regulated as a function of starting, accelerating to start disconnect speed, accelerating to rated speed, and operating in various isochronous or parallel states.
- E. Electric starter(s) capable of three complete cranking cycles without overheating.
- F. Full flow lubrication oil filters with replaceable spin-on canister elements and dipstick oil level indicator.
- G. Replaceable dry element air cleaner with restriction indicator.
- H. Engine mounted battery charging alternator, 95-ampere minimum, and solid-state voltage regulator.
- I. Coolant heater
 1. Engine mounted, thermostatically controlled, coolant heater(s) for each engine. Heater voltage shall be as shown on the project drawings. The coolant heater shall be UL499 listed and labeled.
 2. The coolant heater(s) shall be sized as recommended by the engine manufacturer to warm the engine to a minimum of 100F (40C) in a 40F ambient, in compliance with NFPA110 requirements, or the temperature required for starting and load pickup requirements of this specification.

- J. Provide vibration isolators, spring/pad type or as recommended by the manufacturer, quantity as recommended by the generator set manufacturer. Isolators shall include seismic restraints if required by site location.
- K. Provide exhaust silencer(s) for each engine of size and type as recommended by the generator set manufacturer and approved by the engine manufacturer. The mufflers shall be critical grade. Exhaust system shall be installed according to the engine manufacturer's recommendations and applicable codes and standards.
- L. Provide a minimum 10 amp battery charger for each generator set battery bank. Generator sets incorporating two battery banks shall be provided with two chargers connected together and operating in parallel, with alarm output(s) connected in parallel. The charger(s) shall include the following capabilities.
 - 1. Chargers shall be UL 1236-BBHH listed and CSA or CUL certified for use in emergency applications.
 - 2. The charger shall be compliant with UL991 requirements for vibration resistance.
 - 3. The charger shall be capable of charging a fully discharged battery without damage to the charger. It shall be capable of returning a fully discharged battery to fully charged condition within 24 hours. The charger shall be UL-labeled with the maximum battery amp-hour rating that can be recharged within 24 hours.
 - 4. The charger shall include an LED indicating lamp(s) to indicating normal charging condition (green), equalize charge state (amber), and fault condition (red); AC input overcurrent, over voltage, and undervoltage protection; DC output overcurrent protection; and an alarm output relay

2.3 AC GENERATOR

- A. The AC generator shall be; synchronous, four pole, 2/3 pitch, revolving field, drip-proof construction, single prelubricated sealed bearing, air cooled by a direct drive centrifugal blower fan, and directly connected to the engine with flexible drive disc. All insulation system components shall meet NEMA MG1 temperature limits for Class H insulation system. Actual temperature rise measured by resistance method of the alternator shall not exceed 105 degrees Centigrade.
- B. The generator shall be capable of delivering rated output (kVA) at rated frequency and power factor, at any voltage not more than 5 percent above or below rated voltage.
- C. A permanent magnet generator (PMG) shall be included to provide a reliable source of excitation power for optimum motor starting and short circuit performance. The PMG and controls shall be capable of sustaining and regulating current supplied to a single phase or three phase fault at approximately 300% of rated current for not more than 10 seconds.
- D. The subtransient reactance of the alternator shall not exceed 12 percent, based on the standby rating of the generator set.

2.4 GENERATOR SET CONTROL

- A. The control shall be mounted on the generator set, or may be mounted in a free-standing panel next to the generator set if adequate space and accessibility is available. The control shall be vibration isolated and prototype tested to verify the durability of all components in the system under the vibration conditions encountered.

B. The generator set mounted control shall include the following features and functions:

1. Control Switches

- a) Mode Select Switch. The mode select switch shall initiate the following control modes. When in the RUN or MANUAL position the generator set shall start, and accelerate to rated speed and voltage as directed by the operator. A separate push-button to initiate starting is acceptable. In the OFF position the generator set shall immediately stop, bypassing all time delays. In the AUTO position the generator set shall be ready to accept a signal from a remote device to start and accelerate to rated speed and voltage.
- b) EMERGENCY STOP switch. Switch shall be Red "mushroom-head" push-button. Depressing the emergency stop switch shall cause the generator set to immediately shut down, and be locked out from automatic restarting.
- c) RESET switch. The RESET switch shall be used to clear a fault and allow restarting the generator set after it has shut down for any fault condition.
- d) PANEL LAMP switch. Depressing the panel lamp switch shall cause the entire panel to be lighted with DC control power. The panel lamps shall automatically be switched off 10 minutes after the switch is depressed, or after the switch is depressed a second time.

2. Generator Set AC Output Metering. The generator set shall be provided with a metering set including the following features and functions:

- a) Digital metering set, 1% accuracy, to indicate generator RMS voltage and current, frequency, output current, output KW, KW-hours, and power factor. Generator output voltage shall be available in line-to-line and line-to-neutral voltages, and shall display all three-phase voltages (line to neutral or line to line) simultaneously.
- b) Analog voltmeter, ammeter, frequency meter, power factor meter, and kilowatt (KW) meter. Voltmeter and ammeter shall display all three phases. Meter scales shall be color coded in the following fashion: green shall indicate normal operating condition, amber shall indicate operation in ranges that indicate potential failure, and red shall indicate failure impending. Metering accuracy shall be within 1% at rated output. Both analog and digital metering are required.
- c) The control system shall monitor the total load on the generator set, and maintain data logs of total operating hours at specific load levels ranging from 0 to 110% of rated load, in 10% increments. The control shall display hours of operation at less than 30% load and total hours of operation at more than 90% of rated load.
- d) The control system shall log total number of operating hours, total KWH, and total control on hours, as well as total values since reset.

3. Generator Set Alarm and Status Display.

- a) The control shall include green lamps to indicate that the generator set is running at rated frequency and voltage, and that a remote start signal has been received at the generator set. The running signal shall be based on actual sensed voltage and frequency on the output terminals of the generator set.

- b) The control shall include a flashing red lamp to indicate that the control is not in automatic state, and red common shutdown lamp.
- c) The control shall include an amber common warning indication lamp.
- d) The generator set control shall indicate the existence of the warning and shutdown conditions on the control panel. All conditions indicated below for warning shall be field-configurable for shutdown. Conditions required to be annunciated shall include:
 - low oil pressure (warning)
 - low oil pressure (shutdown)
 - oil pressure sender failure (warning)
 - low coolant temperature (warning)
 - high coolant temperature (warning)
 - high coolant temperature (shutdown)
 - high oil temperature (warning)
 - engine temperature sender failure (warning)
 - low coolant level (warning)
 - fail to crank (shutdown)
 - fail to start/overcrank (shutdown)
 - overspeed (shutdown)
 - low DC voltage (warning)
 - high DC voltage (warning)
 - weak battery (warning)
 - low fuel-daytank (warning)
 - high AC voltage (shutdown)
 - low AC voltage (shutdown)
 - under frequency (shutdown)
 - over current (warning)
 - over current (shutdown)
 - short circuit (shutdown)
 - over load (warning)
 - emergency stop (shutdown)
 - (4) configurable conditions

4. Engine Status Monitoring.

- a) The following information shall be available from a digital status panel on the generator set control:
 - engine oil pressure (psi or kPA)
 - engine coolant temperature (degrees F or C)
 - engine oil temperature (degrees F or C)
 - engine speed (rpm)
 - number of hours of operation (hours)
 - number of start attempts
 - battery voltage (DC volts)

5. Engine Control Functions

- a) The control system provided shall include a cycle cranking system, which allows for user selected crank time, rest time, and # of cycles. Initial settings shall be for 3 cranking periods of 15 seconds each, with 15-second rest period between cranking periods.
- b) The control system shall include an idle mode control, which allows the engine to run in idle mode in the RUN position only. In this mode, the alternator excitation system shall be disabled.
- c) The control system shall include an engine governor control, which functions to provide steady state frequency regulation as noted elsewhere in this specification. The governor control shall include adjustments for gain, damping, and a ramping function to control engine speed and limit exhaust smoke while the unit is starting.
- d) The control system shall include time delay start (adjustable 0-300 seconds) and time delay stop (adjustable 0-600 seconds) functions.

2.5 ENCLOSURE

- A. The generator set shall be provided with a sound-attenuated housing which allows the generator set to operate at full rated load in an ambient temperature of up to 104F. The enclosure shall reduce the sound level of the generator set while operating at full rated load to a maximum of 75 dBA at any location 7 meters from the generator set in a free field environment.

2.6 AUTOMATIC TRANSFER SWITCH:

- A. Provide complete factory assembled power transfer equipment with field programmable digital electronic controls designed for fully automatic operation and including: surge voltage isolation, voltage sensors on all phases of the normal source and single phase of the generator source, linear operator, permanently attached manual handles, positive mechanical and electrical interlocking, and mechanically held contacts for both sources. Equipment rated 1000 amps and less shall include quick-break, quick-make contact mechanisms for manual transfer under load
- B. The generator set manufacturer shall warrant transfer switches to provide a single source of responsibility for all the products provided, and it shall have the same warranty coverage as the generator set. Technicians specifically trained to support the product and employed by the generator set supplier shall service the transfer switches
- C. The transfer switch and accessories shall be UL listed and labeled, tested per UL Standard 1008, and CSA Approved.
- D. Ratings: Provide a 400 amp automatic transfer switch, 240 volts, 1 phase, 2 pole, 3 wire. Main contacts shall be rated for 600 Volts AC minimum.
- E. Transfer switches shall be rated to carry 100 percent of rated current continuously in the NEMA 3R enclosure. Circuit breaker type transfer switches do not meet this specification

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Equipment shall be installed by the contractor in accordance with final submittals and contract documents. Installation shall comply with applicable state and local codes as required by the authority having jurisdiction. Install equipment in accordance with manufacturer's instructions and instructions included in the listing or labeling of UL listed products.
- B. Installation of equipment shall include furnishing and installing all interconnecting wiring between all major equipment provided for the on-site power system. The contractor shall also perform interconnecting wiring between equipment sections (when required), under the supervision of the equipment supplier.
- C. Equipment shall be installed on concrete housekeeping pads. Equipment shall be permanently fastened to the pad in accordance with manufacturer's instructions and seismic requirements of the site.
- D. Equipment shall be initially started and operated by representatives of the manufacturer.
- E. All equipment shall be physically inspected for damage. Scratches and other installation damage shall be repaired prior to final system testing. Equipment shall be thoroughly cleaned to remove all dirt and construction debris prior to final testing of the system.

3.2 ON SITE ACCEPTANCE TEST

- A. The complete installation shall be tested for compliance with the specification following completion of all site work. Testing shall be conducted by representatives of the manufacturer, with required fuel supplied by Contractor. The Engineer shall be notified in advance and shall have the option to witness the tests.
- B. Installation acceptance tests to be conducted on-site shall include a "cold start" test, a two hour full load test utilizing a resistive load bank, and a one step rated load pickup test in accordance with NFPA 110. Provide a resistive load bank and make temporary connections for full load test.
- C. Perform a power failure test on the entire installed system. This test shall be conducted by opening the power supply from the utility service, and observing proper operation of the system for at least 2 hours. Coordinate timing and obtain approval for start of test with site personnel.
- D. Per the EPA SI NSPS regulations for Compliant Capable products a site validation emission test must be performed per the EPA's requirements.

3.3 TRAINING

- A. The equipment supplier shall provide training for the facility operating personnel covering operation and maintenance of the equipment provided. The training program shall be not less than 4 hours in duration and the class size shall be limited to 5 persons. Training date shall be coordinated with the facility owner.

3.4 WARRANTY

- A. The generator set and associated equipment shall be warranted for a period of 2 years from the date of commissioning against defects in materials and workmanship.

- B. The warranty shall be comprehensive. No deductibles shall be allowed for travel time, service hours, repair parts cost, etc.

END OF SECTION 26 32 13

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SECTION 26 43 13
SURGE PROTECTION DEVICES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes field-mounted (installed external to electrical equipment) SPDs for low-voltage (120 to 600 V) power distribution and control equipment.
- B. The SPD for Service Entrance Section application shall provide TOV protection in addition to surge protection.
- C. The requirements of this specification section supersede those in other specification sections.

1.3 DEFINITIONS

- A. Inominal: Nominal discharge current.
- B. MCOV: Maximum continuous operating voltage.
- C. Mode(s), also Modes of Protection: The pair of electrical connections where the VPR applies.
- D. MOV: Metal-oxide varistor; an electronic component with a significant non-ohmic current-voltage characteristic.
- E. OCPD: Overcurrent protective device.
- F. SCCR: Short-circuit current rating.
- G. SPD: Surge protective device.
- H. TOV: Temporary overvoltage.
- I. VPR: Voltage protection rating.

1.4 ACTION SUBMITTALS

- A. Products will only be considered for approval if the request is accompanied with the appropriate SPD Documentation of Performance as tested by a third party testing agency. All products shall be tested

at their listed ratings. Ratings derived from the summation of module ratings or mathematical extrapolations will not be accepted.

B. Product Data: For each type of product.

1. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.
2. Copy of UL Category Code VZCA certification, as a minimum, listing the tested values for VPRs, Inominal ratings, MCOVs, type designations, OCPD requirements, model numbers, system voltages, and modes of protection.

C. Documentation of Performance

1. Provide a copy of peak surge current test report, certifying that the SPD has been tested to, and survives, the peak surge current rating as specified.
2. Provide a copy of repetitive impulse test report, certifying that the SPD has been tested to, and survives, the number of repetitive impulses as specified.
3. Provide a copy of TOV performance testing.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For SPDs to include in maintenance manuals.

B. Copy of installed test report.

1.6 WARRANTY

A. Manufacturer's Warranty: Manufacturer agrees to repair or replace SPDs that fail in materials or workmanship within specified warranty period.

1. Warranty period for Service Entrance SPD
 - a. Twenty (20) years from date of Substantial Completion.

PART 2- PRODUCTS

2.1 GENERAL SPD REQUIREMENTS

- A. SPD and Accessories. Listed and labeled as defined by NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Comply with NFPA 70.
- C. Comply with UL 1449.

D. MCOV of the SPD shall be the nominal system voltage.

2.2 SERVICE ENTRANCE SUPPRESSOR

A. Manufacturer: Subject to compliance with requirements, provide product by one of the following:

1. Current Technology SL3 Series (Basis of Design).

B. SPDs: Comply with UL 1449 4th Edition, Type 1.

1. SPDs with the following features and accessories.

- a. Mounted external to electrical equipment.
- b. Integral disconnect switch.
- c. Internal thermal protection that disconnects the SPD before damaging internal suppressor components.
- d. SPD monitoring shall include:

- 1.) Indicator lights which display protection status.
- 2.) Audible alarm with silence switch.
- 3.) Form C contacts rated at 5 A and 250 V, one normally open and one normally closed for remote monitoring of protection status.
- 4.) Component tracking and visual indication of percent protection remaining.
- 5.) Surge counter which measures, discriminates between and indicates the level of surges.

- a.) Low level surge: 100 A to 500 A
- b.) Medium level surge: 500 A to 3000A.
- c.) High level surge: > 3000 A.

6.) Time/date stamp, duration and magnitude of the following events:

- a.) Sag
- b.) Swell
- c.) Voltage drop-outs
- d.) Power outages
- e.) THD
- f.) Frequency excursions
- g.) Volts (RMS, per phase)

e. Information from monitoring shall be available through the facility network.

- 1.) Via ModBus.
- 2.) Via Ethernet.

C. Comply with UL 1283.

D. Performance Ratings

1. Peak Surge Current Rating

- a. The peak surge current withstand rating per mode shall be as indicated in the table below, for the respective Service Entrance current rating.
- b. The peak surge current rating shall be the surge current at which the SPD was tested and which the SPD survived—with less than a 10% degradation in VPR. Testing documentation shall be provided. (Due to present industry testing limitations, surge currents ratings greater than 200 kA will be tested at 200 kA.)
- c. Peak surge current ratings which are the arithmetic sum of the ratings of individual MOVs in a given mode are not acceptable.

2. Repetitive Impulse Rating

- a. The minimum repetitive impulse capacity (10 kA and 20 kV) of the SPD per mode shall not be less than as indicated in the table below, for the respective Service Entrance current rating.
- b. The minimum repetitive impulse capacity shall be the number of impulses at which the SPD was tested and which the SPD survived—with less than a 10% degradation in VPR. Testing documentation shall be provided.
- c. Minimum repetitive ratings which are derived by calculations are not acceptable.

Product Application and Performance Rating Chart						
Service Entrance Current Rating	Surge Current Rating per Mode		Surge Current Rating per Phase		Repetitive Impulse Rating per Mode	
	Single Service Entrance	Multiple Service Entrances*	Single Service Entrance	Multiple Service Entrances*	Single Service Entrance	Multiple Service Entrances*
2000 A and above	200 kA	150 kA	200 kA	200 kA	15,000	14,500
1600 A	150 kA	125 kA	200 kA	200 kA	14,500	14,000
1000 A - 1200 A	125 kA	125 kA	200 kA	200 kA	14,000	14,000
800 A	100 kA	80 kA	200 kA	160 kA	14,000	12,000
400 A - 600 A	80 kA	50 kA	160 kA	100 kA	10,000	10,000
200 A	50 kA	50 kA	100 kA	100 kA	10,000	10,000

*Multiple Service Entrances to be understood as one feed from a utility substation feeding multiple (i.e., more than one) utility transformers and/or utility meters for their respective Service Entrance sections.

3. Overvoltage Performance

- a. The SPD shall be able to prevent common temporary overvoltages and high impedance faults from damaging the MOVs, increasing their longevity and ability to protect the critical load.
- b. For limited and intermediate current TOVs (as specified in UL 1449 article 39.3 and 39.4) of 30 cycles, the voltage to the MOVs shall be reduced from 173% of nominal voltage, at the intermediate currents listed to the values below.

1.) 30 A: 140%

2.)	100 A:	150%
3.)	500 A:	160%
4.)	1000 A:	160%

- c. The SPD shall be able to withstand multiple TOVs without damage to the MOVs by shunting current away from the MOVs during the overvoltage. SPD must have the ability to withstand greater than 100 TOVs with a source current of 30A, duration of 30 cycles, with 10 seconds between TOV events. Testing documentation shall be provided.

- E. Protection modes and UL 1449 VPR for the applicable modes of grounded WYE/delta and high leg delta circuits shall not exceed the following.

1. For 208Y/120 V and 208 V delta systems:

a.	Line to Neutral:	700 V
b.	Line to Ground:	700 V
c.	Neutral to Ground:	700 V
d.	Line-to-Line	1200 V

- F. SCCR: Equal to or exceed 200 kA.

- G. Inominal rating: 20 kA.

2.3 SWITCHBOARD AND PANELBOARD SUPPRESSOR

- A. Manufacturer: Subject to compliance with requirements, provide product by one of the following:

1. Current Technology TG3 Series (Basis of Design).
2. Engineer Approved Equal.
 - a. Other manufacturers wishing to have specific products evaluated for equivalence shall provide, for each unit, ATTACHMENT 2 – SWITCHBOARD AND PANELBOARD SPD SPECIFIED PERFORMANCE COMPLIANCE FORM, fully executed with the required documentation. For any approval request to be considered complete, the required supporting documentation shall be provided for each model to be supplied. (Information shall be organized in tabular content according to the numerical identifier shown on the right side of each Performance Specification section.) The request for approval shall be signed by an authorized company representative and submitted no less than 10 days prior to the bid date.
 - b. Failure to provide the required documentation, for each model to be supplied, no less than 10 days prior to the bid date will disqualify products from consideration for this project.

- B. SPDs: Comply with UL 1449 4th Edition, Type 1.

1. SPDs with the following features and accessories.

- a. Mounted external to electrical equipment.
- b. Integral disconnect switch, where indicated on the drawings.
- c. Internal thermal protection that disconnects the SPD before damaging internal suppressor components.
- d. SPD monitoring shall include:
 - 1.) Indicator lights which display protection status.
 - 2.) Audible alarm with silence switch.
 - 3.) Form C contacts rated at 5 A and 250 V, one normally open and one normally closed for remote monitoring of protection status.
 - 4.) Component tracking and visual indication of percent protection remaining.
 - 5.) Surge counter which measures, discriminates between and indicates the level of surges.
 - a.) Low level surge: 100 A to 500 A
 - b.) Medium level surge: 500 A to 3000A.
 - c.) High level surge: > 3000 A.
 - 6.) Time/date stamp, duration and magnitude of the following events:
 - a.) Sag
 - b.) Swell
 - c.) Voltage drop-outs
 - d.) Power outages
 - e.) THD
 - f.) Frequency excursions
 - g.) Volts (RMS, per phase)
- e. Information from monitoring shall be available through the facility network.
 - 1.) Via ModBus.
 - 2.) Via Ethernet.
- f. Integral Test Point with test data from factory provided for comparison. Information is provided in the form of suppressed voltage rating given by portable test set and written on a Diagnostic Signature Card which will be provided with the device. See section 3.2.

C. Comply with UL 1283.

D. Performance Ratings

1. Peak Surge Current Rating

- a. The peak surge current withstand rating per mode shall be as indicated in the table below, for the respective Service Entrance current rating.
- b. The peak surge current rating shall be the surge current at which the SPD was tested and which the SPD survived—with less than a 10% degradation in VPR. Testing

documentation shall be provided. (Due to present industry testing limitations, surge currents ratings greater than 200 kA will be tested at 200 kA.)

- c. Peak surge current ratings which are the arithmetic sum of the ratings of individual MOVs in a given mode are not acceptable.

2. Repetitive Impulse Rating

- a. The minimum repetitive impulse capacity (10 kA and 20 kV) of the SPD per mode shall not be less than as indicated in the table below, for the respective Service Entrance current rating.
- b. The minimum repetitive impulse capacity shall be the number of impulses at which the SPD was tested and which the SPD survived—with less than a 10% degradation in VPR. Testing documentation shall be provided.
- c. Minimum repetitive ratings which are derived by calculations are not acceptable.

Product Application and Performance Rating Chart						
Service Entrance Current Rating	Surge Current Rating per Mode		Surge Current Rating per Phase		Repetitive Impulse Rating per Mode	
	With No Upstream SPD	With Upstream SPD	With No Upstream SPD	With Upstream SPD	With No Upstream SPD	With Upstream SPD
2000 A and above	200 kA	100 kA	200 kA	200 kA	9,000	7,000
1600 A	150 kA	80 kA	200 kA	160 kA	8,000	6,000
1000 A - 1200 A	125 kA	80 kA	200 kA	160 kA	7,500	6,000
800 A	100 kA	50 kA	200 kA	100 kA	7,000	5,000
400 A - 600 A	50 kA	50 kA	160 kA	100 kA	5,000	5,000
200 A	50 kA	50 kA	100 kA	100 kA	5,000	5,000

- E. Protection modes and UL 1449 VPR for the applicable modes of grounded WYE/delta and high leg delta circuits shall not exceed the following.

1. For 208Y/120 V and 208 V delta systems:

- a. Line to Neutral: 700 V
- b. Line to Ground: 700 V
- c. Neutral to Ground: 700 V
- d. Line-to-Line 1200 V

- F. SCCR: Equal to or exceed 200 kA.

- G. Nominal rating: 20 kA.

PART 3— EXECUTION

3.1 INSTALLATION

- A. Comply with NECA 1.
- B. Install SPD external to electrical equipment.
- C. Install an OCPD or disconnect if required to comply with the UL listing of the SPD.
- D. Install SPDs with conductors between suppressor and points of attachment as short and straight as possible, and adjust circuit-breaker positions to achieve shortest and straightest leads. Do not splice and extend SPD leads unless specifically permitted by manufacturer. Do not exceed manufacturer's recommended lead length. Do not bond neutral and ground.
- E. Use crimped connectors and splices only. Wire nuts are not acceptable.
- F. Utilize the following conductors for connection of the device to the source, for all phase conductors, neutral (if applicable) and ground conductors.
 - 1. Service Entrance Suppressor
 - a. For Service Entrances 1200 A and above, utilize #2 AWG conductors.
 - b. For Service Entrances 400 A - 1000 A, utilize #6 AWG conductors.
 - c. For Service Entrances 200 A, utilize #10 AWG conductors.
 - 2. Switchboard and Panelboard Suppressor
 - a. For Service Entrances 1200 A and above, utilize #2 AWG conductors.
 - b. For Service Entrances 400 A - 1000 A, utilize #6 AWG conductors.
 - c. For Service Entrances 200 A, utilize #10 AWG conductors.

3.2 FIELD QUALITY CONTROL

- A. Perform the following tests and inspections with the assistance of a factory-authorized service representative.
 - 1. Compare equipment nameplate data for compliance with Drawings and Specifications.
 - 2. Inspect anchorage, alignment, grounding and clearances.
 - 3. Verify that electrical wiring installation complies with manufacturer's written installation requirements.
 - 4. Testing: Perform the following field tests and inspections and prepare test reports:
 - a. After installation of surge protection devices, but before electrical circuitry has been energized, test for compliance with requirements.
 - b. Utilize a portable test set and test devices to confirm:
 - 1.) The suppressed voltage rating of the installed unit is within 10% of the suppressed voltage rating of the device when tested prior to shipment from the factory.
 - 2.) The SPD is properly installed.

3.) The presence of an X_0 bond at the most proximal upstream separately derived source.

- B. An SPD will be considered defective if it does not pass tests and inspections.
- C. Repeat tests and inspection after replacement or repair of defective units.
- D. Prepare test-result and inspection reports and submit them to the project engineer.

3.3 STARTUP SERVICE

- A. Complete startup checks according to manufacturer's written instructions.
- B. Do not perform insulation-resistance tests of the distribution wiring equipment with SPDs installed. Disconnect SPDs before conducting insulation-resistance tests, and reconnect them immediately after the testing is completed.
- C. Energize SPDs after power system has been energized, stabilized, and tested.

3.4 DEMONSTRATION

- A. Engage a factory authorized service representative to train Owner's maintenance personnel to operate and maintain SPDs.

END OF SECTION 26 43 14

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**SECTION 26 51 00
LIGHTING**

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Conditions and Division 01 Specification Sections, apply to this Section.
- B. Specifications throughout all Divisions of the Project Manual are directly applicable to this Section, and this Section is directly applicable to them.

1.2 SUMMARY

- A. This section specifies the requirements for indoor and outdoor lighting fixtures and LED drivers.

1.3 REFERENCE STANDARDS

- A. The latest published edition of a reference shall be applicable to this Project unless identified by a specific edition date.
- B. All reference amendments adopted prior to the effective date of this Contract shall be applicable to this Project.
- C. All materials, installation and workmanship shall comply with the applicable requirements and standards addressed within the following references:
 - 1. NFPA 101 - Code for Safety to Life from Fire in Buildings and Structures.
 - 2. NFPA 70, National Electrical Code
 - 3. IESNA LM-79, Electrical and Photometric Measurements of Solid-State Lighting Products
 - 4. IESNA LM-80, Approved Method for Measuring Lumen Maintenance of LED Light Sources
 - 5. IESNA TM-21, Luminaire Classification System for Indoor Luminaires
 - 6. UL1598, Standard for Safety of Luminaires.

1.4 DELIVERY, STORAGE AND HANDLING

- A. Deliver lighting fixtures individually wrapped in factory-fabricated fiberboard type containers. Parabolic louvers shall be shipped in thermally sealed polyethylene wrapper.
- B. Handle lighting fixtures carefully to prevent breakage, denting and scoring the fixture finish. Do not install damaged lighting fixtures.
- C. Store products in a clean, dry space protected from weather.

1.5 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. FM Global Compliance: Lighting fixtures for hazardous locations shall be listed and labeled for indicated class and division of hazard by FM Global.
- C. Luminaires shall be provided with a minimum 5 year warranty covering, LEDs, drivers and paint finish.

PART 2 - PRODUCTS

2.1 GENERAL

- A. All materials shall meet or exceed all applicable referenced standards, federal, state and local requirements, and conform to codes and ordinances of authorities having jurisdiction.
- B. Lighting fixtures are specified by type and manufacturer in the lighting fixture schedule on the drawings. Model numbers are based on manufacturer information at time of design. Model numbers are subject to change by the manufacturers. Contractor shall verify the accuracy of the model number for style and application and adjust model numbers as required.
- C. Recessed Fixtures: Comply with NEMA LE 4 for ceiling compatibility for recessed fixtures.
- D. Metal Parts: Free of burrs and sharp corners and edges.
- E. Sheet Metal Components: Steel unless otherwise indicated. Form and support to prevent warping and sagging.
- F. Doors, Frames, and Other Internal Access: Smooth operating, free of light leakage under operating conditions, and designed to permit re-lamping without use of tools. Designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during re-lamping and when secured in operating position.
- G. Diffusers and Globes:
 - 1. Acrylic Lighting Diffusers: 100 percent virgin acrylic plastic. High resistance to yellowing and other changes due to aging, exposure to heat, and UV radiation.
 - a. Lens Thickness: Minimum of 0.125 inch.
 - b. UV stabilized.
 - 2. Glass: Annealed crystal glass unless otherwise indicated

2.2 DRIVERS FOR LED FIXTURES

- A. Electronic Driver for LED Fixtures: Comply with UL 1310 Class 2 requirements for dry and damp locations. Include the following features unless otherwise indicated:
 - 1. Rated for 50,000 hours of life, unless otherwise noted.

2. Sound Rating: Class A.
3. Total Harmonic Distortion Rating: 20 percent or less.
4. Current Crest Factor: 1.5 or less.
5. 0-10V Dimming Standard (Step Dimming does not qualify)

2.3 LED FIXTURES

- A. Except as otherwise indicated, provide LED luminaires, of types and sizes indicated on fixture schedules.
- B. Include the following features unless otherwise indicated:
 1. Each Luminaire shall consist of an assembly that utilizes LEDs as the light source. In addition, a complete luminaire shall consist of a housing, LED array, and electronic driver (power supply).
 2. Each luminaire shall be rated for a minimum operational life of 50,000 hours utilizing a maximum ambient temperature of (25°C).
 3. Light Emitting Diodes tested under LM-80 Standards for a minimum of 12,000 hours.
 4. Color Rendering Index (CRI) of 82 at a minimum.
 5. Color temperature 4000K, unless otherwise indicated.
 6. Rated lumen maintenance at 78% lumen output for 50,000 hours, unless otherwise indicated.
 7. 5 year luminaire warranty, minimum.
 8. Photometry must comply with IESNA LM-79.
 9. The individual LEDs shall be constructed such that a catastrophic loss of the failure of one LED will not result in the loss of the entire luminaire.
 10. Luminaire shall be constructed such that driver may be replaced or repaired without the replacement of the whole fixture.
- C. Technical Requirements
 1. The luminaire shall not consume power in the off state.
 2. Operation Voltage: The luminaire shall operate from a 50 HZ to 60 HZ AC line over a voltage ranging from 120 VAC to 277 VAC. The fluctuations of line voltage shall have no visible effect on the luminous output.
 3. Power Factor: The luminaire shall have a power factor of 0.9 or greater.
 4. THD: Total harmonic distortion (current and voltage) induced into an AC power line by a luminaire shall not exceed 20 percent.

5. Operational Performance: The LED circuitry shall prevent visible flicker to the unaided eye over the voltage range specified above.

D. Thermal Management

1. The thermal management (of the heat generated by the LEDs) shall be of sufficient capacity to assure proper operation of the luminaire over the expected useful life.
2. The LED manufacturer's maximum thermal pad temperature for the expected life shall not be exceeded.
3. Thermal management shall be passive by design. The use of fans or other mechanical devices shall not be allowed.

- E. The luminaire shall have a minimum heat sink surface such that LED manufacturer's maximum junction temperature is not exceeded at maximum rated ambient temperature

2.4 LIGHTING FIXTURE SUPPORT COMPONENTS

- A. Single-Stem Hangers: 1/2-inch steel tubing with swivel ball fittings and ceiling canopy. Finish same as fixture.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Lighting fixtures: Set level, plumb, and square with ceilings and walls. Install lamps in each fixture.
- B. Comply with NFPA 70 for minimum fixture supports.
- C. Recessed Lighting Fixture Support:
1. Recessed light fixtures shall have a minimum of two (2) independent supports points from the structure above. The two suspension point shall be on opposite corners of the fixture.
 2. Fixtures shall not be supported from suspended ceilings or their components.
 3. Fasten to lighting fixtures and to ceiling grid members at or near each fixture corner with clips that are UL listed for the application

END OF SECTION 26 51 00

SECTION 32 13 13
CONCRETE PAVING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Sidewalks and other horizontal concrete paving
 - 2. Base under Unit Pavers
- B. Related Sections:
 - 1. Section 031000 "Concrete Formwork"
 - 2. Section 033000 "Cast-in-Place Concrete" for general building applications of concrete.
 - 3. Section 321373 "Joint Sealants for Concrete Paving" for joint sealants in expansion and contraction joints within concrete paving and in joints between concrete paving and asphalt paving or adjacent construction.
 - 4. Section 321414 "Unit Paving"

1.3 DEFINITIONS

- A. Cementitious Materials: Portland cement. None of the following are allowed in any concrete for this project: blended hydraulic cement, fly ash and other pozzolans, ground granulated blast-furnace slag, and silica fume.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Samples for Initial Selection: For each type of product, ingredient, or admixture requiring color selection.
- C. Other Action Submittals:
 - 1. Design Mixtures: For each concrete paving mixture. Include alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.

1.5 INFORMATIONAL SUBMITTALS

- A. Material Certificates: For the following, from manufacturer:
 - 1. Cementitious materials.
 - 2. Steel reinforcement and reinforcement accessories.
 - 3. Admixtures.
 - 4. Curing compounds.
 - 5. Joint fillers.
- B. Material Test Reports: For each of the following:
 - 1. Aggregates. Include service-record data indicating absence of deleterious expansion of concrete due to alkali-aggregate reactivity.

- C. Field quality-control reports.

1.6 QUALITY ASSURANCE

- A. Ready-Mix-Concrete Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.
 - 1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities" (Quality Control Manual - Section 3, "Plant Certification Checklist").
- B. Testing Agency Qualifications: Qualified according to ASTM C 1077 and ASTM E 329 for testing indicated.
 - 1. Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-1 or an equivalent certification program.
- C. Concrete Testing Service: Engage a qualified testing agency to perform material evaluation tests and to design concrete mixtures.
- D. ACI Publications: Comply with ACI 301 unless otherwise indicated.
- E. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
 - 1. Build mockups of full-thickness sections of concrete paving to demonstrate typical joints; surface finish, texture, and color; curing; and standard of workmanship.
 - 2. Build mockups of concrete paving in the location and of the size indicated or, if not indicated, build mockups where directed by Landscape Architect and not less than 3 feet x 3 feet.
 - 3. Separate mockups shall be built to demonstrate each different concrete finish specified.
 - 4. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Landscape Architect specifically approves such deviations in writing.
- F. Preinstallation Conference: Conduct conference at Project site.
 - 1. Review methods and procedures related to concrete paving, including but not limited to, the following:
 - a. Concrete mixture design.
 - b. Quality control of concrete materials and concrete paving construction practices.
 - 2. Require representatives of each entity directly concerned with concrete paving to attend, including the following:
 - a. Contractor's superintendent.
 - b. Independent testing agency responsible for concrete design mixtures.
 - c. Concrete paving subcontractor.

1.7 PROJECT CONDITIONS

- A. Traffic Control: Maintain access for vehicular and pedestrian traffic as required for other construction activities.

PART 2 - PRODUCTS

2.1 FORMS

- A. Forms for straight sidewalks: Dimensional lumber (2"x6" or similar), 3/4" Plywood, metal, metal-framed plywood, or other approved panel-type materials to provide full-depth, continuous, straight, and smooth exposed surfaces.
- B. Forms for curves with a radius of 20 feet or greater: Dimensional lumber (2"x6" or similar), or 3/4" plywood that is kerf cut on the non-concrete side to sufficiently to achieve the desired radius while maintaining stability
- C. Forms for curves with a radius of 20 feet or less:

1. Flexible engineered wood or plastic forms with sufficient bracing to create a smooth, uniform curve.
- D. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and that will not impair subsequent treatments of concrete surfaces.

2.2 STEEL REINFORCEMENT

- A. Plain-Steel Welded Wire Reinforcement: ASTM A 1064/A 1064M, fabricated from galvanized-steel wire into flat sheets.
- B. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 ; deformed.
- C. Joint Dowel Bars: ASTM A 615/A 615M, Grade 60 plain-steel bars. Cut bars true to length with ends square and free of burrs.
- D. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars, welded wire reinforcement, and dowels in place. Manufacture bar supports according to CRSI's "Manual of Standard Practice" from steel wire, plastic, or precast concrete of greater compressive strength than concrete specified, and as follows:
 1. Equip wire bar supports with sand plates or horizontal runners where base material will not support chair legs.
- E. Zinc Repair Material: ASTM A 780.

2.3 CONCRETE MATERIALS

- A. Cementitious Material: Use the following cementitious materials, of same type, brand, and source throughout Project:
 1. Blended Hydraulic Cement: ASTM C 595, light gray, Type I/II.
- B. Normal-Weight Aggregates: ASTM C 33, uniformly graded. Provide aggregates from a single source for exposed surfaces.
 1. Do not use aggregates containing soluble salts or other substances such as iron sulfides, pyrite, marcasite, ochre, or other materials that can cause stains on exposed concrete surfaces.
 2. Fine Aggregate: Clean, sharp, natural sand free from loam, clay, lumps or other deleterious substances. Dune sand, bank run sand and manufactured
 3. Coarse Aggregate: Clean, uncoated, processed aggregate containing no clay, mud, loam, or foreign matter, as follows:
 - a. Crushed stone, processed from natural rock or stone in primarily brown and tan colors.
 - b. Wash gravel, either natural or crushed. Use of slag and pit or bank run gravel is not permitted.
 - c. Coarse Aggregate Size: Size to be ASTM C33, No. 67.
- C. Water: Potable and complying with ASTM C 94/C 94M.
- D. Air-Entraining Admixture: ASTM C 260.

2.4 CURING MATERIALS

- A. Absorptive Cover: AASHTO M 182, Class 3, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. dry.
- B. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.
- C. Water: Potable.
- D. Evaporation Retarder: Waterborne, monomolecular, film forming, manufactured for application to fresh concrete.
- E. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, dissipating.

2.5 SURFACE RETARDER AND FINISHING AIDS

- A. Water-based, spray-applied, film-forming top surface retarder designed for specific sized aggregates and finish requirements. Color coded to allow for ease of application and verification of etch level being used as well as even and complete coverage.
- B. Products and Manufacturers:
 - 1. Top-Cast Surface Retarder by Dayton Superior
 - 2. Top-Surface Surface Retarder by WR Meadows
 - 3. Approved Equals

2.6 Absorptive Cover: AASHTO M 182, Class 3, burlap cloth made from jute or kenaf, weighing approximately

2.7 EXPANSION JOINTS

- A. Provide a semi-rigid, closed-cell polypropylene foam, preformed joint filler that meets the following physical property requirements and fully complies with ASTM D8139.
 - 1. Compression Strength 30-60 psi per ASTM D 545 or AASHTO T 42
 - 2. Compression Recovery > 80% per ASTM D 545 or AASHTO T 42
 - 3. Extrusion < 0.1 in. per ASTM D 545 or AASHTO T 42
 - 4. Density >3.5 lbs./cu.ft. per ASTM D 545 or AASHTO T 42
 - 5. Water Absorption < 1.0% per ASTM D 545 or AASHTO T 42
 - 6. Heat Resistance °F 392°F± 5°F per ASTM D 5249
 - 7. Freeze Thaw Resistance No change per ASTM C 666 (300 cycles)
 - 8. UV Weathering No change per ASTM D 4329 (1000 hrs., Cycle A)
 - 9. Thickness 3/8" Min.
 - 10. Width 6" Min.
- B. Manufacturers
 - 1. Nomaco, WR Meadows, or Approved Equal

2.8 CONCRETE MIXTURES

- A. Prepare design mixtures, proportioned according to ACI 301 , for each type and strength of normal-weight concrete, and as determined by either laboratory trial mixtures or field experience.
 - 1. Use a qualified independent testing agency for preparing and reporting proposed concrete design mixtures for the trial batch method.
 - 2. When automatic machine placement is used, determine design mixtures and obtain laboratory test results that meet or exceed requirements.
- B. Proportion mixtures to provide normal-weight concrete with the following properties:
 - 1. Compressive Strength (28 Days): 4000 psi .
 - 2. Maximum Water-Cementitious Materials Ratio at Point of Placement: 0.45.
 - 3. Slump Limit: 4 inches , plus or minus 1 inch.
- C. Add air-entraining admixture at manufacturer's prescribed rate to result in normal-weight concrete at point of placement having an air content as follows:
 - 1. Air Content: 5 percent plus or minus 2 percent for 1-inch nominal maximum aggregate size.
- D. Limit water-soluble, chloride-ion content in hardened concrete to 0.15 percent by weight of cement.
- E. Chemical Admixtures: Use admixtures according to manufacturer's written instructions.
 - 1. Use water-reducing admixture in concrete as required for placement and workability.
 - 2. Use water-reducing and retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.

2.9 CONCRETE MIXING

- A. Project-Site Mixing: Measure, batch, and mix concrete materials and concrete according to ASTM C 94/C 94M. Mix concrete materials in appropriate drum-type batch machine mixer.
 - 1. For concrete batches of 1 cu. yd. or smaller, continue mixing at least 1-1/2 minutes, but not more than 5 minutes after ingredients are in mixer, before any part of batch is released.
 - 2. For concrete batches larger than 1 cu. yd. , increase mixing time by 15 seconds for each additional 1 cu. yd. .
 - 3. Provide batch ticket for each batch discharged and used in the Work, indicating Project identification name and number, date, mixture type, mixing time, quantity, and amount of water added.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine exposed subgrades and subbase surfaces for compliance with requirements for dimensional, grading, and elevation tolerances.
- B. Proof-roll prepared subbase surface below concrete paving to identify soft pockets and areas of excess yielding.
 - 1. Completely proof-roll subbase in one direction and repeat in perpendicular direction. Limit vehicle speed to 3 mph .
 - 2. Correct subbase with soft spots and areas of pumping or rutting exceeding depth of 1/2 inch according to requirements in Section 312000 "Earth Moving."
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Remove loose material from compacted subbase surface immediately before placing concrete.

3.3 EDGE FORMS AND SCREED CONSTRUCTION

- A. Set, brace, and secure edge forms, bulkheads, and intermediate screed guides to required lines, grades, and elevations. Install forms to allow continuous progress of work and so forms can remain in place at least 24 hours after concrete placement.
- B. Clean forms after each use and coat with form-release agent to ensure separation from concrete without damage.

3.4 STEEL REINFORCEMENT

- A. General: Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.
- B. Clean reinforcement of loose rust and mill scale, earth, ice, or other bond-reducing materials.
- C. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position during concrete placement. Maintain minimum cover to reinforcement.
- D. Install welded wire reinforcement in lengths as long as practicable. Lap adjoining pieces at least one full mesh, and lace splices with wire. Offset laps of adjoining widths to prevent continuous laps in either direction.
- E. Zinc-Coated Reinforcement: Use galvanized-steel wire ties to fasten zinc-coated reinforcement. Repair cut and damaged zinc coatings with zinc repair material.

3.5 JOINTS

- A. General: Form construction, isolation, and contraction joints and tool edges true to line, with faces perpendicular to surface plane of concrete. Construct transverse joints at right angles to centerline unless otherwise indicated.
 - 1. When joining existing paving, place transverse joints to align with previously placed joints unless otherwise indicated.
- B. Construction Joints: Set construction joints at side and end terminations of paving and at locations where paving operations are stopped for more than one-half hour unless paving terminates at isolation joints.
 - 1. Continue steel reinforcement across construction joints unless otherwise indicated. Do not continue reinforcement through sides of paving strips unless otherwise indicated.
 - 2. Provide tie bars at sides of paving strips where indicated.
 - 3. Keyed Joints: Provide preformed keyway-section forms or bulkhead forms with keys unless otherwise indicated. Embed keys as indicated.
 - 4. Doweled Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or coat with asphalt one-half of dowel length to prevent concrete bonding to one side of joint.
- C. Expansion Joints: Form expansion joints of preformed joint-filler strips abutting concrete curbs, catch basins, manholes, inlets, structures, other fixed objects, and where indicated.
 - 1. Typical expansion joint
 - a. Locate expansion joints as indicated on plan.
 - b. Extend joint fillers full width and depth of joint.
 - c. Terminate joint filler not less than 1/2 inch or more than 1 inch below finished surface if joint sealant is indicated where keyway expansion joints are not used.
 - d. Place top of joint filler flush with finished concrete surface if joint sealant is not indicated.
 - e. Furnish joint fillers in one-piece lengths. Where more than one length is required, lace or clip joint-filler sections together.
 - f. During concrete placement, protect top edge of joint filler with metal, plastic, or other temporary preformed cap. Remove protective cap after concrete has been placed on both sides of joint.
- D. Sawcut Control Joints:
 - 1. Sawcut control joints to be 1/8" wide. Depth shall be 1/4 the total depth of concrete slab.
- E. Edging: After initial floating, tool edges of paving, gutters, curbs, and joints in concrete with an edging tool to a 1/2 inch radius on all exposed edges, no radius on jointed edges. Repeat tooling of edges after applying surface finishes. Eliminate edging-tool marks on concrete surfaces.

3.6 CONCRETE PLACEMENT

- A. Before placing concrete, inspect and complete formwork installation, steel reinforcement, and items to be embedded or cast-in.
- B. Remove snow, ice, or frost from subbase surface and steel reinforcement before placing concrete. Do not place concrete on frozen surfaces.
- C. Moisten subbase to provide a uniform dampened condition at time concrete is placed. Do not place concrete around manholes or other structures until they are at required finish elevation and alignment.
- D. Comply with ACI 301 requirements for measuring, mixing, transporting, and placing concrete.
- E. Do not add water to concrete during delivery or at Project site. Do not add water to fresh concrete after testing.
- F. Deposit and spread concrete in a continuous operation between transverse joints. Do not push or drag concrete into place or use vibrators to move concrete into place.
- G. Consolidate concrete according to ACI 301 by mechanical vibrating equipment supplemented by hand spading, rodding, or tamping.
 - 1. Consolidate concrete along face of forms and adjacent to transverse joints with an internal vibrator. Keep vibrator away from joint assemblies, reinforcement, or side forms. Use only

square-faced shovels for hand spreading and consolidation. Consolidate with care to prevent dislocating reinforcement dowels and joint devices.

- H. Screed paving surface with a straightedge and strike off.
- I. Commence initial floating using bull floats or darbies to impart an open-textured and uniform surface plane before excess moisture or bleed water appears on the surface. Do not further disturb concrete surfaces before beginning finishing operations or spreading surface treatments.
- J. Cold-Weather Placement: Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing, or low temperatures. Comply with ACI 306.1 and the following:
 - 1. When air temperature has fallen to or is expected to fall below 40 deg F , uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 deg F and not more than 80 deg F at point of placement.
 - 2. Do not use frozen materials or materials containing ice or snow.
 - 3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in design mixtures.
- K. Hot-Weather Placement: Comply with ACI 301 and as follows when hot-weather conditions exist:
 - 1. Cool ingredients before mixing to maintain concrete temperature below 90 deg F at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated in total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
 - 2. Cover steel reinforcement with water-soaked burlap so steel temperature will not exceed ambient air temperature immediately before embedding in concrete.
 - 3. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade moisture uniform without standing water, soft spots, or dry areas.

3.7 CONCRETE FINISHING

- A. Reference Drawings for concrete surface finishes and locations.
- B. General: Do not add water to concrete surfaces during finishing operations.
- C. Float Finish: Begin the second floating operation when bleed-water sheen has disappeared and concrete surface has stiffened sufficiently to permit operations. Float surface with power-driven floats or by hand floating if area is small or inaccessible to power units. Finish surfaces to true planes. Cut down high spots and fill low spots. Refloat surface immediately to uniform granular texture.
- D. Trowel Finish: After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance.
- E. Sand Wash Finish: After applying a trowel finish, complete one of the following options.
 - 1. Option 1: No Surface Retardant
 - a. When warmer weather conditions allow, the sand wash finish may be achieved without the use of a surface retardant
 - b. After trowel finish is applied, allow concrete to cure long enough so that foot traffic does not deform the surface elevation.
 - 1) +/- 45 minutes after troweling
 - 2) Exact time shall be determined through the mockup process and the exact conditions for each pour.
 - c. After surface is ready, lightly brush the surface with a stiff bristled broom to loosen the cream layer, but not enough to expose the concrete aggregate.
 - d. After brushing, thoroughly rinse the loosened cream layer off of the surface with an open-ended water hose (no nozzle).
 - e. After rinsing, review the finish to verify uniformity and consistency. If there are inconsistencies identified, repeat the brushing and rinsing process as necessary to achieve a uniform surface texture.
 - 2. Option 2: Use of Surface Retardant
 - a. During cooler weather or at the discretion of the Contractor, the sand wash finish may be achieved with the use of the specified surface retardant.

- b. After the trowel finish is applied and at the time as directed by the manufacturer, spray the surface retardant onto the concrete at the rate specified by the manufacturer.
 - c. After the surface retardant has set long enough to achieve the desired finish, rinse the concrete with a water hose and stiff-bristled broom to remove the cream layer of the concrete. The use of a pressure washer may also be used if a consistent, even finish is achieved.
- F. Broom Finish
 - 1. Medium-to- Fine-Textured Broom Finish: Draw a soft-bristle broom across float-finished concrete surface perpendicular to line of traffic to provide a uniform, fine-line texture.
 - 2. Medium-to-Coarse-Textured Broom Finish: Provide a coarse finish by striating float-finished concrete surface 1/16 to 1/8 inch deep with a stiff-bristled broom, perpendicular to line of traffic.

3.8 CONCRETE PROTECTION AND CURING

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.
- B. Comply with ACI 306.1 for cold-weather protection.
- C. Evaporation Retarder: Apply evaporation retarder to concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete but before float finishing.
- D. Begin curing after finishing concrete but not before free water has disappeared from concrete surface.
- E. Curing Methods: Cure concrete by moisture curing moisture-retaining-cover curing compound or a combination of these as follows:
 - 1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:
 - a. Water.
 - b. Continuous water-fog spray.
 - c. Absorptive cover, water saturated and kept continuously wet. Cover concrete surfaces and edges with 12-inch lap over adjacent absorptive covers.
 - 2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover, placed in widest practicable width, with sides and ends lapped at least 12 inches and sealed by waterproof tape or adhesive. Immediately repair any holes or tears Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas that have been subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating, and repair damage during curing period.

3.9 PAVING TOLERANCES

- A. Comply with tolerances in ACI 117 and as follows:
 - 1. Elevation: 1/4 inch .
 - 2. Thickness: Plus 3/8 inch , minus 1/4 inch .
 - 3. Surface: Gap below 10-foot- long, unlevelled straightedge not to exceed 1/4 inch .
 - 4. Alignment of Tie-Bar End Relative to Line Perpendicular to Paving Edge: 1/4 inch per 12 inches of tie bar.
 - 5. Lateral Alignment and Spacing of Dowels: 1/2 inch .
 - 6. Vertical Alignment of Dowels: 1/4 inch .
 - 7. Alignment of Dowel-Bar End Relative to Line Perpendicular to Paving Edge: 1/4 inch per 12 inches of dowel.
 - 8. Joint Spacing: 3 inches .
 - 9. Joint Width: Plus 1/16 inch , no minus.

3.10 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- B. Testing Services: Testing of composite samples of fresh concrete obtained according to ASTM C 172 shall be performed according to the following requirements:
 - 1. Testing Frequency: Obtain at least one composite sample for each 100 cu. yd. or fraction thereof of each concrete mixture placed each day.
 - a. When frequency of testing will provide fewer than five compressive-strength tests for each concrete mixture, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.
 - 2. Slump: ASTM C 143/C 143M; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture. Perform additional tests when concrete consistency appears to change.
 - 3. Air Content: ASTM C 231, pressure method; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
 - 4. Concrete Temperature: ASTM C 1064/C 1064M; one test hourly when air temperature is 40 deg F and below and when it is 80 deg F and above, and one test for each composite sample.
 - 5. Compression Test Specimens: ASTM C 31/C 31M; cast and laboratory cure one set of three standard cylinder specimens for each composite sample.
 - 6. Compressive-Strength Tests: ASTM C 39/C 39M; test one specimen at seven days and two specimens at 28 days.
 - a. A compressive-strength test shall be the average compressive strength from two specimens obtained from same composite sample and tested at 28 days.
- C. Strength of each concrete mixture will be satisfactory if average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi .
- D. Test results shall be reported in writing to Landscape Architect, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.
- E. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Landscape Architect but will not be used as sole basis for approval or rejection of concrete.
- F. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Landscape Architect..
- G. Concrete paving will be considered defective if it does not pass tests and inspections.
- H. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
- I. Prepare test and inspection reports.

3.11 REPAIRS AND PROTECTION

- A. Remove and replace concrete paving that is broken, damaged, or defective or that does not comply with requirements in this Section. Remove work in complete sections from joint to joint unless otherwise approved by Landscape Architect.
- B. Drill test cores, where directed by Landscape Architect, when necessary to determine magnitude of cracks or defective areas. Fill drilled core holes in satisfactory paving areas with portland cement concrete bonded to paving with epoxy adhesive.
- C. Protect concrete paving from damage. Exclude traffic from paving for at least 14 days after placement. When construction traffic is permitted, maintain paving as clean as possible by removing surface stains and spillage of materials as they occur.

- D. Maintain concrete paving free of stains, discoloration, dirt, and other foreign material. Sweep paving not more than two days before date scheduled for Substantial Completion inspections.

END OF SECTION 32 13 13

SECTION 32 14 00
UNIT PAVING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. Section Includes:
 - 1. Brick pavers set in mortar setting beds with polymeric sand filled joints.
- B. Related Sections:
 - 1. Section 312000 "Earth Moving" for establishment of subgrade elevations.
 - 2. Section 321313 "Concrete Paving" for concrete base under unit pavers.

1.03 PRECONSTRUCTION TESTING

- A. Preconstruction Adhesion and Compatibility Testing: Submit to latex-additive manufacturer, for testing as indicated below, samples of paving materials that will contact or affect mortar and grout that contain latex additives.
 - 1. Use manufacturer's standard test methods to determine whether mortar and grout materials will obtain optimum adhesion with, and will be nonstaining to, installed pavers and other materials constituting paver installation.

1.04 ACTION SUBMITTALS

- A. Product Data: For materials other than water and aggregates.
- B. Product Data: For the following:
 - 1. Pavers.
 - 2. Mortar setting materials.
 - 3. Joint sand materials.
- C. Adhesion and Compatibility Test Reports: From latex-additive manufacturer for mortar and grout containing latex additives.
- D. Sieve Analyses: For aggregate setting-bed materials, according to ASTM C 136.
- E. Samples for Initial Selection: For the following:
 - 1. Each type of unit paver indicated.
 - 2. Joint materials involving color selection.
 - 3. Edge restraints involving color selection.
- F. Samples for Verification:
 - 1. Full-size units of each type of unit paver indicated.
 - 2. Joint materials.

1.05 QUALITY ASSURANCE

- A. Source Limitations: Obtain each type of unit paver, joint material, and setting material from single source with resources to provide materials and products of consistent quality in appearance and physical properties.

- B. Mockups: Build sample panel to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution. Panel shall be 8 ft. x 8 ft. minimum, exhibiting the specified base, setting method, thickness, colors, jointing, pattern, finish, and workmanship. The accepted panel shall become the standard for the entire job and shall remain undisturbed until completion of the concrete unit paving.
 - 1. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.
 - 2. Notify Landscape Architect seven days in advance of dates and times when mockups will be constructed.
- C. Substitutions: As approved by the Landscape Architect
- D. Preinstallation Conference: Conduct conference at project site.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Store pavers on elevated platforms in a dry location. If units are not stored in an enclosed location, cover tops and sides of stacks with waterproof sheeting, securely tied.
- B. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.
- C. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.
- D. Store liquids in tightly closed containers protected from freezing.
- E. Store asphalt cement and other bituminous materials in tightly closed containers.

1.07 PROJECT CONDITIONS

- A. Cold-Weather Protection: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen subgrade or setting beds. Remove and replace unit paver work damaged by frost or freezing.
- B. Weather Limitations for Sand:
 - 1. Joint sand to be applied only in dry conditions.

PART 2 - PRODUCTS

2.01 QUALITY

- A. Use new materials without flaws or defects.

2.02 SUBSTITUTIONS

- A. Specified product is only used to denote the general style, type, character, and quality standard of the product desired. Bidders are not restricted to the specified brand, make, or manufacturer.
- B. Use specified product, or pre-approved equal. Alternative products must be approved by Landscape Architect prior to bidding. Changes and associated design costs to accommodate alternative equipment are Contractor's responsibility.

2.03 BASE SLAB

- A. Cast-in-place concrete base. refer to Section 321313, Concrete Paving

2.04 BRICK PAVERS

- A. Brick Pavers: Brick pavers shall be A-Grade pavers manufactured/supplied by a member of the

- Brick Institute of America (BIA).
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following or approved equal:
1. Pine Hall Brick
P.O. Box 11044
2701 Shorefair Drive
Winston-Salem, NC 27116-1044
Phone: (800) 334-8689
www.pinehallbrick.com
 - a. Authentic Rumbled Pavers:
Thickness: 2 1/4-inches.
Face Size and Shape: 4-inches x 8-inches, rectangular.
Colors / Color Mix: Cocoa
 2. Glen-Gery
P.O. Box 7001
1166 Spring Street
Wyomissing, PA 19610-6001
Phone: (610) 374-4011
<https://www.glengery.com/>
 - a. Molded Paving Brick:
4-inches x 8-inches, rectangular
Colors / Color Mix: Augusta
 3. Approved Equal

2.05 MORTAR SETTING-BED MATERIALS

- A. Mortar that meets or exceeds ANSI A118.4 requirements when mixed with water or a latex admixture, and is designed for installation of large format tile.
1. Portland Cement: ASTM C 150, Type I or Type II.
 2. Hydrated Lime: ASTM C 207, Type S.
 3. Sand: ASTM C 144.
 4. Latex Additive: Manufacturer's standard acrylic resin or styrene-butadiene- rubber water emulsion, serving as replacement for part or all of gaging water, of type specifically recommended by latex-additive manufacturer for use with field-mixed portland cement and aggregate mortar bed, and not containing a retarder.
 5. Water: Potable.

2.06 MORTAR AND GROUT MIXES

- A. General: Comply with referenced standards and with manufacturers' written instructions for mix proportions, mixing equipment, mixer speeds, mixing containers, mixing times, and other procedures needed to produce setting-bed and joint materials of uniform quality and with optimum performance characteristics. Discard mortars and grout if they have reached their initial set before being used.
- B. Mortar-Bed Bond Coat: Mix neat cement and latex additive to a creamy consistency.
- C. Latex-Modified, Portland Cement Setting-Bed Mortar: Proportion and mix portland cement, sand, and latex additive for setting bed to comply with written instructions of latex-additive manufacturer and as necessary to produce stiff mixture with a moist surface when bed is ready to receive pavers.
- D. Latex-Modified, Portland Cement Bond Coat: Proportion and mix portland cement, aggregate, and liquid latex for bond coat to comply with written instructions of liquid- latex manufacturer.

2.07 SAND MATERIALS

- A. Sand for Joints
 - 1. Manufacturer
 - a. TechniSeal, Inc., Boucherville, Canada J4B 7K2; Tel 800 363 7560; "Alliance DP SuperSand Bond" Polymeric Sand, manufactured by Alliance Designer Products, Inc., Laval, Canada, H7L 6A1; Tel 866 212 1611
 - b. Approved Equal
 - 2. Type: Polymeric joint sand for pavement Joints
 - 3. Provide sand of color needed to match pavers, for approval by Landscape Architect.

2.08 PAVER SEALER

- A. Pavers in interior applications shall be sealed using a manufacturer recommended concrete paver sealer.
 - 1. Manufacturer
 - a. Hanover Architectural Products, Inc.
5000 Hanover Road
Hanover, PA 17331
Phone: (717) 637-0500
Toll Free: (800) 426-4242
Fax: (717) 637-7145
www.hanoverpavers.com
 - b. Approved Equal
 - 2. Type: Intensifying Sealer or Natural Sealer

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine areas indicated to receive paving, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance.
- B. Where pavers are to be installed over waterproofing, examine waterproofing installation, with waterproofing Installer present, for protection from paving operations, including areas where waterproofing system is turned up or flashed against vertical surfaces.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Sweep concrete substrates to remove dirt, dust, debris, and loose particles.
- B. Proof-roll prepared subgrade according to requirements in Section 312000 "Earth Moving" to identify soft pockets and areas of excess yielding. Proceed with unit paver installation only after deficient subgrades have been corrected and are ready to receive subbase and base course for unit pavers.

3.03 INSTALLATION, GENERAL

- A. Do not use unit pavers with chips, cracks, voids, discolorations, or other defects that might be visible or cause staining in finished work.
- B. Mix pavers from several pallets or cubes, as they are placed, to produce uniform blend of colors and textures.
- C. Cut unit pavers with motor-driven masonry saw equipment to provide clean, sharp, unchipped

edges. Cut units to provide pattern indicated and to fit adjoining work neatly. Use full units without cutting where possible. Hammer cutting is not acceptable.

- D. Joint Pattern: See Drawings.
- E. Tolerances: Do not exceed 1/32-inch unit-to-unit offset from flush (lippage) nor 1/8 inch in 10 feet from level, or indicated slope, for finished surface of paving.

3.04 MORTAR SETTING-BED APPLICATIONS

- A. Saturate concrete sub-base with clean water several hours before placing setting bed. Remove surface water about one hour before placing setting bed.
- B. Apply mortar-bed bond coat over surface of concrete sub-base about 15 minutes before placing mortar bed. Limit area of bond coat to avoid its drying out before placing setting bed. Do not exceed 1/16-inch thickness for bond coat.
- C. Mix and place only that amount of mortar bed that can be covered with pavers before initial set. Before placing pavers, cut back, bevel edge, and remove and discard setting-bed material that has reached initial set.
- D. Place pavers before initial set of cement occurs. Immediately before placing pavers on mortar bed, apply uniform 1/16-inch-thick bond coat to mortar bed or to back of each paver with a flat trowel.
- E. Tamp or beat pavers with a wooden block or rubber mallet to obtain full contact with setting bed and to bring finished surfaces within indicated tolerances. Set each paver in a single operation before initial set of mortar; do not return to areas already set or disturb pavers for purposes of realigning finished surfaces or adjusting joints.

3.05 FIELD QUALITY CONTROL

- A. After removal of excess joint sand, check final elevations for conformance to the drawings

3.06 REPAIRING, POINTING, AND CLEANING

- A. Remove and replace unit pavers that are loose, chipped, broken, stained, or otherwise damaged or that do not match adjoining units. Provide new units to match adjoining units and install in same manner as original units, with same joint treatment and with no evidence of replacement.
- B. Pointing: During tooling of joints, enlarge voids or holes and completely fill with grout. Point joints at sealant joints to provide a neat, uniform appearance, properly prepared for sealant application.
- C. Cleaning: Remove excess grout from exposed paver surfaces; wash and scrub clean.
 - 1. Remove temporary protective coating as recommended by coating manufacturer and as acceptable to paver and grout manufacturers.
 - 2. Do not allow protective coating to enter floor drains. Trap, collect, and remove coating material.

END OF SECTION 32 14 00

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SECTION 32 31 19
DECORATIVE METAL FENCES AND GATES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Decorative metal fencing and accessories.
- B. Related Sections:
 - 1. Section 055001 "Metal Fabrications for Landscape" for custom gate
 - 2. Section 312000 "Earth Moving"
 - 3. Section 033100 "Cast in Place Concrete"

1.3 SYSTEM DESCRIPTION

- A. The manufacturer shall supply a total ornamental aluminum or steel fence system of the style, strength, size, and color defined herein. The system shall include all components (pickets, posts, rails, gates, hardware, and accessories) as required, and shall be fabricated, coated, and assembled in the United States.

1.4 QUALITY ASSURANCE

- A. The contractor shall provide laborers and supervisors who are familiar with the type of construction involved, and the materials and techniques specified.
- B. Manufacturer of fence system must have ten (10) years of documented experience in manufacturing the products specified in this section.

1.5 REFERENCES

- A. AAMA 2604 – Voluntary Specification, Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels
- B. AAMA 2603 – Voluntary Specification, Performance Requirements and Test Procedures for Pigmented Organic Coatings on Aluminum Extrusions and Panels
- C. ASTM B117 – Practice for Operating Salt Spray (Fog) Apparatus
- D. ASTM D2247 – Standard Practice for Testing Water Resistance of Coatings in 100% Relative Humidity
- E. ASTM B221 – Specification for Aluminum Alloy Extruded Bars, Shapes, and Tubes
- F. ASTM B85 – Standard Specification for Aluminum-Alloy Die Castings
- G. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvannealed) by the Hot-Dip Process.
- H. ASTM D523 - Test Method for Specular Gloss.
- I. ASTM D714 - Test Method for Evaluating Degree of Blistering in Paint.
- J. ASTM D822 - Practice for Conducting Tests on Paint and Related Coatings and Materials using Filtered Open-Flame Carbon-Arc Light and Water Exposure Apparatus.
- K. ASTM D1654 - Test Method for Evaluation of Painted or Coated Specimens Subjected to Corrosive Environments.
- L. ASTM D2244 - Test Method for Calculation of Color Differences from Instrumentally Measured Color Coordinates.
- M. ASTM D2794 - Test Method for Resistance of Organic Coatings to the Effects of Rapid Deformation (Impact).
- N. ASTM D3359 - Test Method for Measuring Adhesion by Tape Test.
- O. ASTM F2408 – Ornamental Fences Employing Galvanized Steel Tubular Pickets.

1.6 SUBMITTALS

- A. Manufacturer's submittal package shall be provided prior to installation for
 - 1. All fence and gate posts, rails, and fittings
 - 2. Gates and Hardware
- B. Shop Drawings for all fences and gates.
- C. Changes in specification may not be made after the bid date.
- D. Samples of assembled materials, components, hardware, accessories, and/or colors, if requested.

1.7 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Upon receipt, materials should be checked for damage that may have occurred in shipping to the job site.
- B. Each package shall bear the name of the manufacturer.
- C. Store products in manufacturer's unopened packaging.
- D. Store materials in a secure and dry area to protect against damage, weather, vandalism, and theft.
- E. Transport, handle and store products with care to protect against damage before installation.

PART 2 - PRODUCTS

2.1 MANUFACTURER

- A. The fencing and gate system shall be manufactured by:
 - 1. Windsor Aluminum Fence
Jerith Manufacturing, LLC
14499 McNulty Road
Philadelphia, PA 19154
t: 800-344-2242
e: sales@jerith.com
www.jerith.com
 - 2. Montage II Standard Picket Fence - Genesis
Ameristar Perimeter Security USA Inc.
t: 888-333-3422
www.ameristarfence.com
 - 3. Approved Equals in accordance with Section "012500 Substitution Procedures"
- B. Style: 3-Rail (top, accent, bottom)
- C. Fence height: 72 inches.
- D. Color shall be Black.

2.2 MATERIALS

- A. Aluminum Extrusions: All posts and rails used in the fence system shall be extruded from HS-35™ aluminum alloy having a minimum yield strength of 35,000 psi. All pickets shall have a minimum yield strength of 25,000 psi. 6063-T5 and 6063-T52 Alloys (in accordance with ASTM B221) are not acceptable for any components.
- B. Steel material for fence panels and posts shall conform to the requirements of ASTM A653/A653M, with a minimum yield strength of 45,000 psi (310 MPa) and a minimum zinc (hot-dip galvanized) coating weight of 0.90 oz/ft² (276 g/m²), Coating Designation G-90. Fasteners: All fasteners shall be stainless steel. Hidden spring clips shall be used to connect the pickets to the horizontal rails. Rail to post connections shall be made using stainless steel screws with heads painted to match the color of the fence.
- C. Accessories: Aluminum sand and die castings shall be used for all scrolls, post caps, finials, and miscellaneous hardware. Die castings shall be made from Alloy A360.0 as per ASTM B85

for superior corrosion resistance. Alloy A380.0 is not acceptable.

2.3 FINISH

- A. Pretreatment: A three stage non-chrome pretreatment shall be applied. The first step shall be a chemical cleaning, followed by a water rinse. The final stage shall be a dry-in-place activator which produces a uniform chemical conversion coating for superior adhesion.
- B. Coating: Manufacturer applied polyester powder-coated finish that meets or exceed industry standard tests. Min. coating thickness of 2 mil.
- C. Tests: The cured finish shall meet or exceed AAMA 2604, which includes the following requirements:
 - 1. Humidity resistance of 3,000 hours using ASTM D2247.
 - 2. Salt-spray resistance of 3,000 hours using ASTM B117.
 - 3. Outdoor weathering shall show no adhesion loss, checking or crazing, with only slight fade and chalk when exposed for 5 years in Florida facing south at a 45 degree angle.
- D. Finishes that only meet AAMA 2603 (or the previous version - AAMA 603) are not acceptable.

2.4 FENCE COMPONENTS

- A. Pickets, rails, and posts shall be pre-cut by manufacturer to specified lengths. Rails shall be pre-punched to accept pickets
- B. Pickets: Aluminum - 3/4" x .050" square extrusions (min. size); Steel - 1" square x 14 Ga. tubing
- C. Rails: Aluminum – 1.5" x 1" x .072 rectangular extrusions (min. size); Steel - steel channel, 1.75" x 1.75" x .105"
- D. Posts: Aluminum – 2.5" x 2.5" x .060 square extrusions (min. size); Steel – a minimum of 2-1/2" square x 12 Ga.
- E. Gates
 - 1. All gates shown on drawings shall be fabricated by the manufacturer to fit the dimensions shown on the drawings. No field modifications shall be accepted.
 - 2. Gate hinges and other hardware shall be provided by the manufacturer.
 - 3. Gates and gate posts shall be sized and reinforced per manufacturer recommendations to eliminate sagging or improper closure.

2.5 WARRANTY

- A. The entire fence system shall have a written 8 Year Warranty against rust and defects in workmanship and materials. In addition, the finish shall be warranted not to crack, chip, peel, or blister for the same period.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Verify areas to receive fencing are completed to final grades and elevations.
- B. Ensure property lines and legal boundaries are clearly established.
- C. Remove any surface irregularities which may cause interference with the installation of the fence.

3.2 FENCE INSTALLATION

- A. Install fence in accordance with the manufacturer's instructions.
- B. Excavate post holes to proper depth to suit local conditions for stability and support of the fence system without disturbing the underlying materials. Excavate deeper as required for adequate support in soft and loose soils.
- C. Set fence posts in concrete footers at 70" spacing from inside of post to inside of post. Note that this fence must be stepped for installations on a slope. It cannot follow the grade.
- D. Center and align posts in holes to required depth. Place concrete around posts and tamp for consolidation. After tamping, check alignment of posts, and make necessary corrections before

- the concrete hardens.
- E. Insert rail ends into horizontal rails and fasten in place to the posts.

3.3 GATE INSTALLATION

- A. Set gate posts plumb and level for gate openings specified in construction drawings.
- B. Install gates to allow full opening without interference after concrete has hardened around gate posts. Adjust hardware for smooth operation. Install one drop rod for double gates.

3.4 ACCESSORIES

- A. Install post caps and other accessories to complete fence.

3.5 CLEANING

- A. Contractor shall clean site of debris and excess materials. Post hole excavations shall be scattered uniformly away from posts.
- B. If necessary, clean fence system with mild household detergent and clean water. Excess concrete must be removed from posts and other fencing material before it hardens.

END OF SECTION 323119

SECTION 32 84 00
IRRIGATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes valves, piping, sprinklers, specialties, accessories, controls, and wiring for lawn and shrubbery irrigation systems.

1.3 DEFINITIONS

- A. Pipe sizes used in this Section are nominal pipe size (NPS) in inches. Tube sizes are standard size in inches. Equivalent SI (metric) sizes are indicated in millimeters (mm) in parentheses.
- B. Pressure piping: Piping downstream from point of connection to and including control valves. Piping is under irrigation system pressure. Piping in this category includes pressure regulators, water meters, and backflow preventers, when used.
- C. Circuit Piping: Piping downstream from control valves to irrigation system sprinklers, emitters, devices, and drain valves. Piping is under pressure (less than pressure piping) during flow.
- D. Control Valve: Manual or automatic (electrically operated) valve for control water flow to irrigation system zone.
- E. Drain Piping: Downstream from circuit piping drain valves. Piping is not under pressure.
- F. Drain Valve: Manual or automatic (pressure operated) drain valve for draining of irrigation system circuit piping.

1.4 SYSTEM PERFORMANCE REQUIREMENTS

- A. Location of Sprinklers and Devices: Design location is approximate. Make minor adjustments necessary to avoid plantings and obstructions such as signs and light standards.
- B. Minimum Water Coverage: Contractor shall be responsible for 100% coverage for all irrigated areas.
- C. Components and Installation: Capable of producing piping systems with the following minimum pressure ratings: 50 psi static, 32 psi working
 - 1. Pressure Piping: 50 psi (static).
 - 2. Circuit and Drain Piping: 32 psi (working).

1.5 SUBMITTALS

- A. General: Submit the following according to the Conditions of the Contract and Division 1 Specification Sections:
- B. Materials List: Include sleeving, pipe, fittings, mainline components, sprinkler components, drip irrigation components, control system components, and other components shown on drawings and installation details or described herein. Include pipe sealant, wire, wire connectors, ID tags, and other miscellaneous items. Quantities of materials need not be included.
- C. Product Data: Submit manufacturer's product data including pressure rating, rated capacity, settings, and electrical data of selected models for the following if different than specified on plans:
 - 1. Backflow preventers, including size and test equipment
 - 2. Pressure regulators.

3. Valves, including general-duty, underground, manual and automatic control, and quick coupler types, and valve boxes.
 4. Sprinklers, including emitters, bubblers, and devices.
 5. Controls, including controller wiring diagrams.
 6. Wiring.
 7. Any other component listed on material list.
- D. Shop Drawings: Contractor shall submit shop drawings to illustrate the following:
1. Water meter size and location
 2. Backflow preventor size and location
 3. Mainline layout
 4. Sprinkler head layout
 5. Controller location
 6. Layout of any other major components
- E. Maintenance data for inclusion in "Operating and Maintenance Manual" for:
1. Backflow preventers, including instructions for testing.
 2. Pressure regulators.
 3. Automatic control valves.
 4. Sprinklers.
 5. Controllers.
- F. Warranty: Manufacturer's standard warranty.

1.6 QUALITY ASSURANCE

- A. Comply with requirements of utility supplying water for prevention of backflow and back-siphonage.
- B. Comply with requirements of authority with jurisdiction for irrigation systems.
- C. Product Options: Irrigation system piping, specialties, and accessories are based on specific types, manufacturers, and models indicated. Components with equal performance characteristics produced by other manufacturers may be considered, provided deviations in dimensions, operations, and other characteristics do not change design concept or intended performance as judged by the Landscape Architect. The burden of proof of product equality is on the Contractor.

1.7 PROJECT CONDITIONS

- A. Perform site survey, research public utility records, and verify existing utility locations. Verify that irrigation system piping may be installed in compliance with original design and referenced standards.

1.8 SEQUENCING AND SCHEDULING

- A. Coordinate irrigation systems work with landscape work specified in Division 2 Section "Landscape Work."

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Delivery: Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly identifying product name and manufacturer.
- B. Storage: Store materials in clean, dry area in accordance with manufacturer's instructions. Keep materials in manufacturer's original, unopened containers and packaging until installation.
- C. Handling: Protect materials and finish during handling and installation to prevent damage.

1.10 TESTING

- A. Products will be free from defects in material and/or workmanship for a period of three years from the date of invoice. Schedule testing with Owner's Representative a minimum of three days in

advance of testing.

- B. Mainline pipe jointed with rubber gaskets or threaded connections may be subjected to pressure test at any time after partial completion of backfill. Allow irrigation pipe jointed with solvent-welded PVC joints to cure at least 24 hours before testing.
- C. Subsections of mainline pipe may be tested independently, subject to review of Irrigation Engineer.
- D. Provide clean, clear water, pumps, labor, fittings, and equipment necessary to conduct tests or retests.
- E. Test Documentation:
 - 1. Submit a written report of all tests to Owner. Each test must list name of test, date of test, name of the individual completing the test, name of the company completing the test. Submit test documentation to Owner within three (3) days of completing test.
 - 2. Hydraulic Pressure Test – Include starting and ending pressures. If pipe does not pass test, document reason for pressure loss.
 - 3. Copper Tracing Wire – Include voltage readings for length of tested wire. If wire does not pass test, document reason for voltage failure.
 - 4. Control System Grounding – Include identification of each grounding equipment by the remote control valve number and the ohms resistance to ground.
- F. Hydrostatic Pressure Test:
 - 1. Subject mainline pipe to hydrostatic pressure equal to 120 PSI for two hours. Test with mainline components installed.
 - 2. Backfill to prevent pipe from moving under pressure. Expose couplings and fittings.
 - 3. Purge air from mainline pipe before test. Attach pressure gauge to mainline pipe in test section.
 - 4. Observe pressure loss on pressure gauge. If pressure loss is greater than 5 PSI, identify reason for pressure loss. Replace defective pipe, fitting, joint, valve, or appurtenance. Repeat test until pressure loss is equal to or less than 5 PSI.
 - 5. Visually inspect irrigation pipe for leakage and replace defective pipe, fitting, joint, valve, or appurtenance. Repeat test until pipe passes test.
 - 6. Cement or caulking to seal leaks is prohibited.
- G. Operational Test:
 - 1. Activate each remote control valve in sequence from controller. Provide either one additional personal with radio or use handheld remote to activate remote control valves from controller. Manually activating remote control valve using manual bleed mechanism at remote control valve is not an acceptable method of activation. Owner's Representative will visually observe operation, water application patterns, and leakage.
 - 2. Replace defective remote control valve, decoder, solenoid, two wire cable, wiring, or appurtenance to correct operational deficiencies.
 - 3. Replace, adjust, or move water emission devices to correct operational or coverage deficiencies.
 - 4. Replace defective pipe, fitting, joint, valve, sprinkler, or appurtenance to correct leakage problems. Cement or caulking to seal leaks is prohibited.
 - 5. Repeat test(s) until each lateral passes all tests. Repeat tests, replace components, and correct deficiencies at no additional cost to Owner.
- H. Copper Tracing Wire:
 - 1. Pass current through wire and demonstrate that wire is capable of locating all mainline pipe.
 - 2. If wire will not pass current, locate break in circuit, repair or replace wire or splice, and test until tracer wire works in accordance for its intended use.
- I. Control System Grounding:
 - 1. Test for proper grounding of control system and two wire cable per manufacturer's recommendations. Test results must meet or exceed manufacturer's guidelines for acceptance.
 - 2. Replace defective wire, grounding rods, or appurtenances. Repeat test until manufacturer's guidelines are met.
- J. Testina Review:

1. Failure of initial testing review will require additional review. Payment of costs, including travel expenses and site visits by Owner's Representative, for additional reviews that may be required due to non-compliance with the Construction Documents will be Contractor's responsibility.
- K. Field Mock Up:
1. Fabricate an on-site example of the following assemblies for demonstration prior to construction. The mock-ups must be presented to the Owner's Representative and meet approval prior to construction.
 - a. Remote Control Valve Assembly: Mock-up is to include remote control valve, wire splices, two wire cable, and decoder.
 - b. Decoder Grounding: Mock-up is to include decoder, wire splices, and grounding equipment.
- 1.11 CONSTRUCTION REVIEW
- A. The purpose of on-site reviews by Owner's Representative is to periodically observe work in progress, Contractor's interpretation of construction documents, and to address questions with regard to installation.
 - B. Schedule reviews for irrigation system layout or testing with Owner's Representative as required by these specifications.
 - C. Impromptu reviews may occur at any time during project.
 - D. A review will occur at completion of irrigation system installation and Project Record Drawing submittal.
- 1.12 WARRANTY
- A. Products will be free from defects in material and/or workmanship for a period of three years from the date of invoice.
 - B. The warranty does not apply to damage resulting from accident, alteration, misuse, tampering, negligence, or abuse.
 - C. Purchasers should be aware that normal use of these high quality products can result in superficial damage affecting the finish. Scratches, nicks, and dents are to be considered normal wear and tear, and are not the responsibility of the manufacturer.

PART 2 - PRODUCTS

2.1 QUALITY

- A. Use new materials without flaws or defects.

2.2 SUBSTITUTIONS

- A. Specified equipment is only used to denote the general style, type, character, and quality standard of the product desired. Bidders are not restricted to the specified brand, make, or manufacturer.
- B. Use specified equipment, or pre-approved equal. Alternative equipment must be approved by Landscape Architect prior to bidding. Changes and associated design costs to accommodate alternative equipment are Contractor's responsibility.
- C. Pipe sizes referenced in the construction documents are minimum sizes, and may be increased at Contractor's option.

2.3 PIPES AND TUBES

- A. Mainline Pipe and Fittings:
 1. Use rigid, unplasticized polyvinyl chloride (PVC) 1120, 1220 National Sanitation Foundation

- (NSF) approved pipe, extruded from material meeting requirements of Cell Classification 12454-A or 12454-B, ASTM Standard D1784, with integral belled end.
- 2. Use Schedule 40, Type 1 pipe, conforming to dimensions and tolerances established by ASTM Standard D2241.
- 3. Use solvent weld pipe for mainline pipe with nominal diameter less than or equal to 3-inches. Use Schedule 40, Type 1, PVC solvent weld fittings conforming to ASTM Standards D2466 and D1784. Use primer approved by pipe manufacturer. Use solvent cement conforming to ASTM Standard D2564.
- 4. Mainline pipe within sleeves: Use solvent weld pipe for mainline pipe with nominal diameter 3-inches and smaller installed within sleeves.
- B. Lateral Pipe and Fittings:
 - 1. Use rigid Use rigid, unplasticized polyvinyl chloride (PVC) 1120, 1220 National Sanitation Foundation (NSF) approved pipe, extruded from material meeting requirements of Cell Classification 12454-A or 12454-B, ASTM Standard D1784, with integral belled end suitable for solvent welding.
 - 2. Use Class 200, SDR-21, rated at 200 PSI, conforming to dimensions and tolerances established by ASTM Standard D2241SDR-26,. Use PVC pipe rated at higher pressures than Class 160 in cases where small nominal diameters are not manufactured in Class 160. Use solvent weld pipe for lateral pipe. Use Schedule 40, Type 1, PVC solvent weld fittings conforming to ASTM Standards D2466 and D1784 for PVC pipe. Use primer approved by pipe manufacturer. Solvent cement to conform to ASTM Standard D2564, of type approved by pipe manufacturer.
- C. Specialized Pipe and Fittings:
 - 1. Copper pipe: Use Type "K" rigid pipe conforming to ASTM Standard B88.
 - 2. Use wrought copper or cast bronze fittings, soldered, flared mechanical, or threaded joint per installation details or local code. Use a 95-percent tin and 5- percent antimony solder.
 - 3. Use dielectric union wherever copper-based metal (copper, brass, bronze) is joined to iron-based metal (iron, galvanized steel, stainless steel).
 - 4. Ductile iron pipe: Use Class 50 conforming to ANSI A21.51 (AWWA C151). Use mechanical joints conforming to ANSI A21.10 (AWWA C110) and ANSI A21.11 (AWWA C111).
 - 5. Galvanized steel pipe: use Schedule 40 conforming to ASTM Standard A53. Use galvanized, threaded, standard weight, malleable iron fittings.
 - 6. Use PVC Schedule 80 nipples and PVC Schedule 40 or 80 threaded fittings for threaded pipe connections.
 - 7. Joint sealant: Use non-hardening, nontoxic pipe thread sealant formulated for use on threaded connections and approved by pipe fitting or valvemanufacturer.

2.4 COPPER TRACING WIRE

- A. Use American Wire Gauge (AWG) No. 12-1 solid copper, 600 volt, Type UF or PE cable, UL approved for direct underground burial.
- B. Color: Tracing wire must be of color different from that of any active two wire cable, control wire, or common wire. Wire color shall be continuous over entire length.
- C. Splices: Use 3M DBR/Y wire connector with waterproof sealant.

2.5 MAINLINE COMPONENTS

- A. Check Valve Assembly: as presented in drawings and installation details.
- B. Blow Out Assembly: as presented in drawings and installation details.
- C. Isolation Gate Valve Assembly: as presented in drawings and installation details.
- D. Quick Coupling Valve Assembly: as presented in drawings and installation details.

2.6 SPRINKLER IRRIGATION COMPONENTS

- A. Check Remote Control Valve (RCV) Assembly for Sprinkler Laterals:
 - 1. Rainbird PESB
 - 2. Approved Equal
 - B. Sprinkler Assembly: as presented in drawings and installation details.
- 2.7 JOINING MATERIALS
- A. Solvent Cement: ASTM F 656 primer and ASTM D 2564 solvent cement.
- 2.8 BACKFLOW PREVENTERS
- A. See Plumbing Drawings.
- 2.9 AUTOMATIC CONTROL SYSTEM
- A. See Drawing for Irrigation Systems Components List.
 - B. Irrigation Controller Assembly:
 - 1. Controller
 - a. Rainbird ESP-LXD 2-wire Decoder Controller
 - b. Approved Equal
 - 2. Controller Assembly Enclosure: As presented in drawings and installation details.
 - 3. Electrical conduit: Use PVC Schedule 40 conduit conforming to dimensions and tolerances established by ASTM Standard D-1785. Use Schedule 40, Type 1, PVC solvent weld sweep fittings for PVC conduit conforming to ASTM Standards D2466 and D1784 for buried installations. Use rigid metallic conduit with sweep elbows for above-grade installations.
 - 4. Lightning protection: As presented in drawings and installation details.
 - 5. Wire markers: Prenumbered or labeled with indelible nonfading ink, made of permanent, nonfading material.
 - C. Two Wire Cable From Controller to Decoders:
 - 1. Use two wire cable per controller manufacturer's guidelines.
 - 2. Splices
 - a. 3M DBR/Y wire connector with waterproof sealant.
 - b. Approved Equal
 - 3. Electrical conduit: Use PVC Schedule 40 conduit conforming to dimensions and tolerances established by ASTM Standard D-1785. Use Schedule 40, Type 1, PVC solvent weld sweep fittings for PVC conduit conforming to ASTM Standards D2466 and D1784 for buried installations. Use rigid metallic conduit with sweep elbows for above grade installations.
 - 4. Warning tape: Inert plastic film highly resistant to alkalis, acids, or other destructive chemical components likely to be encountered in soils. Three inches wide, colored red, and imprinted with "CAUTION: BURIED ELECTRIC LINE BELOW."
 - D. Low Voltage Control Wire from Solenoid Valve to Decoder:
 - 1. Use American Wire Gauge (AWG) No. 14-1 solid copper, 600 volt, Type UF or PE cable, UL approved for direct underground burial for individual control wires from the decoder to each remote control valve assembly.
 - 2. Color: Use colors same as decoder station wires. Use easily distinguished colors for other control wires. Wire color shall be continuous over entire length.
 - 3. Use 3M DBR/Y wire connector with waterproof sealant.
 - E. Instrumentation:
 - 1. As presented in the drawings and installation details.
 - G. Rain Check: WR2-RFC-48. Location to be verified with Landscape Architect.
 - H. Controller Mount: Wall mounted – see irrigation drawings for location.
 - I. Other Components
 - 1. Tools and Spare Parts: Furnish operating keys, servicing tools, test equipment, spare parts and other items indicated in drawings and specifications.

2. Other Materials: Provide other materials or equipment shown on drawings or installation details that are part of irrigation system, even though items may not have been referenced in specifications.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Investigate and determine available water supply water pressure and flow characteristics.

3.2 PREPARATION

- A. Set stakes to identify proposed sprinkler locations. Obtain landscape Architect's approval before excavation.

3.3 PIPING APPLICATIONS

- A. Refer to Part 2 of this Section for detailed specifications for pipe and fittings products listed below. Use pipe, tube, fittings, and joining methods according to the following applications. Piping in pits and above ground may be joined with flanges instead of joints indicated.
- B. Use pipe, tube, fittings, and joining methods according to the following applications.
 1. Pressure Piping Above ground: Use the following:
 - a. ASTM D 1785, Schedule 40 PVC pipe, ASTM D 2466 Schedule 40 PVC fittings, solvent cemented joints.
 2. Pressure Piping Underground: Use the following:
 - a. Main Lines - ASTM D 2466 Schedule 40 PVC, ASTM D 2466 Schedule 40 PVC fittings, and solvent cemented joints
 - b. Lateral Lines - ASTM D 1785 Class 200 PVC pipe, ASTM D 2466 Schedule 40 PVC fittings, and solvent cemented joints
 - c. HDPE Pipe: Lateral piping in sleeves under building shall be 1" HDPE.
 3. Circuit Piping: Use the following:
 - a. ASTM D 1785 Class 200 PVC pipe, ASTM D 2466 Schedule 40 PVC fittings, and solvent cemented joints.
 4. Swing Joints: Use the following:
 - a. ASTM D1785 Schedule 40 PVC pipe, ASTM D 2466 Schedule 40 PVC fittings, and solvent cemented joints. (use only for 'rotor' type heads).
 - b. Plastic piping made for this application "Funny Pipe" shall be used instead of pipe and fittings specified for all 'spray' type heads.
 5. Sleeves: ASTM D 1785, Schedule 40, polyvinyl chloride (PVC) plastic pipe; ASTM D 2466, Schedule 40, PVC plastic, socket-type fittings and solvent- cemented joints.

3.4 JOINT CONSTRUCTION

- A. Polyvinyl Chloride (PVC) Piping Solvent-Cemented Joints: Construct joints according to ASTM D 2672 and ASTM D 2855.
 1. Handling of Solvent Cements, Primers and Cleaners: Comply with procedures in ASTM F 402 for safe handling when joining plastic pipe and fittings with solvent cements.

3.5 PIPING SYSTEMS – COMMON REQUIREMENTS

- A. General Locations and Arrangements: Drawings indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, and in other design considerations. Install piping as indicated, except where deviations to layout are approved on coordination drawings.
- B. Install components having pressure rating equal to or greater than system operating pressure.

- C. Install piping free of sags and bends.
- D. Locate groups of pipes parallel to each other, spaced to permit valve servicing.
- E. Install fittings for changes in direction and branch connections.

3.6 PIPING INSTALLATION

- A. Install underground piping according to ASTM D 2774.
- B. Lay piping on solid sub-base, uniformly sloped without humps or depressions.
 - 1. Slope exhaust header in drip system down toward drain valve minimum of ½ inch in 10 feet (1:240).
 - 2. Install polyvinyl chloride (PVC) plastic pipe in dry weather when temperature is above 40 deg F (4 deg C). Allow joints to cure at least 24 hours at temperature above 40 deg F (4 deg C) before testing, unless otherwise recommended by manufacturer.
- C. Drain Pockets for Drip System: Excavate to a minimum of 12" x 12".
 - 1. Backfill with cleaned gravel or crushed stone, graded from 3 inches (75mm) to ¾ inch (19mm) minimum.
- D. Minimum Cover: Provide following minimum cover over top of buried piping:
 - 1. Pressure Piping: Greater depth of minimum of 24 inches (915 mm) below finished grade, or not less than 18 inches (460 mm) below average local frost depth.
 - 2. Circuit Piping: 12 inches (300 mm).
 - 3. Drain Piping: 12 inches (300 mm).
 - 4. Sleeves: 24 inches (600 mm).
 - 5. Drip tube: 2"
- E. Tunneling: Install pipe under streets or other obstructions that cannot be disturbed, by tunneling, boring, or jacking.
- F. Install piping under sidewalks and paving in sleeves provided.

3.7 VALVE INSTALLATION

- A. Valves: Install underground valves in valve boxes.
- B. Control Valves: Install in valve control valve boxes, arranged for easy adjustment and removal. Install union on downstream side.

3.8 WATER METER INSTALLATION

- A. Install one appropriately-sized water meter that will be dedicated to irrigation system. Coordinate meter size with the local municipality or regulatory agency. Locate meter per layout on Drawings.

3.9 BACKFLOW PREVENTER INSTALLATION

- A. Contractor shall install the backflow prevention device at the location as shown on the Drawings.

3.10 SPRINKLER INSTALLATION

- A. Sprinklers: Flush circuit piping with full head of water and install sprinklers after hydrostatic test is completed.
 - 1. Install sprinklers at manufacturer's recommended heights.
 - 2. Locate sprinklers to maintain a minimum distance of 4 inches (100 mm) from walls and other structures, unless otherwise indicated.

3.11 AUTOMATIC CONTROL SYSTEM INSTALLATION

- A. Install control wiring in same trench with piping.

3.12 CONNECTIONS

- A. Connect piping to sprinklers, devices, valves, control valves, specialties, and accessories.
- B. Connect water supplies to irrigation systems. Include backflow preventers on potable water supplies.
- C. Electrical Connections: Connect to power source, controllers, and automatic control valves.
- D. Ground system

3.13 FIELD QUALITY CONTROL

- A. Testing: Perform hydrostatic test of piping and valves before back-filling trenches. Piping may be tested in sections to expedite work.
 - 1. Cap and subject the piping system to a static water pressure of 50 psi above the operating pressure without exceeding pressure rating of piping system materials. Isolate test source and allow to stand for 4 hours. Leaks and loss in test pressure constitute defects that must be repaired.
 - 2. Repair leaks and defects with new materials and retest system of portion thereof until satisfactory results are obtained

3.14 CLEANING AND ADJUSTING

- A. Flush dirt and debris from piping before installing sprinklers and other devices.
- B. Adjust automatic control valves to provide flow rate of rated operating pressure required for each sprinkler circuit.
- C. Adjust settings of controllers and automatic control valves.

3.15 COMMISSIONING

- A. Starting Procedures: Follow manufacturer's written procedures. If no procedures are prescribed by manufacturers, proceed as follows:
 - 1. Verify that specialty valves and their accessories have been installed correctly and operate correctly.
 - 2. Verify that specified tests of piping are complete.
 - 3. Check that sprinklers and devices are correct type.
 - 4. Check that damaged sprinklers and devices have been replaced with new materials.
 - 5. Check that potable water supplies have correct type backflow preventers.
 - 6. Energize circuits to electrical equipment and devices.
 - 7. Adjust operating controls.
- B. Operational Testing: Perform operational testing after hydrostatic testing is completed, backfill is in place, and sprinklers are adjusted to final position.

3.16 DEMONSTRATION

- A. Demonstrate to Landscape Architect that system meets coverage requirements and that automatic controls function properly.
- B. Demonstrate to Owner's maintenance personnel operation of equipment, sprinklers, specialties, and accessories. Review operating and maintenance information.
- C. Provide 7 days' written notice in advance of demonstration.

3.17 WARRANTY

- A. Contractor shall warranty entire system to be complete and operational for a period of one year from the date of final project acceptance.

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SECTION 329200
TURF AND GRASSES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
1. Fine grading and preparing lawn areas.
 2. Furnishing and applying new topsoil.
 3. Furnishing and applying soil amendments.
 4. Furnishing and applying fertilizers.
 5. Sodding new lawns.
 6. Replanting unsatisfactory or damaged lawns.
- B. Related Sections:
1. Section 311000 "Site Clearing" for topsoil stripping and stockpiling.
 2. Section 312000 "Earth Moving" for excavation, filling and backfilling, and rough grading.
 3. Section 328400 "Planting Irrigation " for turf irrigation.
 4. Section 329300 "Plants" for border edgings

1.3 DEFINITIONS

- A. Finish Grade: Elevation of finished surface of planting soil.
- B. Manufactured Topsoil: Soil produced off-site by homogeneously blending mineral soils or sand with stabilized organic soil amendments to produce topsoil or planting soil.
- C. Pesticide: A substance or mixture intended for preventing, destroying, repelling, or mitigating a pest. This includes insecticides, miticides, herbicides, fungicides, rodenticides, and molluscicides. It also includes substances or mixtures intended for use as a plant regulator, defoliant, or desiccant.
- D. Pests: Living organisms that occur where they are not desired or that cause damage to plants, animals, or people. These include insects, mites, grubs, mollusks (snails and slugs), rodents (gophers, moles, and mice), unwanted plants (weeds), fungi, bacteria, and viruses.
- E. Planting Soil: Standardized topsoil; existing, native surface topsoil; existing, in-place surface soil; imported topsoil; or manufactured topsoil that is modified with soil amendments and perhaps fertilizers to produce a soil mixture best for plant growth.
- F. Subgrade: Surface or elevation of subsoil remaining after excavation is complete, or top surface of a fill or backfill before planting soil is placed.
- G. Subsoil: All soil beneath the topsoil layer of the soil profile, and typified by the lack of organic matter and soil organisms.
- H. Surface Soil: Soil that is present at the top layer of the existing soil profile at the Project site. In undisturbed areas, the surface soil is typically topsoil, but in disturbed areas such as urban environments, the surface soil can be subsoil.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
 - 1. Pesticides and Herbicides: Include product label and manufacturer's application instructions specific to this Project.
 - 2. Product data for Soil Amendments and Fertilizer

1.5 INFORMATIONAL SUBMITTALS

- A. Certification of Sod: From sod vendor indicating the botanical and common name of the grass sod to be provided.
- B. Certification of Grass Seed: From seed vendor for each grass or meadow seed monostand or mixture stating the botanical and common name, percentage by weight of each species and variety, and percentage of purity, germination, and weed seed. Include the year of production and date of packaging.
- C. Qualification Data: For qualified landscape Installer.
- D. Product Certificates: For soil amendments and fertilizers, from manufacturer.
- E. Material Test Reports: For standardized ASTM D 5268 topsoil and imported or manufactured topsoil.
- F. Maintenance Instructions: Recommended procedures to be established by Owner for maintenance of turf during a calendar year. Submit before expiration of required initial maintenance periods.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified landscape Installer whose work has resulted in successful turf establishment.
 - 1. Experience: Five years' experience in turf installation in addition to requirements in Section 014000 "Quality Requirements."
 - 2. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on Project site when work is in progress.
 - 3. Pesticide Applicator: State licensed, commercial.
- B. Soil-Testing Laboratory Qualifications: An independent laboratory or university laboratory, recognized by the State Department of Agriculture, with the experience and capability to conduct the testing indicated and that specializes in types of tests to be performed.
- C. Soil Analysis: For each unamended soil type, furnish soil analysis and a written report by a qualified soil-testing laboratory stating percentages of organic matter; gradation of sand, silt, and clay content; cation exchange capacity; sodium absorption ratio; deleterious material; pH; and mineral and plant-nutrient content of the soil.
 - 1. Testing methods and written recommendations shall comply with USDA's Handbook No. 60.
 - 2. The soil-testing laboratory shall oversee soil sampling, with depth, location, and number of samples to be taken per instructions from Landscape Architect. A minimum of three representative samples shall be taken from varied locations for each soil to be used or amended for planting purposes.
 - 3. Report suitability of tested soil for turf growth.
 - a. Based on the test results, state recommendations for soil treatments and soil amendments to be incorporated. State recommendations in weight per 1000 sq. ft. or volume per cu. yd. for nitrogen, phosphorus, and potash nutrients and soil amendments to be added to produce satisfactory planting soil suitable for healthy, viable plants.
 - b. Report presence of problem salts, minerals, or heavy metals, including aluminum, arsenic, barium, cadmium, chromium, cobalt, lead, lithium, and vanadium. If such problem materials are present, provide additional recommendations for corrective action.
- D. Preinstallation Conference: Conduct conference at Project site.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Sod: Harvest, deliver, store, and handle sod according to requirements in "Specifications for Turfgrass Sod Materials" and "Specifications for Turfgrass Sod Transplanting and Installation" in TPI's "Guideline Specifications to Turfgrass Sodding." Deliver sod in time for planting within 24 hours of harvesting. Protect sod from breakage and drying.
- B. Bulk Materials:
 - 1. Do not dump or store bulk materials near structures, utilities, walkways and pavements, or on existing turf areas or plants.
 - 2. Provide erosion-control measures to prevent erosion or displacement of bulk materials, discharge of soil-bearing water runoff, and airborne dust reaching adjacent properties, water conveyance systems, or walkways.
 - 3. Accompany each delivery of bulk fertilizers, lime, and soil amendments with appropriate certificates.

1.8 PROJECT CONDITIONS

- A. Weather Limitations: Proceed with planting only when existing and forecasted weather conditions permit planting to be performed when beneficial and optimum results may be obtained. Apply products during favorable weather conditions according to manufacturer's written instructions.
- B. Planting Season: Hydroseed and install sod during normal planting seasons for the type of lawn work required. Correlate planting with specified maintenance periods to provide required maintenance from date of Substantial Completion.

1.9 MAINTENANCE SERVICE

- A. Initial Turf and Meadow Maintenance Service: Maintain as required in Part 3. Provide full maintenance by skilled employees of landscape Installer. Begin maintenance as required in Part 3 immediately after each area is planted and continue until Satisfactory Turf is established and accepted. The maintenance period shall not be less than the following periods:
 - 1. Sodded Turf: 30 days from date of Substantial Completion.
 - 2. Hydro-seeded Lawns: 90 days from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 TURFGRASS SOD

- A. Turfgrass Sod: Certified Number 1 Quality/Premium, including limitations on thatch, weeds, diseases, nematodes, and insects, complying with "Specifications for Turfgrass Sod Materials" in TPI's "Guideline Specifications to Turfgrass Sodding." Furnish viable sod at a thickness of approximately 2" and of uniform density, color, and texture, strongly rooted, and capable of vigorous growth and development when planted.
 - 1. Strongly rooted 'Palisades' Zoysia sod (or approved, similar Zoysia variety), not less than 3 years old, from off site source; free of weed, undesirable plants, large stone and other materials detrimental to development and maintenance of the lawn. Sod shall consist of ninety-five (95%) of the specified grass (Bermuda). Sod that fails to meet requirements shall be rejected.

2.2 INORGANIC SOIL AMENDMENTS

- A. Lime: ASTM C 602, agricultural liming material containing a minimum of 80 percent calcium carbonate equivalent and as follows:
 - 1. Class: T, with a minimum of 99 percent passing through No. 8 sieve and a minimum of 75 percent passing through No. 60 sieve.
 - 2. Provide lime in form of ground dolomitic limestone.

- B. Aluminum Sulfate: Commercial grade, unadulterated.

2.3 ORGANIC SOIL AMENDMENTS

- A. Compost: Well-composted, stable, and weed-free organic matter, pH range of 5.5 to 8; moisture content 35 to 55 percent by weight; 100 percent passing 1/2-inch sieve; soluble salt content of 5 to 10 decisiemens/m; not exceeding 0.5 percent inert contaminants and free of substances toxic to plantings; and as follows:
 - 1. Organic Matter Content: 50 to 60 percent of dry weight.
 - 2. Feedstock: Agricultural, food, or industrial residuals; biosolids; yard trimmings; or source-separated or compostable mixed solid waste.
- B. Sphagnum Peat: Partially decomposed sphagnum peat moss, finely divided or of granular texture, with a pH range of 3.4 to 4.8.
- C. Manure: Well-rotted, unleached, stable or cattle manure containing not more than 25 percent by volume of straw, sawdust, or other bedding materials; free of toxic substances, stones, sticks, soil, weed seed, and material harmful to plant growth.

2.4 FERTILIZERS

- A. Granular Fertilizer:
 - 1. Complete Fertilizer of 1-2-2 ratio.
 - 2. Gypsum or dolomite calcium fertilizer.
 - 3. Urea or IBDU fertilizer.
 - 4. Rates to be determined based on soil fertility analysis and environmental conditions.
- B. Liquid Biological and Biostimulant – Post sod installation
 - 1. Verma Plex® Concentrate or approved equal.
 - a. Apply 15 ounces per 1000 SF active ingredient with 3 gallons total spray volume per 1000 SF
 - 2. 6-20-6
 - a. Apply with VermaPlex at 15 ounces per 1000 SF active ingredient and a total spray volume of 3 gallons per 1000 SF.
 - 3. Do not mix with pesticides.
 - 4. Supplier:
 - a. Southern Organics & Supply
4813 East Fork Lane
Monroe, NC 28110
Phone: 866-240-8501
Web: www.southernorganicsandsupply.com

2.5 PLANTING SOILS

- A. Planting Soil: ASTM D 5268 topsoil, with pH range of 5.5 to 7, a minimum of 4 percent organic material content; free of stones 1 inch or larger in any dimension and other extraneous materials harmful to plant growth. Mix ASTM D 5268 topsoil with soil amendments and fertilizer at rates recommended
- B. General: Pesticide, registered and approved by EPA, acceptable to authorities having jurisdiction, and of type recommended by manufacturer for each specific problem and as required for Project conditions and application. Do not use restricted pesticides unless authorized in writing by authorities having jurisdiction.
- C. Pre-Emergent Herbicide (Selective and Non-Selective): Effective for controlling the germination or growth of weeds within planted areas at the soil level directly below the mulch layer.

2.6 MULCHES

- A. Straw Mulch: Provide air-dry, clean, mildew and seed-free, salt hay or threshed straw of wheat, rye, oats, or barley.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas to be planted for compliance with requirements and other conditions affecting performance.
 - 1. Verify that no foreign or deleterious material or liquid such as paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, or acid has been deposited in soil within a planting area.
 - 2. Do not mix or place soils and soil amendments in frozen, wet, or muddy conditions.
 - 3. Suspend soil spreading, grading, and tilling operations during periods of excessive soil moisture until the moisture content reaches acceptable levels to attain the required results.
 - 4. Uniformly moisten excessively dry soil that is not workable and which is too dusty.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.
- C. If contamination by foreign or deleterious material or liquid is present in soil within a planting area, remove the soil and contamination as directed by Landscape Architect and replace with new planting soil.

3.2 TURF AREA SOIL PREPARATION

- A. Protect structures, utilities, sidewalks, pavements, and other facilities, trees, shrubs, and plantings from damage caused by planting operations.
 - 1. Protect grade stakes set by others until directed to remove them.
- B. Install erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.
- C. Standard Turf Preparation: For new construction projects, projects with significant site renovations, areas of grade changes, areas of unacceptable topsoil, and all other areas with compacted soil conditions at the proposed lawn areas, especially in and around buildings, parking lots, or other hardscape areas, the following steps shall be taken:
 - 1. Limit preparation to areas that will be planted in the immediate future.
 - 2. Excavate and remove compacted or unacceptable soil to a depth of 4" below the final grade elevation in the turf areas.
 - 3. After excavation, loosen subgrade to a maximum depth of one inch (1"). Remove stones larger than 1-1/2 inches in any dimension and all sticks, roots, rubbish, and other extraneous matter. Agricultural lime, if required, shall be spread prior to scarifying the areas.
 - 4. Install 2" min. of clean topsoil on top of loosened subgrade.
 - 5. Apply soil amendments and fertilizers with topsoil at rates recommended. Delay mixing fertilizer if planting does not follow placing of planting soil within a few days. Either mix soil before spreading or apply soil amendments on surface of spread topsoil and mix thoroughly into topsoil before planting.
- D. Preparation of Unchanged Grades: Where lawns are to be planted in areas unaltered or undisturbed by excavating, grading, or surface soil stripping operations, or where existing topsoil is sufficient to support plant growth, prepare soil as follows:
 - 1. No sod cutting, application of herbicides, or soil placement shall be permitted beneath the canopies of existing trees that are scheduled to remain, except at the direction of the Landscape Architect.

2. Apply approved grass and weed herbicide on area to be sodded at manufacturer's recommended rate and under weather condition to be effective. Avoid overspray onto adjacent areas and other plant materials.
 3. Areas to receive slab sod shall be pulverized to a depth of at least 3", graded and cleared of weeds, roots, grass, stones and other debris. Excessive roots, which may be present in some areas where trees have been removed, shall be removed by hand or mechanical method. Remove waste material, including grass, vegetation, and turf, and legally dispose of it off the Owner's property. Agricultural lime, if required, shall be spread prior to scarifying the areas.
 4. Apply required soil amendments and initial fertilizers and mix thoroughly into scarified soil to meet proposed grade.
- E. Grade lawns and grass areas to a smooth, even surface with loose, uniformly fine texture. Roll and rake, remove ridges, and fill depressions to meet finish grades. Limit fine grading to areas that can be planted in the immediate future. Remove trash, debris, stones larger than 1-1/2 inches in any dimension, and other objects that may interfere with planting or maintenance operations.
 - F. Moisten prepared lawn areas before planting when soil is dry. Water thoroughly and allow surface to dry before planting. Do not create muddy soil.
 - G. Restore prepared areas if eroded or otherwise disturbed after fine grading and before planting.
 - H. Before planting, obtain Landscape Architect's acceptance of finish grading; restore planting areas if eroded or otherwise disturbed after finish grading.

3.3 SODDING NEW LAWNS

- A. Lay sod within 24 hours of harvesting. Do not lay sod if dormant or if ground is frozen or muddy.
- B. Sod shall be placed in areas designated on the drawings. Sod to be installed prior to October 15th.
 1. Sod shall be harvested in 42-inch and 21-inch widths. Depth of soil harvested for sod shall be 0.25 to 0.5 inches measured from below the thatch layer.
 2. When placing sod, the Contractor shall use great care so as not to disturb the finished grades of the rootzone mix. Contractor will make provisions to avoid rutting of the Rootzone Mix. Equipment used to lay sod shall have large floatation tires. Equipment is not allowed to drive over laid sod.
 3. The first row of sod should, if possible, be laid in a straight line with subsequent rows placed parallel and tightly against one another. Lateral joints shall be staggered 36 inches minimum to promote more uniform growth and strength. Do not stretch or overlap sod pieces. All joints are butted tight in order to prevent voids. Lap ends of sod rolls 6" and cut new tight joint.
 4. Lay sod across angle of slopes exceeding 1:3.
 5. Anchor sod on slopes exceeding 1:6 with wood pegs or steel staples spaced as recommended by sod manufacturer but not less than 2 anchors per sod strip to prevent slippage.
- C. Saturate sod with fine water spray within two hours of planting. During first week after planting, water daily or more frequently as necessary to maintain moist soil to a minimum depth of 1-1/2 inches below sod.

3.4 POST INSTALLATION TURF MAINTENANCE

- A. The Contractor shall be responsible for the maintenance, fertilization, watering, performance, and operation of the turf area for the specified maintenance period. Maintenance shall consist of watering, replanting, maintaining existing grades, and repair of erosion damage as specified and any other work incidental to proper maintenance.
 1. When the surface to be grassed becomes gullied or otherwise damaged or repair work is required due to faulty operations or negligence on the part of the contractor, repair work shall be performed at no additional cost to the owner.
- B. Mowing: One mowing shall be performed at the time that the grass obtains a height of two inches (2"). At that time, it shall be mowed to a height of one and a half inches (1-1/2"). Repeat mowing as required to maintain specified height without cutting more than 40 percent of the grass height.

Remove no more than 40 percent of grass-leaf growth in initial or subsequent mowings, to maintain grass height of 1½" - 2".

- C. Weed and Pest Control: The Contractor is to maintain the turf free from disease and infestation. Required treatments will be made according to the needs of the turf as determined by the Owner's Representative. Comply with applicable requirements of Federal, State, and Local laws, regulations and codes having jurisdiction over chemical treatments.
- D. Maintenance Log: The Contractor shall maintain a log of all maintenance activities on the construction site at all times. Make a daily record of all work performed until final acceptance of the work, including:
 - 1. Daily soil and ambient temperature measurements at a minimum of 2 times per day at peak temperature periods of the day.
 - 2. Chemical application logs – All labels, application rates, equipment used to apply chemicals shall be kept in the maintenance log. Chemicals shall include all fertilizers, bio-stimulants, growth regulators, and pesticides.
 - 3. Irrigation applications – Any use of the irrigation system should be documented as to zones used, duration of application, and any problems with coverage or system components.
 - 4. System repair logs for each system must be maintained. Record replaced or repaired items such as irrigation heads and valves, or any drainage components in the appropriate system repair log.
- E. Watering: Install and maintain permanent or temporary piping, hoses, and turf-watering equipment (if necessary) to convey water from sources and to keep turf uniformly moist to a depth of 2 inches.
 - 1. Schedule watering to prevent wilting, puddling, erosion, and displacement of seed or mulch. Lay out temporary watering system to avoid walking over muddy or newly planted areas.
 - 2. Water turf with fine spray at a minimum rate of 1 inch per week unless rainfall precipitation is adequate.
- F. Turf post fertilization: Apply fertilizer after initial mowing and when grass is dry.
 - 1. Use fertilizer that will provide actual nitrogen of at least 1 lb/1000 sq. ft. to turf area.
- G. Inspection and Acceptance: Acceptance of Satisfactory Turf as outlined herein will be determined by visual inspection after the completion of the initial maintenance period.

3.5 SATISFACTORY TURF

- A. Turf installations shall meet the following criteria as determined by Landscape Architect
 - 1. Turf has rooted into the Rootzone mix to a depth of 3 inches.
 - 2. The turfgrass surface has a smooth appearance and no erosion or washout problems are visible
 - 3. Turf is free of dead or bare spots in excess of 3 square inches in 5,000 SF.
- B. Replant or repair lawns that are unsatisfactory.
 - 1. Use specified materials to reestablish turf that does not comply with requirements and continue maintenance until turf is satisfactory.

3.6 PESTICIDE APPLICATION

- A. Apply pesticides and other chemical products and biological control agents in accordance with requirements of authorities having jurisdiction and manufacturer's written recommendations. Coordinate applications with Owner's operations and others in proximity to the Work. Notify Owner before each application is performed.

3.7 CLEANUP AND PROTECTION

- A. Promptly remove soil and debris created by turf work from paved areas. Clean wheels of vehicles before leaving site to avoid tracking soil onto roads, walks, or other paved areas.

- B. Erect temporary fencing or barricades and warning signs as required to protect newly planted areas from traffic. Maintain fencing and barricades throughout initial maintenance period and remove after plantings are established.
- C. Remove nondegradable erosion-control measures after grass establishment period.

END OF SECTION 329200

SECTION 32 93 00

PLANTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Excavation as required for all planting and backfilling tree pits.
 - 2. Minor filling and leveling as necessary to ensure survival of plants in all areas.
 - 3. Furnishing, transporting, preparing and placing of prepared topsoil for plant beds.
 - 4. Bed preparation.
 - 5. Steel Landscape Edging
 - 6. Furnishing and planting of tree, shrubs, and ground covers as indicated on Drawings.
 - 7. Staking trees.
 - 8. Samples and analyses for approval.
 - 9. Maintenance during Period of Establishment (365 days), and one-year plant material guarantee.
 - 10. Landscape gravel
 - 11. Replacement of unsatisfactory plant material.
- B. Related Sections:
 - 1. Section 015639 "Temporary Tree and Plant Protection" for protecting, trimming, pruning, repairing, and replacing existing trees to remain that interfere with, or are affected by, execution of the Work.
 - 2. Section 311000 "Site Clearing" for protection of existing trees and plantings, topsoil stripping and stockpiling, and site clearing.
 - 3. Section 312000 "Earth Moving" for excavation, filling, and rough grading and for subsurface aggregate drainage and drainage backfill materials.
 - 4. Section 329200 "Turf and Grasses" for turf (lawn)

1.3 DEFINITIONS

- A. Backfill: The earth used to replace or the act of replacing earth in an excavation.
- B. Balled and Burlapped Stock: Plants dug with firm, natural balls of earth in which they were grown, with ball size not less than diameter and depth recommended by ANSI Z60.1 for type and size of plant required; wrapped with burlap, tied, rigidly supported, and drum laced with twine with the root flare visible at the surface of the ball as recommended by ANSI Z60.1.
- C. Container-Grown Stock: Healthy, vigorous, well-rooted plants grown in a container, with a well-established root system reaching sides of container and maintaining a firm ball when removed from container. Container shall be rigid enough to hold ball shape and protect root mass during shipping and be sized according to ANSI Z60.1 for type and size of plant required.
- D. Finish Grade: Elevation of finished surface of planting soil.
- E. Manufactured Topsoil: Soil produced off-site by homogeneously blending mineral soils or sand with stabilized organic soil amendments to produce topsoil or planting soil.
- F. Pesticide: A substance or mixture intended for preventing, destroying, repelling, or mitigating a pest. This includes insecticides, miticides, herbicides, fungicides, rodenticides, and molluscicides. It also includes substances or mixtures intended for use as a plant regulator, defoliant, or desiccant.
- G. Pests: Living organisms that occur where they are not desired, or that cause damage to plants,

animals, or people. These include insects, mites, grubs, mollusks (snails and slugs), rodents (gophers, moles, and mice), unwanted plants (weeds), fungi, bacteria, and viruses.

- H. Planting Area: Areas to be planted.
- I. Planting Soil: Standardized topsoil; existing, native surface topsoil; existing, in-place surface soil; imported topsoil; or manufactured topsoil that is modified with soil amendments and perhaps fertilizers to produce a soil mixture best for plant growth.
- J. Plant; Plants; Plant Material: These terms refer to vegetation in general, including trees, shrubs, vines, ground covers, ornamental grasses, bulbs, corms, tubers, or herbaceous vegetation.
- K. Root Flare: Also called "trunk flare." The area at the base of the plant's stem or trunk where the stem or trunk broadens to form roots; the area of transition between the root system and the stem or trunk.
- L. Stem Girdling Roots: Roots that encircle the stems (trunks) of trees below the soil surface.
- M. Subgrade: Surface or elevation of subsoil remaining after excavation is complete, or the top surface of a fill or backfill before planting soil is placed.
- N. Subsoil: All soil beneath the topsoil layer of the soil profile, and typified by the lack of organic matter and soil organisms.
- O. Surface Soil: Soil that is present at the top layer of the existing soil profile at the Project site. In undisturbed areas, the surface soil is typically topsoil; but in disturbed areas such as urban environments, the surface soil can be subsoil.
- P. Contractor: The term "Contractor" as referred to in this section only means the Landscape Contractor. The Landscape Contractor shall be currently licensed by the Louisiana Horticulture Commission to do landscape contracting work in the State of Louisiana.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated, including soils.
 - 1. Plant Materials: Include quantities, sizes, quality, and sources for plant materials.
 - 2. Pesticides and Herbicides: Include product label and manufacturer's application instructions specific to the Project.
 - 3. Plant Photographs: Include color photographs in digital format of each required species and size of plant material as it will be furnished to the Project. Take photographs from an angle depicting true size and condition of the typical plant to be furnished. Include a scale rod or other measuring device in each photograph. For species where more than 20 plants are required, include a minimum of three photographs showing the average plant, the best quality plant, and the worst quality plant to be furnished. Identify each photograph with the full scientific name of the plant, plant size, and name of the growing nursery.
 - 4. Steel Landscape Edging
- B. Samples for Verification: For each of the following:
 - 1. Mulch: 1-quart volume of each organic mulch required; in sealed plastic bags labeled with composition of materials by percentage of weight and source of mulch. Each Sample shall be typical of the lot of material to be furnished; provide an accurate representation of color, texture, and organic makeup.
 - 2. Steel Landscape Edging Materials and Accessories: Manufacturer's standard size, to verify color selected.
 - 3. Tree Staking System: Submit 1 full staking system for review
 - 4. Rock and Gravel Types: 1-quart volume of rock or gravel type required; in sealed plastic bags labeled by type. Each Sample shall be typical of the lot of material to be furnished; provide an accurate representation of color, and texture.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified landscape Installer. Include list of similar projects completed by Installer demonstrating Installer's capabilities and experience. Include project names, addresses, and year completed, and include names and addresses of owners' contact persons.
- B. Product Certificates: For each type of manufactured product, from manufacturer, and complying with the following:

1. Manufacturer's certified analysis of standard products.
 2. Analysis of other materials by a recognized laboratory made according to methods established by the Association of Official Analytical Chemists, where applicable.
- C. Material Test Reports: For standardized ASTM D 5268 topsoil existing native surface topsoil existing in-place surface soil and imported or manufactured topsoil.
- D. Maintenance Instructions: Recommended procedures to be established by Owner for maintenance of plants during a calendar year. Submit before start of required maintenance periods.
- E. Warranty: Sample of special warranty.

1.6 APPLICABLE STANDARDS

- A. Work shall be in strict accordance with sound nursery practice. The following documents, used as standards, are to be considered part of these Specifications.
1. American Standard for Nursery Stock, Latest edition, as published by the American Association of Nurserymen, Inc.
 2. Standardized Plant Names, latest edition, as adopted by the American-Joint Committee on Horticultural Nomenclature.
 3. Grades and Standards for Landscape Materials, latest edition, as prepared by the Louisiana Association of Nurserymen, Inc.

1.7 SPECIAL LANDSCAPE PROVISIONS

- A. Contractor: The term "Contractor" as referred to in this section only means the Landscape Contractor. The Landscape Contractor shall be currently licensed by the Louisiana Horticulture Commission to do landscape contracting work in the State of Louisiana.
- B. Water: All proposed landscaping is to be irrigated under an automatic irrigation system. It is the Contractor's responsibility to ensure proper scheduling and quantity of watering of all plant material.
- C. Finished Grading: It shall be the Contractor's responsibility to do whatever additional fine grading as may be required to bring areas to be planted back up to the existing finished grades or to grades specified on the Drawings or these Specifications. This shall also apply to existing slopes, berms, or lawn areas damaged during the Work herein, and the Contractor shall replace or repair and such existing area to return it to its original grade or condition.
- D. Disposal of Waste Materials: Reusable items are to be removed and stored in such a manner that they may be used again. The Owner shall have priority for the selection of salvaged equipment and materials. Any excess soil and/or other materials determined to remain as the property of the Owner shall be removed and delivered to a location as designated by the Owner. Materials not retained by the Owner shall become the property of the Contractor and shall be removed from the site by the Contractor.
- E. Period of Establishment and Replacement
1. Upon the completion of planting, and providing plants are in place, living and conform to these Specifications, this portion of the Contract will be given provisional acceptance.
 2. The Contractor shall be responsible for replacing dead, damaged, or unhealthy plant materials and in general insuring proper plant growth by watering as needed for a Period of Establishment, which shall be 365 calendar days after the provisional acceptance is made. Plant materials shall be guaranteed for a period of one year after provisional acceptance.
 3. Plant materials, which have partially died so that the shape, size, or symmetry has been damaged, shall be considered subject to replacement. In such case, the opinion of the owner shall be final.
 4. Plants used for replacement shall be of the same quantity, size, kind and quality as those originally planted, and they shall be planted as originally specified. This extra work, including materials, labor, and equipment used in replacements, shall be at no cost to the Owner. Replaced plants shall carry the same establishment period as the original. Damage, including ruts in lawn or bed areas, existing utilities, paving, and other improvements, incurred in making replacements shall be immediately repaired to the satisfaction of the Owner.

5. At the direction of the Owner, plants may be replaced at the start of the next year's planting or digging season, but in such cases, dead plants shall be removed from the premises immediately.
6. The Contractor agrees that for the Period of Establishment, he will water the plants during dry periods.
7. This replacement guarantee does not apply where plants die after final acceptance because of injury by storm, hail, non-treatable insects and diseases, or vandalism.
8. Final acceptance will be made only if all plants are in place, living, and are in conformance with the Drawings and these special provisions.

1.8 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified landscape Installer whose work has resulted in successful establishment of plants.
 1. Experience; Five years' experience in landscape installation in addition to requirements in Section 014000 "Quality Requirements."
 2. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on Project site when work is in progress.
 3. Pesticide Applicator: State licensed, commercial.
- B. Soil-Testing Laboratory Qualifications: An independent or university laboratory, recognized by the State Department of Agriculture, with the experience and capability to conduct the testing indicated and that specializes in types of tests to be performed.}
- C. Soil Analysis: For each unamended soil type, furnish soil analysis and a written report by a qualified soil-testing laboratory stating percentages of organic matter; gradation of sand, silt, and clay content; cation exchange capacity; sodium absorption ratio; deleterious material; pH; and mineral and plant-nutrient content of the soil.
 1. Testing methods and written recommendations shall comply with USDA's Handbook No. 60.
 2. The soil-testing laboratory shall oversee soil sampling; with depth, location, and number of samples to be taken per instructions from Landscape Architect. A minimum of three representative samples shall be taken from varied locations for each soil to be used or amended for planting purposes.
 3. Report suitability of tested soil for plant growth.
 - a. Based upon the test results, state recommendations for soil treatments and soil amendments to be incorporated. State recommendations in weight per 1000 sq. ft. or volume per cu. yd. for nitrogen, phosphorus, and potash nutrients and soil amendments to be added to produce satisfactory planting soil suitable for healthy, viable plants.
 - b. Report presence of problem salts, minerals, or heavy metals, including aluminum, arsenic, barium, cadmium, chromium, cobalt, lead, lithium, and vanadium. If such problem materials are present, provide additional recommendations for corrective action.
- D. Provide quality, size, genus, species, and variety of plants indicated, complying with applicable requirements in ANSI Z60.1.
- E. Measurements: Measure according to ANSI Z60.1. Do not prune to obtain required sizes.
 1. Trees and Shrubs: Measure with branches and trunks or canes in their normal position. Take height measurements from or near the top of the root flare for field-grown stock and container grown stock. Measure main body of tree or shrub for height and spread; do not measure branches or roots tip to tip. Take caliper measurements 6 inches above the root flare for trees up to 4-inch caliper size, and 12 inches above the root flare for larger sizes.
 2. Other Plants: Measure with stems, petioles, and foliage in their normal position.
- F. Plant Material Observation: Landscape Architect may observe plant material either at place of growth or at site before planting for compliance with requirements for genus, species, variety, cultivar, size, and quality. Landscape Architect retains right to observe trees and shrubs further for size and condition of balls and root systems, pests, disease symptoms, injuries, and latent defects and to reject unsatisfactory or defective material at any time during progress of work. Remove rejected trees or shrubs immediately from Project site.
 1. Notify Landscape Architect of sources of planting materials seven days in advance of delivery to site.

- G. Pre-installation Conference: Conduct conference at Project site.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Packaged Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and indication of conformance with state and federal laws if applicable.
- B. Bulk Materials:
 - 1. Do not dump or store bulk materials near structures, utilities, walkways and pavements, or on existing turf areas or plants.
 - 2. Provide erosion-control measures to prevent erosion or displacement of bulk materials, discharge of soil-bearing water runoff, and airborne dust reaching adjacent properties, water conveyance systems, or walkways.
 - 3. Accompany each delivery of bulk fertilizers, lime, and soil amendments with appropriate certificates.
- C. Do not prune trees and shrubs before delivery. Protect bark, branches, and root systems from sun scald, drying, wind burn, sweating, whipping, and other handling and tying damage. Do not bend or bind-tie trees or shrubs in such a manner as to destroy their natural shape. Provide protective covering of plants during shipping and delivery. Do not drop plants during delivery and handling.
- D. Handle planting stock by root ball.
- E. Store bulbs, corms, and tubers in a dry place at 60 to 65 deg F until planting.
- F. Deliver plants after preparations for planting have been completed, and install immediately. If planting is delayed more than six hours after delivery, set plants and trees in their appropriate aspect (sun, filtered sun, or shade), protect from weather and mechanical damage, and keep roots moist.
 - 1. Set balled stock on ground and cover ball with soil, peat moss, sawdust, or other acceptable material.
 - 2. Do not remove container-grown stock from containers before time of planting.
 - 3. Water root systems of plants stored on-site deeply and thoroughly with a fine-mist spray. Water as often as necessary to maintain root systems in a moist, but not overly-wet condition.

1.10 PROJECT CONDITIONS

- A. Field Measurements: Verify actual grade elevations, service and utility locations, irrigation system components, and dimensions of plantings and construction contiguous with new plantings by field measurements before proceeding with planting work.
- B. Interruption of Existing Services or Utilities: Do not interrupt services or utilities to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary services or utilities according to requirements indicated:
 - 1. Notify Landscape Architect and Owner no fewer than three days in advance of proposed interruption of each service or utility.
 - 2. Do not proceed with interruption of services or utilities without Landscape Architect's or Owner's written permission.
- C. Planting Restrictions: Plant during normal planting seasons. Coordinate planting periods with maintenance periods to provide required maintenance from date of Substantial Completion.
- D. Weather Limitations: Proceed with planting only when existing and forecasted weather conditions permit planting to be performed when beneficial and optimum results may be obtained. Apply products during favorable weather conditions according to manufacturer's written instructions and warranty requirements.
- E. Coordination with Turf Areas (Lawns): Plant trees, shrubs, and other plants after finish grades are established and before planting turf areas unless otherwise indicated.
 - 1. When planting trees, shrubs, and other plants after planting turf areas, protect turf areas, and promptly repair damage caused by planting operations.

1.11 WARRANTY

- A. Special Warranty: Installer agrees to repair or replace plantings and accessories that fail in materials, workmanship, or growth within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Death and unsatisfactory growth, except for defects resulting from abuse, lack of adequate maintenance, or neglect by Owner, or incidents that are beyond Contractor's control.
 - b. Structural failures including plantings falling or blowing over.
 - c. Faulty performance of tree stabilization metal edgings.
 - d. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
 - 2. Warranty Periods from Date of Substantial Completion:
 - a. Trees, Shrubs, Vines, and Ornamental Grasses: 12 months.
 - b. Ground Covers, Biennials, Perennials, and Other Plants: 12 months.
 - c. Annuals: Three months.
 - 3. Include the following remedial actions as a minimum:
 - a. Immediately remove dead plants and replace unless required to plant in the succeeding planting season.
 - b. Replace plants that are more than 25 percent dead or in an unhealthy condition at end of warranty period.
 - c. A limit of one replacement of each plant will be required except for losses or replacements due to failure to comply with requirements.
 - d. Provide extended warranty for period equal to original warranty period, for replaced plant material.

1.12 MAINTENANCE SERVICE

- A. Initial Maintenance Service for Trees and Shrubs: Provide maintenance by skilled employees of landscape Installer. Maintain as required in Part 3. Begin maintenance immediately after plants are installed and continue until plantings are acceptably healthy and well established but for not less than maintenance period below.
 - 1. Maintenance Period: Twelve (12) months from date of Substantial Completion.
- B. Initial Maintenance Service for Ground Cover and Other Plants: Provide maintenance by skilled employees of landscape Installer. Maintain as required in Part 3. Begin maintenance immediately after plants are installed and continue until plantings are acceptably healthy and well established but for not less than maintenance period below.
 - 1. Maintenance Period: Twelve (12) months from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PLANT MATERIAL

- A. General: Furnish No. 1 grade or better nursery-grown plants true to genus, species, variety, cultivar, stem form, shearing, and other features indicated in Plant Schedule or Plant Legend shown on Drawings and complying with ANSI Z60.1; and with healthy root systems developed by transplanting or root pruning. Provide well-shaped, fully branched, healthy, vigorous stock, densely foliated when in leaf and free of disease, pests, eggs, larvae, and defects such as knots, sun scald, injuries, abrasions, and disfigurement.
 - 1. Trees with damaged, crooked, or multiple leaders; tight vertical branches where bark is squeezed between two branches or between branch and trunk ("included bark"); crossing trunks; cut-off limbs more than 3/4 inch in diameter; or with stem girdling roots will be rejected.
 - 2. Collected Stock: Do not use plants harvested from the wild, from native stands, from an established landscape planting, or not grown in a nursery unless otherwise indicated.
- B. Quality and Size
 - 1. Specific requirements concerning the various species, sizes, and manner in which they are to be furnished are shown on the Plans and Plant List.

2. Provide plants of sizes, grades, and ball or container sizes complying with ANSI Z60.1 for types and form of plants required. Plants of a larger size may be used if acceptable to Landscape Architect, with a proportionate increase in size of roots or balls.
 3. Plants and trees shall equal or exceed the measurements specified in the Plant List, which are minimum acceptable sizes. They shall be measured before pruning, with branches in normal position. Dimensions for height and spread as contained herein refer to the main body of the plant and not from branch tip to branch tip. No pruning of branches to obtain the required height shall be done before the plants are delivered to the site unless so approved by the Owner.
 4. Stock furnished in a size range specified shall be interpreted to mean that not less than fifty percent (50%) shall be of the maximum size specified.
 5. The determining measurements for the trees shall be the caliper and/or height as described in the Plant List. Caliper shall be taken three (3) feet above the top of the root ball.
 6. Plants larger in size than specified in the Plant List may be used if approved by the Owner, but the use of larger plants shall not increase the contract price. If the use of larger plants is approved, the ball of earth shall be increased in proportion to the size of the plant.
 7. Plants shall have a habit growth, which is normal for the species and shall be sound, healthy, vigorous, and free from insect pests, plant diseases, injuries, and aftereffects thereof.
 8. Nursery grown plants shall mean plants, which are healthy, vigorous, plants, lined out in rows in a nursery and which are cultivated, sprayed, pruned, and fertilized in accordance with good horticulture practice.
 9. No trees, which have had their leaders cut, or have been damaged so that cutting is necessary, will be accepted.
 10. Plants lacking compactness or proper proportions and plants injured by being planted too close in nursery rows will not be accepted.
 11. Plants shall be freshly dug or containerized; neither heeled-in plants nor plants from cold storage will be accepted. Nursery grown plants shall have been transplanted or root pruned at least once in the past three years.
 12. Plants designated "B&B" in the Plant List shall be balled and burlapped. Requirements for the measurement, branching, grading, quality, balling and burlapping of the plants generally follow the code of standards in the "American Standard of Nursery Stock". They shall be dug with firm, natural balls of earth sufficient diameter and depth to encompass the plant. Balls shall be firmly wrapped with burlap or similar material and bound with twine or cord. Plants with a rootball greater than or equal to 20 inches in diameter shall be placed in a properly sized wire basket for transport and handling. After planting, the wire basket is to be cut away and removed. Any plant with a loose soil ball or broken ball at the time of planting will be rejected.
 13. The balls of "B&B" plants, which cannot be planted immediately on delivery, shall be covered with moist soil or mulch, or other protection from drying winds and sun. Bare rooted plants will not be allowed. Plants shall be watered as necessary by the Contractor until planting.
 14. Plants grown in containers shall be fully rooted throughout the earth ball within the container, but not root bound. Container plants must be acclimated to area conditions.
- C. Shape and Form:
1. Plant material shall be symmetrical, typical for the variety and species, and shall conform to the measurements specified in the Plant List. Plants used where symmetry is required shall be matched as nearly as possible.
 2. Plants meeting the requirements specified in the Plant List, but not possessing a normal balance between height and spread will be rejected.
 3. No plant shall be bound with wire or rope at any time so as to damage the bark or break the branches. After planting, wires and ropes will be removed.
- D. Inspection / Rejection: The Owner may inspect plants at place of growth, but such inspection does not preclude the right of rejection on site. Any materials may be rejected if, in the opinion of the Owner, such does not meet the requirements of the Plant List, Drawings, or Specifications. Rejected materials shall be removed from the site by the Contractor at no cost to the Owner.
- E. Plant Material Selection: Contractor shall make provision for Owner approval of all plant material to be used prior to installation (except those plant materials pre-selected by Owner). Approval of plant material may require a site visit to nursery of field where material is grown. Expense of any site visit for plant material approval/selection will be the responsibility of the contractor.

- F. Substitutions: Will not be permitted without approval of Landscape Architect. If proof is submitted that any plant specified is not reasonably obtainable, a proposal will be considered for the use of the nearest equivalent size or variety with an equitable adjustment of Contract price. Notification of possible substitutions prior to award of Contract will be made at least 7 DAYS prior to bid opening.
- G. Quantities: Quantities necessary to complete the planting as shown and located on the Drawings shall be furnished. Dimension for ground cover beds have, in all instances, been established from scaled drawings. It is the Contractor's responsibility to check these dimensions on the site and allow for correct quantity of plants accordingly.
- H. Root-Ball Depth: Furnish trees and shrubs with root balls measured from top of root ball, which shall begin at root flare according to ANSI Z60.1. Root flare shall be visible before planting.
- I. Labeling: Label each plant of each variety, size, and caliper with a securely attached, waterproof tag bearing legible designation of common name and full scientific name, including genus and species. Include nomenclature for hybrid, variety, or cultivar, if applicable for the plant as shown on Drawings.
- J. If formal arrangements or consecutive order of plants is shown on Drawings, select stock for uniform height and spread, and number the labels to assure symmetry in planting.
- K. Annuals and Biennials: Provide healthy, disease-free plants of species and variety shown or listed, with well-established root systems reaching to sides of the container to maintain a firm ball, but not with excessive root growth encircling the container. Provide only plants that are acclimated to outdoor conditions before delivery and that are in bud but not yet in bloom.

2.2 SOIL PREPARATION MATERIAL

- A. Topsoil: Topsoil shall be fertile, friable soil obtained from well drained arable land. It shall be free draining, non-toxic and capable of sustaining healthy plant growth. Topsoil shall be reasonably free of calcium carbonate, subsoil, refuse, roots, and other deleterious substances. The contractor shall furnish a written soil analysis prepared by an accredited soil analyst. The analysis shall indicate pH, total soluble salts, and plasticity index and particle size gradation.
- B. Sand: Sand shall be loose, granular soil containing particles smaller than gravel but coarser than silt. Sandy soil shall obtain a minimum of 90% sand and no greater than 5% clay.
- C. Peat Moss: Peat moss shall be imported Canadian sphagnum peat moss, brown, low in content of woody material and free of any mineral matter harmful to plant life. Peat moss shall have an acid rating of approximately 4.5 pH and have a water absorbing capacity of 1100 to 1200 % by weight. Peat moss shall be thoroughly pulverized before use except when used as a top-dressing. No native or sedge peats shall be approved.
- D. Organic Soil Conditioner: Organic soil conditioner shall be partially decomposed ground pine bark. Sawdust will not be accepted. Particle size and surface area shall be such as to resist displacement by wind or by surface storm water or irrigation runoff for two growing seasons.
- E. Commercial Fertilizer: Fertilizer shall be a complete, slow release, 12-6-6 fertilizer or approved alternate delivered in original unopened containers bearing the manufacturer's guaranteed analysis. To be applied at manufacturer's recommended rate.
- F. Herbicide: Snapshot brand pre-emergent herbicide manufactured by Dow Agra or approved equal, applied at manufacturer's recommendations.
- G. Composted Cow Manure: Composted cow manure shall be a minimum of 50% cow manure by weight. Contractor to provide sample and analysis for approval by Landscape Architect.
- H. Standard Planting Bed Mix: This mix shall be used for all planting bed areas and pits unless otherwise noted and shall consist of:
 - 1. 1 CY Organic Soil Conditioner per 50SF of bed area
 - 2. 1 CY Composted Cow Manure per 150SF of bed area
 - 3. 1 3.8 CF Bale of Peat Moss or coffee chaff per 50SF of bed area
 - 4. Sandy Topsoil may be added to be planting mix if the existing soil is of poor quality. The Landscape Architect will make this determination prior to beginning of work.
 - 5. Commercial Fertilizer and Pre-emergent Herbicide per manufacturer's recommendations.
 - 6. Topdressing shall be Standard Bed Mulch as listed below.
 - 7. Substitutions may be made on the advice of the Landscape Architect.
- I. Modified Planting Bed Mix: This mix shall be used for all planting bed areas located within the drip lines of existing live oak trees:

1. Begin by clearing underbrush and any debris. Any existing mulch shall be raked back and stockpiled for reuse
2. Apply Herbicide approved by the institution's landscape or facility services for use under live oaks to eliminate existing grass and weeds. Allow two weeks for complete kill.
3. Install soil mix consisting of the following to a maximum depth of 2"
 - a. 1 CY Organic Soil Conditioner per 100 OSF of bed area
 - b. 1 3.8 CF Bale of Peat Moss or coffee chaff per 50SF of bed area
4. Tilling shall be prohibited within the tree dripline
5. Plant material shall be pit planted in these areas.
6. Topdressing shall be Modified Bed Mulch
7. Herbicide and fertilizer as listed in the Standard Planting Bed Mix

2.3 FERTILIZERS

- A. Commercial Fertilizer: Commercial-grade complete fertilizer of neutral character, consisting of fast- and slow-release nitrogen, 50 percent derived from natural organic sources of urea formaldehyde, phosphorous, and potassium in the following composition:
 1. Composition: Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified soil-testing laboratory.
- B. Slow-Release Fertilizer: Granular or pelleted fertilizer consisting of 50 percent water-insoluble nitrogen, phosphorus.

2.4 STEEL LANDSCAPE EDGING

- A. Manufacturers:
 1. Colmet
 2. JD Russel
 3. Steel flat bar stock
 4. Approved equals
- B. Steel Landscape Edging. Comply with ASTM A 569, hot-rolled, standard flexible carbon steel landscape edging, fabricated in sections with stake pockets stamped or pre-punched into face of sections at 30" o.c. Steel landscape edging (header) shall be double staked at overlap joints, and designed to receive tapered steel stakes. Standard steel flat bar stock may also be utilized.
- C. Size: 1/4" Thick x 4" wide
- D. Finish: Raw Steel. Provide sample to Landscape Architect for approval.
- E. Anchors:
 1. For pre-punched landscape edging: Anchor stakes shall be 1/4" thick x 1" wide (tapered) x 18" long prefabricated stakes provided by the landscape edging manufacturer for use in the stamped pockets
 2. For flat bar stock: Cut #3 rebar into 18" long sections and weld to the planting bed side of the landscape edging @ 30" O.C. max. Top of rebar shall be 1" min. below top of edging
 3. J-Hook style anchors or similar anchors that overlap the top of the edging shall not be accepted.

2.5 LANDSCAPE GRAVEL

- A. Smooth Brown Gravel
 1. 1" – 2" Diameter smooth brown rock, washed. Sides shall be mostly rounded and smooth with varying sizes and shapes. Depth of gravel as noted on the Drawings. Submit Sample for L.A. Approval.
 2. Used around base of building in the maintenance trough and as noted on the Drawings.
- B. Limestone Gravel
 1. #8 Limestone gravel. Submit sample for L.A. approval.
 2. Used for gravel walkways and mechanical yards and as noted on the Drawings.

2.6 SOIL STABILIZATION MATTING

- A. For Rain Garden areas:
 - 1. Natural fiber jute netting designed for soil stabilization and erosion control. Netting shall be made from 100% biodegradable fibers.
 - 2. Secure with 6" long metal landscape or sod staples at 48" O.C. Max.

2.7 MULCHES

- A. Standard Bed Mulch: Pine Straw. Shall be un-dyed pine straw of sufficient character to resist displacement by wind or storm water or by irrigation runoff. Pine straw to be freshly harvested, uniform in color, and free of deleterious materials. Contractor is required to submit a sample to Landscape Architect for approval prior to placing. Pine Straw Mulch shall be used as top dressing for all bed, and tree areas. Retain appropriate materials in first subparagraph below.
- B. Modified Bed Mulch: Composted Shredded Hardwood. Mulch shall be un-dyed premium grade decomposed shredded hardwood of sufficient character to resist displacement by wind or stormwater or by irrigation runoff. Composted shredded hardwood to be uniform in color and free of deleterious materials. Contractor is required to submit a sample to Landscape Architect for approval prior to placing. See plan and details for locations and specified depth.

2.8 PESTICIDES & HERBICIDES

- A. General: Pesticide registered and approved by EPA, acceptable to authorities having jurisdiction, and of type recommended by manufacturer for each specific problem and as required for Project conditions and application. Do not use restricted pesticides unless authorized in writing by authorities having jurisdiction.
- B. Pre-Emergent Herbicide (Selective and Non-Selective): Effective for controlling the germination or growth of weeds within planted areas at the soil level directly below the mulch layer.
- C. Post-Emergent Herbicide (Selective and Non-Selective): Effective for controlling weed growth that has already germinated.

2.9 TREE STABILIZATION MATERIALS

- A. Root-Ball Stabilization Materials:
 - 1. Root-Ball Stabilization Devices: At- or below-grade stabilization systems to secure each new planting by root ball; sized per manufacturer's written recommendations unless otherwise indicated.
 - a. Products: Subject to compliance with requirements, provide the following or approved equal:
 - 1) Foresight Products, LLC; Duckbill Rootball Fixing System
6430 East 49th Drive
Commerce City, CO 80022
USA Contact: Matthew Esquibel
Phone: 800-325-5360 / 303 286-8955
E-mail: mesquibel@earthanchor.com
 - 2) Tree Frog Environmental Products; Tree Frog RBK System
411 N. Donnelly St
Mount Dora, FL 32757
Phone: 1-352-735-7411
Fax: 1-352-735-7412
E-mail: info.treefrogpe@gmail.com
 - 3) Approved Equals.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas to receive plants for compliance with requirements and conditions affecting installation and performance.
 - 1. Verify that no foreign or deleterious material or liquid such as paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, or acid has been deposited in soil within a planting area.
 - 2. Do not mix or place soils and soil amendments in frozen, wet, or muddy conditions.
 - 3. Suspend soil spreading, grading, and tilling operations during periods of excessive soil moisture until the moisture content reaches acceptable levels to attain the required results.
 - 4. Uniformly moisten excessively dry soil that is not workable and which is too dusty.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.
- C. If contamination by foreign or deleterious material or liquid is present in soil within a planting area, remove the soil and contamination as directed by Landscape Architect and replace with new planting soil.

3.2 GENERAL PREPARATION

- A. Protect structures, utilities, sidewalks, pavements, and other facilities and turf areas and existing plants from damage caused by planting operations.
- B. Install erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.
- C. Lay out individual tree and shrub locations and areas for multiple plantings. Stake locations, outline areas, adjust locations when requested, and obtain Landscape Architect's acceptance of layout before excavating or planting. Make minor adjustments as required.
- D. Apply antidesiccant to trees and shrubs using power spray to provide an adequate film over trunks (before wrapping), branches, stems, twigs, and foliage to protect during digging, handling, and transportation.
 - 1. If deciduous trees or shrubs are moved in full leaf, spray with antidesiccant at nursery before moving and again two weeks after planting.
- E. Wrap trees and shrubs with burlap fabric over trunks, branches, stems, twigs, and foliage to protect from wind and other damage during digging, handling, and transportation.

3.3 TREE AND PLANTING BED PREPARATION

- A. General:
 - 1. Time and Planting: Planting operations shall be conducted under favorable weather conditions during the seasons, which are normal for such work as determined by accepted practice in the locality.
 - 2. Preparation for Planting Operations: Before planting operations are begun, existing turf areas which are to be trucked over or upon which soil is to be temporarily stacked pending its reuse or removal, or turf areas which may be subject to abuse of any other kind, shall be covered in a manner which will satisfactorily protect such areas from damage.
 - 3. Plant Material Locations: As shown on the drawings are diagrammatic, and the exact locations shall be approved by the Owner. Shade and ornamental trees shall be located with stakes according to the plan. Shrubs, vines, and ground cover shall be positioned on prepared bed areas as shown on the Drawings in their original containers. After quantity, staking, and spacing has been adjusted, if necessary, and approved by the Owner, plant where located.
 - 4. Obstructions or Unsuitable Conditions Below Grade: Any rock over 3/4" diameter, concrete, or other underground obstruction or unsuitable planting soil shall be removed to the depth necessary to permit proper planting according to Plans and Specifications. If underground construction, utilities, unusually large rock, other serious obstructions or unsuitable soil conditions are encountered in planting areas, other locations for the planting may be selected by the Owner.

- B. Excavation for Planting:
1. For new construction projects or for projects with significant site renovations that result in compacted soil conditions at the planting areas, especially in and around buildings, parking lots, or other hardscape areas, the following steps shall be taken:
 - a. Reference Section 32 92 00 for excavation at sod and meadow areas.
 - b. For all areas to receive shrub and groundcover planting, excavate and remove compacted soil to a minimum depth of 12" below the anticipated finished grade of the landscape bed, accounting for the bed height above the adjacent hardscape and lawn areas as specified herein.
 - c. For tree pits:
 - 1) Compacted soil shall be excavated to the size and depth as listed herein. After excavation, a percolation test shall be performed at each tree pit to verify adequate drainage.
 - 2) Perform percolation test by digging a 12" diameter x 12" deep hole at the bottom of the tree pit. Fill the hole with water and allow the water to drain completely. Refill the hole completely with water, and document how long it takes for the water to drain completely.
 - 3) If it takes longer than 6 hours to fully drain, or it does not fully drain, the contractor shall install three (3) sump holes equally spaced around the bottom of the tree pit. Each sump hole shall be 6" diameter x 24" deep as measured from the bottom of the tree pit and filled with drainage gravel. The top of each sump hole shall be covered with a sheet of non-woven geotextile fabric to prevent soil migration.
 2. Tree and large shrub pits: Shall be circular in outline with vertical, scarified sides and conical bottoms. Mechanical digging of pits may be approved by the Landscape Architect. Tree pit diameter shall be at least three times the size of the root ball diameter. Pits for trees shall be of sufficient depth to allow a six-(6) inch layer of planting soil spread around the ball while resting on scarified subgrade pedestal when they are set to grade. Pits for shrubs and other plants shall be of sufficient depth to allow a six-(6) inch layer of planting soil under the ball when they are set to grade.
 3. Planting Beds: All planting bed areas shall be stripped of any grass, weeds and debris prior to excavation. Excavate to a minimum depth of 3" if compacted or poor soils are not present.
 4. Special Conditions: Beneath Existing Tree Canopies: Soil preparation depths for bed and lawn areas shall be modified to accommodate tree roots. Coordinate work with Landscape Architect.
- C. Soil Preparation:
1. Shrub and groundcover beds:
 - a. After stripping grass or removing the compacted soil from the proposed bed area, the area shall be thoroughly roto-tilled to a depth of six (6) inches. Place the specified Planting Bed Mix into the area to a depth of six (6) inches and the bed area shall then be roto-tilled again.
 - b. Repeat this process in 6" lifts until the top of the landscape bed is approximately 9" above the adjacent lawn or paved area. Incorporate fertilizer as specified herein.
 - c. The total bed depth, excluding the initial roto-tilled depth, shall be a minimum of twelve (12) inches.
 - d. Treat bed areas with specified pre-emergent herbicide at the manufacturer's recommended rate.
 2. Tree and large shrub plantings:
 - a. After planting pit excavation, install the root-ball anchors as specified herein prior to setting the tree in the pit. Verify the anchors are securely installed into undisturbed soil.
 - b. Planting Bed Mix shall be installed after setting the plants as listed below.
- D. Setting Plants:
1. General: Plants, excepting ground cover plants, shall be set approximately 1-1/2 to 2 inches above existing grade so that after settlement they will bear the same relationship to the finished grade of the surrounding soil that they bore to the grade of the soil from which they were dug.

2. Lay out plants at locations as indicated on plans or as directed by Landscape Architect. Stake locations of individual trees and shrubs for approval by Landscape Architect prior to planting.
 3. Trees and large shrubs: After pits have been dug as specified previously, set plants straight and plumb in pits and remove burlap from sides and tops of balls, but no burlap shall be pulled from underneath. Place specified Planting Bed Mix around the ball to two-thirds (2/3) the depth of the pit. Firmly hand tamp and compact carefully to avoid injury to roots and to fill voids. Add water and allow it to drain away, and fill the pit to finished grade with soil. After the ground settles, additional soil shall be filled in to the level of the finished grade.
 4. Plants in Beds: Carefully insert plants into prepared topsoil at slightly above finished grade. When plants are in place, rake the entire bed area smooth, water, and allow to drain away. After settlement, add soil as necessary to finished grade and water again.
 5. Forming Saucers: After planting has been completed, form a "saucer" or "bowl" of soil around each plant. Bowl shall extend to the limits of the plant pit for trees and shrubs. No bowls are required in areas of bed preparation, and shrubs in lines may share a common bowl around their perimeter.
- E. Fertilizing of Planting:
1. Rates: Use a complete fertilizer with contents as specified herein and apply at the manufacturer's recommended rates.
 2. Placement for trees: Place slow-release fertilizer uniformly around and within the diameter of the plant saucer and incorporate into the top 6" layer of planting soil.
 3. Placement for shrubs and groundcovers: Place fertilizer evenly throughout the bed area and incorporate into the top 6" layer of planting soil.
- F. Topdressing / Mulching: Upon completion of the planting of all areas, install the specified topdressing or mulch evenly, entirely covering the area around each plant to the specified depth. In case of bed areas, the area between the plants is to be so treated, regardless of plant spacing, and trees shall be mulched entirely covering the tree pit area within the saucer.

3.4 TREE STABILIZATION

- A. Install below-grade stabilization system to secure each new planting by the root ball unless otherwise indicated.
- B. Root-Ball Stabilization
 1. Install root-ball stabilization system sized and positioned as recommended by manufacturer unless otherwise indicated and according to manufacturer's written instructions.
 2. Verify the root-ball anchors are installed prior to backfilling the tree pit.
 3. Wrap the anchoring straps around the top of the root-ball and tighten to secure.
- C. If the root-ball anchoring system is determined to be insufficient for the site conditions, including unstable soils, an alternative tree stabilization system shall be submitted to the Landscape Architect for approval.

3.5 TREE, SHRUB, AND VINE PRUNING

- A. Each tree shall be assessed for pruning by an experienced plantsman to preserve the natural shape and character of the tree upon acceptance by the Landscape Architect. Method of pruning shall follow the International Society of Arboriculture guidelines for "Pruning Young Trees". Unless otherwise indicated by Landscape Architect, do not cut tree leaders; remove only injured, dying, or dead branches from trees and shrubs; and prune to retain natural character.
- B. Prune, thin, and shape trees, shrubs, and vines according to standard professional horticultural and arboricultural practices. Unless otherwise indicated by Landscape Architect, do not cut tree leaders; remove only injured, dying, or dead branches from trees and shrubs; and prune to retain natural character.
- C. Pruning cuts shall be sharp and clean. Pruning cuts over 3/4" in diameter may be painted with an approved tree surgery paint or sealer, applied only for cosmetic reasons, at the direction of the Landscape Architect.

3.6 LANDSCAPE EDGING INSTALLATION

- A. General: Install landscape edging after major construction activities are complete to avoid damage.
- B. Steel Edging: Install steel edging where indicated according to manufacturer's written instructions. Anchor with steel stakes spaced at 30 inches apart, driven below top elevation of edging, or at every stake pocket location in landscape edging (header) sections designed and manufactured to receive stakes. Stakes shall be located in solid undisturbed soil, or in soil set at 85% relative compaction. A minimum of at least two stakes shall be used to anchor any partial section of edging.
- C. Horizontal Alignment. Install straight sections true to the alignments as indicated, free of waves or bends, using strings as guides. Install curved sections true to the alignments as indicated, free of waves or bends, following marked alignments approved in the field by the Landscape Architect. The Landscape Architect shall be given the opportunity to review the layouts.
- D. Vertical Alignment. Top of edging shall follow the finished grade elevations as indicated on the Drawings. Face of edging shall be plumb.
- E. Corners: All corners shall be bent to achieve straight 90-degree angles. No radius corners shall be accepted. The inside face of the edging may be scored to assist with bending the edging. No corner splices shall be accepted unless they are fully welded and ground smooth after splicing. Pre-fabricated corner splice stakes shall not be accepted.
- F. Splices: If using pre-punched edging, splices shall be double staked at overlap joints and adjacent pieces shall be flush with one another. If flat bar stock is being used, butt joints shall be fully welded, ground smooth, and anchored.
- G. Edging damaged or bent during installation or subsequent construction activities shall be replaced at not cost to the Owner.

3.7 PLANT MAINTENANCE

- A. Maintain plantings by pruning, cultivating, watering, weeding, fertilizing, mulching, restoring planting saucers, adjusting and repairing tree-stabilization devices, resetting to proper grades or vertical position, and performing other operations as required to establish healthy, viable plantings. Spray or treat as required to keep trees and shrubs free of insects and disease.
- B. Fill in as necessary soil subsidence that may occur because of settling or other processes. Replace mulch materials damaged or lost in areas of subsidence.
- C. Apply treatments as required to keep plant materials, planted areas, and soils free of pests and pathogens or disease. Use integrated pest management practices whenever possible to minimize the use of pesticides and reduce hazards. Treatments include physical controls such as hosing off foliage, mechanical controls such as traps, and biological control agents.

3.8 PESTICIDE & HERBICIDE APPLICATION

- A. Apply pesticides and other chemical products and biological control agents in accordance with authorities having jurisdiction and manufacturer's written recommendations. Coordinate applications with Owner's operations and others in proximity to the Work. Notify Owner before each application is performed.
- B. Pre-Emergent Herbicides (Selective and Non-Selective): Apply to tree, shrub, and ground-cover areas in accordance with manufacturer's written recommendations. Do not apply to seeded areas.
- C. Post-Emergent Herbicides (Selective and Non-Selective): Apply only as necessary to treat already-germinated weeds and in accordance with manufacturer's written recommendations.

3.9 CLEANUP AND PROTECTION

- A. During planting, keep adjacent paving and construction clean and work area in an orderly condition.
- B. Protect plants from damage due to landscape operations and operations of other contractors and trades. Maintain protection during installation and maintenance periods. Treat, repair, or replace damaged plantings.
- C. After installation and before Substantial Completion, remove nursery tags, nursery stakes, tie tape, labels, wire, burlap, and other debris from plant material, planting areas, and Project site.

3.10 DISPOSAL

- A. Remove surplus soil and waste material including excess subsoil, unsuitable soil, trash, and debris and legally dispose of them off Owner's property.

END OF SECTION 32 93 00

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SECTION 33 41 00
CATCH BASINS AND DRAINAGE PIPE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. The requirements for drainage conduits and catch basins (also referred to as yard drains on Drawings) including all related appurtenances in conformance with the lines and grades as shown on the Drawings, as outlined within this Specification, and to the satisfaction of the OWNER.
- B. Related Sections:
 - 1. Section 311000 "Site Clearing" for protection of existing trees and plantings, topsoil stripping and stockpiling, and site clearing.
 - 2. Section 312000 "Earth Moving" for excavation, filling, and rough grading and for subsurface aggregate drainage and drainage backfill materials.
 - 3. Section 329200 "Turf and Grasses" for turf (lawn)

1.3 QUALITY ASSURANCE

- A. To ensure unity of responsibility, all drainage conduit, pipe fittings, connectors, catch basins risers, joints, etc. shall be the standard product of a single manufacturer having a minimum of five (5) years experience in the manufacturing of plastic drainage systems conforming to this Specification.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated in accordance with provisions of Section 013400 Shop Drawings, Samples and Project Data
- B. Shop Drawings
 - 1. Manholes: Include plans, elevations, sections, details, frames, and covers.
 - 2. Catch basins. Include plans, elevations, sections, details, frames, covers, and grates.
 - 3. Stormwater Detention Structures: Include plans, elevations, sections, details, frames, covers, design calculations, and concrete design-mix reports.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified landscape Installer. Include list of similar projects completed by Installer demonstrating Installer's capabilities and experience. Include project names, addresses, and year completed, and include names and addresses of owners' contact persons.
- B. Product Certificates: For each type of manufactured product, from manufacturer, and complying with the following:
 - 1. Manufacturer's certified analysis of standard products.
 - 2. Analysis of other materials by a recognized laboratory made according to methods established by the Association of Official Analytical Chemists, where applicable.
- C. Maintenance Instructions: Recommended procedures to be established by Owner for maintenance of plants during a calendar year. Submit before start of required maintenance periods.
- D. Warranty: Sample of special warranty.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Packaged Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and indication of conformance with state and federal laws if applicable.

1.7 PROJECT CONDITIONS

- A. Interruption of Existing Storm Drainage Service: Do not interrupt service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary service according to requirements indicated:
- B. Notify Landscape Architect and Owner no fewer than two days in advance of proposed interruption of service.
- C. Do not proceed with interruption of service without Owner's written permission.

PART 2 - PRODUCTS

2.1 CATCH BASINS & GRATES

- A. Manufacturer: Advanced Drainage Systems, Inc., 4640 Trueman Blvd, Hilliard, OH 43026; Tel.: 1-800-821-6710; www.ads-pipe.com; or approved equal.
- B. Catch Basins
 - 1. Cast-in-place Concrete Catch Basins
 - a. Contractor may elect to construct catch basins on-site using reinforced cast-in-place concrete.
 - b. Shop drawings for each basin noting size, rim elevation, invert elevations, and reinforcement shall be submitted for approval.
 - 2. Prefabricated Catch Basins
 - a. For standard 90-degree or "T" connections:
 - 1) Contractor shall use prefabricated Nyloplast Inline Drain basin and fittings or approved equal
 - b. For non-90-degree connections
 - 1) Contractor shall use factory fabricated AASHTO H-20 heavy duty PVC one piece units of the size and geometrics as shown on the Drawings. The catch basins shall be custom fitted for this project and shall be provided by the HDPE drain pipe manufacturer to ensure a single source of responsibility for the plastic drainage system. Catch basins shall be constructed to specifically adapt to frame and grate sizes shown on the Drawings. Catch basins that require separate transitions to fit the frame and grate will not be acceptable. Catch basins shall be the "Drain Basin" type as manufactured by ADS, Hancor, or approved equal.
- C. Catch Basin Grates: Grates shall be a one (1) piece unit factory fabricated and provided by and specifically designed to instantly install on the exposed end of the vertical pipe catch basin. All grates shall be square, round, or atrium-style as indicated on the Drawings and shall be cast iron meeting AASHTO H-20 rating and shall be manufactured by ADS, Hancor, or approved equal.

2.2 HDPE DRAIN PIPE AND FITTINGS

- A. Manufacturer Advanced Drainage Systems, Inc., 4640 Trueman Blvd, Hilliard, OH 43026; Tel.: 1-800-821-6710; www.ads-pipe.com; or approved equal.
- B. Corrugated HDPE Drainage Pipe (solid and perforated)
 - 1. All HDPE Drain pipe shown on the drawings shall have smooth interior ("Smooth Lined") and annular exterior corrugations conforming to AASHTO M252 or M294.
 - 2. Material must be high density polyethylene meeting ASTM D 3350 minimum call classification 335420 C Piping in paragraph below is available in NPS 12 to NPS 60 (DN 300 to DN 1500).
 - 3. HDPE drain pipe shall be N-12 (dual wall) as manufactured by ADS (Advanced Drainage System)

- C. Corrugated HDPE Drainage Pipe Fittings
 - 1. Drain pipe fittings shall meet the requirements of paragraph 2.1 and conform to AASHTO M252 or M294.
 - 2. Fabricated fittings shall be factory welded at all accessible interior and exterior junctions.
 - 3. Drain pipe fittings shall be by the same manufacturer as specified herein for drain pipe as manufactured by ADS, Hancor, or approved equal.
- D. Corrugated HDPE Pipe Joints
 - 1. Pipe shall be joined with integral bell and spigot joints meeting AASHTO M252, M294 or MP7-97.
 - 2. All joints shall be silt tight and non-rated watertight
 - 3. Gaskets shall be made of polyisoprene meeting the requirements of ASTM 477 with the addition that gaskets shall not have any visible cracking when tested according to ASTM D1149 after 72 hours exposure in 50 PPHM ozone at 104° Fahrenheit.
 - 4. Gaskets shall be installed by the pipe manufacturer and covered with a removable wrap to insure the gasket is free from debris.
 - 5. A joint lubricant shall be supplied by the pipe manufacturer to be used on the gaskets at the time of installation.
 - 6. Drain pipe joints shall be as manufactured by ADS, Hancor, or approved equal.

2.3 SDR 35 DRAIN PIPE AND FITTINGS

- A. Manufacturer Advanced Drainage Systems, Inc., 4640 Trueman Blvd, Hilliard, OH 43026; Tel.: 1-800-821-6710; www.ads-pipe.com; or approved equal.
- B. SDR 35 Drainage Pipe and Fittings
 - 1. Drain pipe and fittings shall be by the same manufacturer as specified herein for drain pipe as manufactured by ADS, Hancor, or approved equal.
 - 2. Fabricated fittings shall be factory welded at all accessible interior and exterior junctions.

2.4 PEA GRAVEL

- A. Pea gravel for perforated HDPE Pipe

U.S. Sieve	Percent Passing
1½"	95-100
No. 4	0-15
No. 200	0-2

2.5 FILTER FABRIC

- A. Filter cloth for HDPE pipe joints and PVC catch basins shall be in conformance with Section 334600 - Subdrainage.

2.6 BACKFILL

- A. Backfill material required for the drainage system shall be in conformance with Section 334600 - Subdrainage

2.7 BEDDING MATERIAL

- A. Refer to Section 334600 – Subdrainage.

PART 3 - EXECUTION

3.1 GENERAL

- A. Install drainage facilities as recommended by the manufacturer and in conformance with the grades designated on the Drawings.
- B. Deflections; The maximum deflection of any drain pipe either solid or perforated shall be one and one half (1 ½°) degrees at each joint. The maximum radius of the deflections combined is seven

hundred sixty five (765') feet. Any turns, bends, angles, etc., in the drainage system that exceed this criteria shall be constructed using fittings. The plastic drainage system (HDPE pipe and PVC catch basins) shall be installed in conformance with the manufacturers recommendations.

END OF SECTION 33 41 00

SPECIFICATIONS FOR ASBESTOS ABATEMENT AND REMEDiation PROTOCOL

FOR

HURRICANE LAURA REPAIRS: PRESIDENT'S RESIDENCE IMPROVEMENTS

McNeese State University

19-627-21-01, F.19002606

01-107-05B-13, F.01004560 (Supplement)

Project Designed by;

Lee Ritter, C.I.E.C., C.E.O.P., FSRT, ASD, Journeyman Water Restoration



**2014 West Pinhook Road
Suite 200
Lafayette, LA 70508**

April 14, 2025

RCE PROJECT NO.: 254102



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INDEX TO SPECIFICATIONS

HURRICANE LAURA REPAIRS PRESIDENT'S RESIDENCE IMPROVEMENTS ASBESTOS ABATEMENT AND REMEDICATION PROTOCOL MCNEESE STATE UNIVERSITY

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SECTION 02 82 10
SUMMARY OF WORK – ASBESTOS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 WORK COVERED BY CONTRACT DOCUMENTS

- A. The Project consists of asbestos removal and related activities at the facility as indicated on plans.
 - 1. Project Location: As Indicated on Plans
 - 2. Owner: Owner's Name
- B. Contract Documents, dated for April 14, 2025 were prepared for the Project by Ritter Consulting Engineers Ltd., 2014 W. Pinhook Rd. Suite 200, Lafayette, LA 70508.
- C. The Work consists of asbestos removal and selected demolition work from the areas designated on the drawings. The erecting of barriers and the removal and disposal of building material coated with asbestos as indicated in the drawings.
 - 1. The Work, as indicated on the plans, may include any or all of the following:
 - a. The removal of asbestos-containing acoustic spray in areas indicated on the drawings.
 - b. The containment, transport and disposal of all waste in full accordance with all pertinent local, State and federal regulations.
 - c. A Schedule of Values shall be provided per work area (each floor and exterior work).
 - d. A Schedule of Work shall be submitted prior to the start of work to allow the Owner to review to gain portion access as needed.
- D. The Work will be done under a single prime contract.

1.3 WORK SEQUENCE

- A. The Work will be conducted as indicated on the drawings. Abatement of asbestos will be performed concurrently or in sequence so that all abatement work is completed within the time specified.

SECTION 02 82 10
SUMMARY OF WORK – ASBESTOS

1.4 ASBESTOS-CONTAINING MATERIALS

- A. The Work of this contract involves activities that will disturb asbestos-containing materials (ACM) or presumed asbestos-containing materials (PACM). The location of ACM known to be present at the worksite is set forth in the drawings. If any other ACM or PACM is found, notify the owner, other employers and employees the about the location and quantity of the ACM or PACM within 24 hours of the discovery.

1.5 ASBESTOS HEALTH RISK

- A. The disturbance or dislocation of ACM may cause asbestos fibers to be released into the building's atmosphere, thereby creating a potential health risk to workers and building occupants. Apprise all workers, supervisory personnel, subcontractors and consultants who will be at the job site of the seriousness of the risk and of proper work procedures which must be followed.
- B. Where in the performance of the work, workers, supervisory personnel, subcontractors, or consultants may encounter, disturb, or otherwise function in the immediate vicinity of any identified ACM, take appropriate continuous measures as necessary to protect all building occupants from the risk of exposure to airborne asbestos. Such measures shall include the procedures and methods described herein, and compliance with regulations of applicable federal, state and local agencies.

C POTENTIAL LEAD HAZARD:

The disturbance or dislocation of lead-based painted materials may cause lead dust to be released into the building's atmosphere, thereby creating a potential health hazard to workers and building occupants. Apprise all workers, supervisory personnel, subcontractors and consultants who will be at the job site of the seriousness of the hazard and of proper work procedures which must be followed.

Where in the performance of the work, workers, supervisory personnel, subcontractors, or consultants may encounter, disturb, or otherwise function in the immediate vicinity of any identified lead-based paint, take appropriate continuous measures as necessary to protect all building occupants from the potential hazard of exposure to lead dust. Such measures shall include the procedures and methods described herein, and compliance with regulations and guidelines of applicable Federal, state and local agencies.

1.6 CONTRACTOR USE OF PREMISES

SECTION 02 82 10
SUMMARY OF WORK – ASBESTOS

- A. Use of the Site: Limit use of the premises to work in areas indicated. Confine operations to areas within contract limits indicated. Do not disturb portions of the site beyond the areas in which the Work is indicated. The Owner will not have access to work area. An office area shall be provided with basic office amenities to include minimum of one desk, chair and 2 2 plug-110 outlets.
1. Driveways and Entrances: Keep driveways and entrances serving the premises clear and available to the Owner, the Owner's employees, and emergency vehicles at all times. Do not use these areas for parking or
- of materials. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.
- B. Use of the Existing Building: Maintain the existing building in a weather tight condition throughout the construction period. Repair damage caused by construction operations. Take all precautions necessary to protect the building and its occupants during the construction period.
1. Smoking: Smoking or open fires will not be permitted within the building enclosure or on the premises.
2. Toilet Rooms: Use of existing toilets within the building, by the Contractor's personnel, will not be permitted.

1.7 AIR MONITORING BY THE OWNER

- A. The Owner will contract for air monitoring. Air monitoring will be conducted outside of the work area during the work, and for clearance sampling at the end of the project
1. Outside of the Work Area: The Owner's air monitoring contractor will sample air outside of the work area to detect faults in the work area isolation such as:
- a. Contamination of the building outside of the work area with airborne asbestos fibers.
- b. Failure of filtration or rupture in the differential pressure system.
- c. Contamination of air outside the building envelop with airborne asbestos fibers.
- B. Work area clearance: Clearance air sampling by the air monitoring contractor at the completion of asbestos abatement work is described in Section 02 82 81 Project Decontamination.

SECTION 02 82 10
SUMMARY OF WORK – ASBESTOS

- C. Air monitoring required by OSHA is work of the Contractor and is not covered in this section.
- D. The following air monitoring firms are approved and acceptable. Use one of these approved firms.
- | | | |
|----|------------------------|-----------------|
| 1. | BBL Environmental | P. 337-793-6253 |
| 2. | Breathe Safe | P. 225-772-5103 |
| 3. | Partners Environmental | P. 337-250-7556 |
| 4. | RPM Environmental | P. 225-571-7062 |

1.8 SCHEDULE OF AIR SAMPLES BY AIR MONITORING CONTRACTOR

- A. Sample cassettes: Samples will be collected on 25 mm. cassettes as follows:
1. PCM: 0.8 micrometer mixed cellulose ester.
 2. TEM: 0.45 micrometer mixed cellulose ester or 0.40 micrometer polycarbonate, with 5.0 micron mixed cellulose ester backing filter.
- B. Number and Volume of Samples: The number and volume of air samples given in the schedules is approximate. The exact number and volume of samples collected by the Contractor may vary depending upon job conditions and the analytical method used.
- C. Sample Volume and Sensitivity:
1. PCM: The sample volumes collected by the Contractor's air monitoring firm will be determined by the following formula:

$$Volume = \frac{\left(\frac{Number\ of\ Fibers}{Area\ of\ 100\ fields} \right) \times Total\ Filter\ Area}{\left(\frac{Limit\ Value}{4} \right)}$$

Where:

Number of fibers =	5 fibers/100 fields, based on a limit of detection (LOD) of 7 fibers/mm ² on the filter
Area of 100 fields	= 0.785mm ²
Total Filter Area =	385mm ²

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SUMMARY OF WORK – ASBESTOS

Limit Value = as specified in the schedules of samples below

- a. For purposes of this specification, the sample volume calculated above will be considered to be of sufficient size so that there is a 95 percent level of confidence that the value measured by each individual sample at the limit of detection (LOD) is less than or equal to the limit values specified below.
 - b. For purposes of this specification, the Limit of Detection (LOD) is defined as 7 fibers/mm² on the filter or 5 fibers/100 fields.
 - c. For purposes of this specification overloaded samples will be considered as exceeding the applicable limit value.
2. TEM: Analytical Sensitivity of 0.05 structures/cc as set forth in the AHERA regulation.

B. Base Line:

1. Before Start of Work: The Air Monitoring Contractor will secure air samples to establish a base line.
2. PCM Samples: (guidelines for Air Monitoring Contractor)

Location Sampled	Number of Samples	Limit Value (Fibers/cc)	Approx. Volume (Liters)	Rate (Liters/Minute)
Outside Each Work Area	5	0.01	<1,000>	1-10
Outside Building	5	0.01	<1,000>	1-10

3. TEM Samples: (guidelines for Air Monitoring Contractor)

Location Sampled	Number of Samples	Analytical Sensitivity (Struct./cc.)	Approx. Volume (Liters)	Rate (Liters/Minute)
Outside Each Work Area	1	0.005	1,300	1-10
Outside Building	1	0.005	1,300	1-10

4. Base Line (PCM): a level expressed in fibers per cubic centimeter which is 25 percent greater than the largest of the following:

**SECTION 02 82 10
SUMMARY OF WORK – ASBESTOS**

- a. Average of the PCM samples collected outside each Work Area
- b. Average of the PCM samples collected outside the building
- c. 0.01 fibers per cubic centimeter

- 5. Samples collected for TEM analysis will be held without analysis. These samples will be analyzed under the conditions and terms set forth in "Fibers Counted" and "Affect On Contract Sum".

C. Daily

- 1. From start of work of Section 02 82 61 Temporary Enclosures through the work of Section 02 82 81 Project Decontamination, the Air Monitoring Contractor must take samples outside of each work area.
- 2. Sample volume and sensitivity: If samples are overloaded at the sample volume required for a limit value equal to the Stop Action Levels or Immediate Stop Action Levels given later in this section, the level is considered to have been exceeded.

- 3. PCM Samples (guidelines for Air Monitoring Contractor):

Location Sampled	Number of Samples	Limit Value (Fibers/cc)	Approx. Volume (Liters)	Rate (LPM)
Outside Each Work Area at Critical Barrier	1	0.01	<1,000>	1-10
Clean Room	1	0.01	<1,000	1-10
Equipment Decon	1	0.01	<1,000>	1-10
Outside Building	1	0.01	<1,000>	1-10
Output of Pressure Differential System	1	0.01	<1,000>	1-10

- 4. Additional samples may be taken at the General Contractor's discretion. If airborne fiber counts exceed allowed limits additional samples may be taken as necessary to monitor fiber levels.

SECTION 02 82 10
SUMMARY OF WORK – ASBESTOS

5. Additional air samples shall be taken for the determination of lead dust concentrations and PEL in each work area containment and adjacent to the entrance of the work area containment.

1.9 ANALYTICAL METHODS USED BY THE AIR MONITORING CONTRACTOR

- A. The following methods will be used by the Air Monitoring Contractor in analyzing filters used to collect air samples. Sampling rates may be varied from printed standards to allow for high volume sampling.
 1. Phase Contrast Microscopy (PCM) will be performed using the NIOSH 7400 method.
 2. Transmission Electron Microscopy (TEM) will be performed using the analysis method set forth in the AHERA regulation 40 CFR Part 763 Appendix A.
 3. Atomic Absorption Spectroscopy or Inductively Coupled Plasma Emission Spectroscopy will be used for the analysis of Surface Lead dust wipe samples, Air samples.

1.10 LABORATORY TESTING BY AIR MONITORING CONTRACTOR

- A. The services of a testing laboratory must be employed by the Air Monitoring Contractor to collect air samples and to perform laboratory analyses of the air samples. A microscope and technician will be set up at the job site, or samples will be sent overnight on a daily basis, so that verbal reports on air samples can be obtained within 24 hours. The Owner and Designer will have access to all air monitoring tests and results.
- B. The Owner and Designer will have access to all air monitoring tests and results upon request no later than 30 days from the completion of work.

1.11 FIBERS AND STRUCTURES

- A. Fibers Counted: The following procedure will be used to resolve any disputes regarding fiber types when a project has been stopped due to excessive airborne fiber counts.
 1. Large Fibers: "Airborne Fibers" referred to above include all fibers regardless of composition as counted by phase contrast microscopy (PCM), unless additional analysis by transmission or scanning electron microscopy demonstrates to the satisfaction of the Designer that non-asbestos fibers are being counted. "Airborne Fibers" counted in samples

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SUMMARY OF WORK – ASBESTOS

analyzed by transmission electron microscopy shall be asbestos fibers, greater than 5 microns in length. For purposes of stop action levels, subsequent to analysis by electron microscopy, the number of "Airborne

Fibers" shall be determined by multiplying the number of fibers, regardless of composition, counted by PCM by the proportion of fibers that are asbestos as determined by TEM (a number equal to, asbestos fibers counted, divided by all fibers counted in the electron microscopy analysis).

2. Small Structures: "Airborne Fibers" referred to above include asbestos structures (fibers, bundles, clusters or matrices) of any diameter and any length greater than 0.5 microns.

1.12 ADDITIONAL TESTING

- A. The Owner may conduct air monitoring and laboratory testing. If he elects to do this the cost of such air monitoring and laboratory testing shall be at no additional cost to the General Contractor.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 STOP ACTION LEVELS

- A. Outside Work Area: If any air sample taken outside of the Work Area exceeds the base line established in Part 1 of this section, immediately and automatically stop all work except corrective action. The Designer will evaluate the situation and advise the General Contractor in writing of the appropriate response.
 1. If the high reading was the result of a failure of Work Area isolation measures initiate the following actions:
 - a. Immediately erect new critical barriers as set forth in Section 02 82 61 Temporary Enclosures to isolate the affected area from the balance of the building. Erect Critical Barriers at the next existing structural isolation of the involved space (e.g. wall, ceiling, floor).
 - b. Decontaminate the affected area in accordance with Section 02 82 83 Cleaning & Decontamination Procedures.
 - c. Require that respiratory protection as set forth in Section 02 82 75 Respiratory Protection be worn in affected area until area is cleared for re-occupancy in accordance with Section 02 82 81 Project Decontamination.

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SUMMARY OF WORK – ASBESTOS**

- d. Leave Critical Barriers in place until completion of work and insure that the operation of the pressure differential system in the

Work Area results in a flow of air from the balance of the building into the affected area.

- e. If the exit from the clean room of the personnel decontamination unit enters the affected area, establish a decontamination facility consisting of a Shower Room and Changing Room as set forth in Section 02 82 77 Decontamination Units at entry point to affected area.
- f. After Certification of Visual Inspection in the Work Area remove critical barriers separating the work area from the affected area. Final air samples will be taken within the entire area as set forth in Section 02 82 81 Project Decontamination.

- 2. If the high reading was the result of other causes, initiate corrective action as determined by the Designer.

- B. Effect on Contract Sum: Complete corrective work with no change in the Contract Sum if high airborne fiber counts were caused by the General Contractor's activities. The General Contract Sum and schedule will be adjusted for additional work caused by high airborne fiber counts beyond the Contractor's control.

3.2 STOP WORK

- A. If the Owner or the Project Designer presents a written stop work order, immediately and automatically conform to that stop work order, while maintaining temporary enclosures and pressure differential. Do not recommence abatement work until authorized in writing by Owner or Project Designer.
- B. Immediately initiate the following actions: After being presented with a stop work order immediately:
 - 1. Cease all asbestos removal activities, or any other activities that disturbs ACM.
 - 2. Repair any fallen, ripped or otherwise failed work area isolation measures.
 - 3. Maintain in operation all work area isolation measures including those required by Sections 02 82 61 Temporary Enclosures, 02 82 60 Temporary Pressure Differential & Air Circulation System, and 02 82 77 Decontamination Units.

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SUMMARY OF WORK – ASBESTOS

4. Maintain all worker protections including those required by Sections 02 82 73 Worker Protection - Asbestos Abatement, and 02 82 75 Respiratory Protection.
 5. Fog the air in the work area with a mist of amended water to reduce airborne fiber levels.
- C. Do not recommence work until authorized in writing by the Owner or Designer.

END OF SECTION 02 82 10

SECTION 02 82 12
COORDINATION – ASBESTOS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes administrative and supervisory requirements necessary for coordinating construction operations including, but not necessarily limited to, the following:
 - 1. General project coordination procedures.
 - 2. Conservation.
 - 3. Contingency Plan.
 - 4. Project Directory.
 - 5. Notifications.
 - 6. Pre-Construction Inspection.
 - 7. Administrative and supervisory personnel.
 - 8. Pre-Construction Conference.
 - 9. Progress Meetings.
 - 10. Coordination meetings.
 - 11. Record Keeping.
 - 12. Special Reports.
- B. Related Sections: The following Sections contain requirements that relate to this Section:
 - 1. “Section 02 82 25 - Submittals - Asbestos Abatement” for administrative procedures regarding submittals.

SECTION 02 82 12
COORDINATION – ASBESTOS

2. “Section 02 82 78 - Materials and Equipment - Asbestos Abatement” for coordinating general installation.
3. “Section 02 82 80 – Project/Contactor Closeout - Asbestos Abatement” for coordinating contract closeout.

1.3 COORDINATION

- A. Owner Occupancy: Coordinate construction operations and scheduling with partial occupancy requirements of the Owner and the Owner’s use of utilities.
- B. Coordinate construction operations included in various Sections of these Specifications to assure efficient and orderly completion of each part of the Work. Coordinate construction operations included under different Sections that depend on each other for proper installation, connection, and operation.
 1. Schedule construction operations in the sequence required to obtain the best results where execution of one part of the Work depends on execution of other components, before or after its own execution.
 2. Coordinate installation of different components to assure maximum accessibility for required maintenance, service, and repair.
 3. Make provisions to accommodate items scheduled for later installation.
- C. Where necessary, prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and attendance at meetings.
 1. Prepare similar memoranda for the Owner and separate contractors where coordination of their work is required.
- D. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities to avoid conflicts and assure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:
 1. Preparation of schedules.
 2. Installation and removal of temporary facilities.
 3. Delivery and processing of submittals.

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4. Progress meetings.
 5. Project closeout activities.
- E. Conservation: Coordinate construction operations to assure that operations are carried out with consideration given to conservation of energy, water, and materials.
1. Salvage materials and equipment involved in performance of, but not actually incorporated in, the Work.

1.4 PLAN OF ACTION

- A. Prepare a detailed plan of the procedures proposed for use in complying with the requirements of this specification. Include in the plan the location and layout of decontamination areas, the sequencing of asbestos work, the interface of trades involved in the performance of work, methods to be used to assure the safety of building occupants and visitors to the site, disposal plan including location of approved disposal site, and a detailed description of the methods to be employed to control pollution. Expand upon the use of portable HEPA ventilation system, closing out of the building's HVAC system, method of removal to prohibit visible emissions, and packaging of removed asbestos debris.
1. Submit the Plan of Action to the Designer for information only, prior to the start of work.

1.5 CONTINGENCY PLAN

- A. Contingency Plan: Prepare a contingency plan for emergencies or any other event that may require breaching of work area containment or modification or abridgement of decontamination or work area isolation procedures. Include in this plan procedures for performing electrical and mechanical repairs inside containment after abatement work has begun. Include in plan specific procedures for decontamination or work area isolation. Note that nothing in this specification should impede safe exiting or providing of adequate medical attention in the event of an emergency. Items to be addressed in the plan include, but are not limited to the following:
1. Fire
 2. Accident
 3. Life threatening injury

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4. Non life threatening injury
5. Rescue
6. Power Failure
7. Pressure differential system failure
8. Breach of containment
9. Electrical faults or shock
10. Excessive heat / cold (if/when such limits are specified)
11. Supplied air system failure
12. Water leaks
13. Waste spills
14. Unauthorized entry into work area
15. Elevated air samples outside of containment
16. Repairs inside containment
17. Toxic releases

1.6 PROJECT DIRECTORY

- A. Develop a directory of all entities involved in the project. Include the Contractor's principal staff assignments, including the Superintendent and other personnel in attendance at the site. Identify individuals, their duties and responsibilities. List business name, contact person, normal business and emergency telephone, pager and fax numbers and addresses of:
 1. Owner, Designer, and Project Administrator.
 2. Contractor's General Superintendent, supervisory personnel and Contractor's home office.

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3. Emergency services including but not limited to fire, ambulance, doctor, hospital, police, power company, telephone company.
 4. Local, state, and federal agencies with jurisdiction over the project.
- B. Post: Post copies of the Project Directory in the project meeting room, the temporary field office, each temporary telephone, and at entrance to clean room of Personnel Decontamination Unit

1.7 NOTIFICATIONS

- A. Notify other entities at the job site of the nature of the asbestos abatement activities, location of asbestos-containing materials (ACM), requirements relative to asbestos set forth in these specifications and applicable regulations. Advance notification will be made to:
1. Owners of the building/facility;
 2. Employees who will perform asbestos abatement work or related activities, or who will be in the work area during the course of the work of this contract.
 3. Employers of employees who work and/or will be working in adjacent areas during the course of the work of this contract.
- B. Notify emergency service agencies including fire, ambulance, police or other agency that may service the abatement work site in case of an emergency. Notification is to include methods of entering work area, emergency entry and exit locations, modifications to fire notification or firefighting equipment, and other information needed by agencies providing emergency services.
- C. Notifications of Emergency: Any individual at the job site may notify emergency service agencies if necessary without effect on this Contract or the Contract Sum.

1.8 PRE-CONSTRUCTION INSPECTION

- A. Inspect areas in which work will be performed, prior to commencement of work. Prepare a listing of damage to structure, surfaces, equipment or of surrounding properties which could be misconstrued as damage resulting from the work. Photograph or videotape existing conditions as necessary to document conditions. Submit to Designer for record purposes prior to starting work.

1.9 ADMINISTRATIVE AND SUPERVISORY PERSONNEL

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- A. Project Supervisor: Provide a full-time Project Supervisor at the work site who is experienced in administration and supervision of asbestos abatement projects including work practices, protective measures for building and personnel, disposal procedures, project scheduling, management, etc. This person is the Contractor's Representative, and will function as the "competent person" at the work site responsible for compliance with all applicable federal, state and local regulations, particularly those relating to ACM.
- B. Training: The General Superintendent must have a current certification from a state approved trainer for a course that meets the requirements of the EPA Model Accreditation Plan for asbestos abatement contractor/supervisor (40 CFR part 763, Subpart E, Appendix C).
- C. Experience: The General Superintendent must have demonstrable experience in the successful management of asbestos abatement projects that are similar to the work of this contract.
 - 1. The General Superintendent must have a minimum of 2 years experience in the on-site management of asbestos abatement projects.
- D. Competent Person: The General Superintendent is to be a Competent Person as required by OSHA in 29 CFR 1926.
- E. Accreditation: The General Superintendent, Supervisors and Forepersons are to be accredited as an Asbestos Abatement Supervisor in accordance with the AHERA regulation 40 CFR Part 763, Subpart E, Appendix C.

1.10 PRE-CONSTRUCTION CONFERENCE

- A. An initial progress meeting, recognized as "Pre-Construction Conference" will be convened by the Designer prior to start of any work. The preconstruction conference will be scheduled before start of construction, at a time convenient to the Owner and the Designer. Meet at the project site, or as otherwise directed, with General Superintendent, Owner, Designer, Project Administrator, and other entities concerned with the asbestos abatement work.
- B. Attendees: Authorized representatives of the Owner, Designer, and their consultants will be in attendance. An authorized representative of the Contractor and its superintendent; major subcontractors; manufacturers; suppliers; and other concerned parties shall attend the conference. All participants at the conference shall be familiar with the Project and authorized to conclude matters relating to the Work.

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1. Seventy-two (72) hours advance notice will be provided to all participants prior to convening Pre-Construction Conference.
- C. Agenda: This is an organizational meeting, to review responsibilities and personnel assignments, to locate regulated areas and temporary facilities including power, light, water, etc. Items of significance that could affect progress will be discussed, including the following:
1. Tentative construction schedule.
 2. Critical work sequencing.
 3. Designation of responsible personnel.
 4. Procedures for processing field decisions and Change Orders.
 5. Procedures for processing Applications for Payment.
 6. Distribution of Contract Documents.
 7. Submittal of Shop Drawings, Product Data, and Samples.
 8. Preparation of record documents.
 9. Use of the premises.
 10. Parking availability.
 11. Office, work, and storage areas.
 12. Equipment deliveries and priorities.
 13. Safety procedures.
 14. First aid.
 15. Security.
 16. Housekeeping.
 17. Working hours.

1.11 PROGRESS MEETINGS

McNeese President's Residence
Improvements | 1427
19-627-21-01, F.19002606 &
01-107-05B-13, F.01004560 (Supplement)
Site Code: 5-10-004 | State ID : S05519
April 14, 2025

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Coordination – Asbestos

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COORDINATION – ASBESTOS

- A. General: In addition to specific coordination and pre-installation meetings for each element of work, and other regular project meetings held for other purposes, the Designer will hold general progress meetings as required. These meeting will be scheduled, where possible, at time of preparation of payment request.
- B. Attendees: Representatives of the Owner and Designer will attend these meetings. In addition to representatives of the Contractor, each subcontractor, supplier, or other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the conference shall be familiar with the Project and authorized to conclude matters relating to the work. Require each entity then involved in planning, coordination or performance of work to be properly represented at each meeting.
- C. Agenda: Be prepared to discuss the following items at the progress meetings. Review other items of significance that could affect progress.
- D. Contractor's Construction Schedule: Review progress since the last meeting. Determine where each activity is in relation to the Contractor's Construction Schedule, whether on time or ahead or behind schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to insure that current and subsequent activities will be completed within the Contract Time.
- E. Review the present and future needs of each entity present, including the following:
 - 1. Interface requirements.
 - 2. Time.
 - 3. Sequences.
 - 4. Status of submittals.
 - 5. Deliveries.
 - 6. Access.
 - 7. Site utilization.
 - 8. Temporary facilities and services.

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9. Hours of work.
10. Hazards and risks.
11. Housekeeping.
12. Quality and work standards.
13. Change Orders.
14. Documentation of information for payment requests.

1.12 RECORD KEEPING

- A. Daily Log: Maintain a Daily Log (in an area accessible to the Owner, Designer and Project Administrator) as a bound, sequential, hand-written record carefully prepared daily that documents but is not limited to the following items:
 1. Meetings; purpose, attendees, brief discussion
 2. Special or unusual events, i.e. barrier breeching, equipment failures, accidents
- B. Documentation of Contractor's completion of the following:
 1. Inspection of work area preparation prior to start of removal and daily thereafter.
 2. Removal of any sheet plastic barriers
 3. Contractor's inspections prior to spray back, lock back, encapsulation, enclosure or any other operation that will conceal the condition of ACM or the substrate from which such materials have been removed.
 4. Removal of waste materials from work area
 5. Decontamination of equipment (list items)
 6. Contractors final inspection/final air test analysis.
- C. Entry/Exit Log: Maintain within the Decontamination Unit a daily log documenting the dates and time of but not limited to, the following items:

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1. Visitations; authorized and unauthorized with the following information:
 - a. Name
 - b. Organization
 - c. Entry time
 - d. Exit Time
 - e. Respiratory protection
2. Personnel, by name, entering and leaving the work area with the following information:
 - a. Printed Name
 - b. Identification Number
 - c. Entry Time
 - d. Exit Time
 - e. Respiratory Protection
- D. Air Monitoring Results: Post personnel and area air monitoring results in Decontamination Unit within 24 hours of sample collection. Post the respiratory protection requirements for the work in progress.
- E. Records in Decontamination Unit: Maintain the following documentation in the Decontamination Unit, in a location accessible to workers.
 1. Documentation of inspections by OSHA, EPA or local authority
 2. Respiratory Protection Program.
- F. Other records: Maintain other documentation in a location that is accessible to the Owner, Designer, and Project Administrator including:
 1. Waste Manifests and shipping records.
 2. Landfill receipts.
 3. Accident reports.

1.13 SPECIAL REPORTS

- A. General: Except as otherwise indicated, submit special reports directly to Owner within one day of occurrence requiring special report, with copy to Designer and others affected by occurrence.
- B. Reporting Unusual Events: When an event of unusual and significant nature occurs at site (examples: failure of pressure differential system, rupture of

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temporary enclosures), prepare and submit report. List chain of events, persons participating, response by Contractor's personnel, evaluation of results or effects, and similar pertinent information. When such events are known or predictable in advance, advise Owner in advance at earliest possible date.

- C. Reporting Accidents: Prepare and submit reports of significant accidents, at site and anywhere else work is in progress. Record and document data and actions; comply with industry standards. For this purpose, a significant accident is defined to include events where personal injury is sustained, property loss of substance is sustained, or where the event posed a significant threat of loss or personal injury, or where work was stopped for over 4 hours during a scheduled shift.
- D. Report Discovered Conditions: When an unusual condition of the building is discovered during the work (e.g. leaks, termites, corrosion) prepare and submit a special report indication condition discovered.

1.14 SUBMITTALS

- A. Before the Start of Work: Submit the following to the Designer in the same manner as product data. Do not begin work until these submittals are returned with designer's action stamp indicating that all submittals have been "received-not reviewed".
 - 1. Contingency Plans.
 - 2. Project Directory.
 - 3. Notifications: copy of notification sent to other entities at the work site, and to emergency service agencies.
 - 4. Pre-Construction Inspection: Report on inspection carried out as required by this section. Include copies of all photographs, video tapes, etc.
 - 5. Accreditation: Submit evidence in the form of training course certificates for the General Superintendent, Supervisors, and Forepersons as asbestos abatement supervisors in accordance with AHERA requirements. Submit evidence in the form of training course certificates that each worker is trained as an asbestos abatement worker in accordance with AHERA requirements.
 - 6. Resume: Submit resume of General Superintendent
 - 7. Schedule of Values

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8. OSHA Lead Awareness Training
 9. Asbestos Transporter License Number
 10. General Contractors License
 11. Asbestos Contractor License for State of Louisiana
- B. Submit daily: Provide two (2) copies for information purposes of all documents indicated in the following sub-sections to Project Administrator by end of the next working day after the day they are received by Contractor.
1. Section on Record Keeping.
 2. Section on Special Reports.
- C. Project Close-out: Submit two (2) copies for information purposes of all documents indicated in the following sections at final closeout of project as a project close-out submittal.
1. Section on Record Keeping.
 2. Section on Special Reports.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 02 82 12

SECTION 02 82 21
REFERENCE STANDARDS AND DEFINITIONS – ASBESTOS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 DEFINITIONS

- A. General: Basic contract definitions are included in the Conditions of the Contract.
1. "Indicated": The term "indicated" refers to graphic representations, notes, or schedules on the Drawings, or other paragraphs or Schedules in the Specifications, and similar requirements in the Contract Documents. Terms such as "shown," "noted," "scheduled," and "specified" are used to help the reader locate the reference. Location is not limited.
 2. "Directed": Terms such as "directed," "requested," "authorized," "selected," "approved," "required," and "permitted" mean directed by the Designer, requested by the Designer, and similar phrases.
 3. "Approved": The term "approved," when used in conjunction with the Designer's action on the Contractor's submittals, applications, and requests, is limited to the Designer's duties and responsibilities as stated in the Conditions of the Contract.
 4. "Regulations": The term "regulations" includes laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, as well as rules, conventions, and agreements within the construction industry that control performance of the Work.
 5. "Furnish": The term "furnish" means supply and deliver to the Project Site, ready for unloading, unpacking, assembly, installation, and similar operations.
 6. "Install": The term "install" describes operations at the Project Site including the actual unloading, unpacking, assembly, erecting, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations.
 7. "Provide": The term "provide" means to furnish and install, complete and ready for the intended use.
 8. "Installer": An installer is the Contractor or another entity engaged by the Contractor, either as an employee, subcontractor, or contractor of lower tier, to perform a particular construction activity, including installation, erection, application, or similar operations. Installers are required to be experienced in the operations they are engaged to perform.

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REFERENCE STANDARDS AND DEFINITIONS – ASBESTOS

- a. The term "experienced," when used with the term "installer," means having a minimum of five previous projects similar in size and scope to this Project, being familiar with the special requirements indicated, and having complied with requirements of authorities having jurisdiction.
 - b. Trades: Using terms such as "carpentry" does not imply that certain construction activities must be performed by accredited or unionized individuals of a corresponding generic name, such as "carpenter." It also does not imply that requirements specified apply exclusively to trades persons of the corresponding generic name.
9. "Project Site" is the space available to the Contractor for performing construction activities, either exclusively or in conjunction, with others performing other work as part of the Project. The extent of the Project Site is shown on the Drawings and may or may not be identical with the description of the land on which the Project is to be built.
10. "Testing Agencies": A testing agency is an independent entity engaged to perform specific inspections or tests, either at the Project Site or elsewhere, and to report on and, if required, to interpret results of those inspections or tests.
11. "Designer": This is the entity described as the "Architect" in AIA Document A201 "General Conditions of the Contract for Construction," or is the entity described as "Engineer" in Engineers Joint Contract Document Committee (EJCDC) Document 1910-8 "Standard General Conditions of the Construction Contract." All references to Architect or Engineer in the Contract Documents in all cases refer to the Designer. The Designer will represent the Owner during construction and until final payment is due. The Designer will advise and consult with the Owner. The Owner's instructions to the Contractor will be forwarded through the Designer.
12. "Project Administrator": This is the entity described as the "Project Representative" in AIA Document A201 "General Conditions of the Contract for Construction," or is the entity described as "Engineer" in Engineers Joint Contract Document Committee (EJCDC) Document 1910-8 "Standard General Conditions of the Construction Contract." The Project Administrator is a full time representative of the Owner at the job site with authority to stop the work upon written or verbal order if requirements of the Contract Documents are not met, or if in the sole judgment of the Project Administrator, Designer, or Owner, the interests of the Owner, safety of any person or the Owner's property are jeopardized by the work.
13. "Stop Work Order": is a written order to cease asbestos removal, encapsulation or enclosure activities. The Contractor must maintain work area enclosure, pressure differential isolation and ventilation of the work area, and decontamination units during the period that a Stop Work Order is in effect.

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REFERENCE STANDARDS AND DEFINITIONS – ASBESTOS

14. "General Superintendent": This is the Contractor's Representative at the work site. This person must be a Competent Person as defined by OSHA in 29 CFR 1926.
15. "Owners Rep": This is a person hired to oversee the work of the Contractor. This can include the Air Monitoring firm or others hired/employed by the Owner.

B. Definitions Relative to Asbestos Abatement:

1. "Adequately Wet" means to sufficiently mix or penetrate with liquid to prevent the release of particulates. If visible emissions are observed coming from the asbestos-containing material (ACM), then that material has not been adequately wetted. However, the absence of visible emissions is not sufficient evidence of being adequately wetted.
2. "Asbestos": The asbestiform varieties of chrysolite (serpentine), amosite (cummingtonite-grunerite), crocidolite (riebeckite), tremolite, anthophyllite, actinolite, and any of these minerals that has been chemically treated and/or altered. For purposes of the contract documents materials described in the contract documents as asbestos are to be considered as asbestos.
3. "Asbestos-Containing Material (ACM)": Any material containing more than 1 percent asbestos as determined using the methods specified in appendix A, subpart F, 40 CFR part 763, Section 1, Polarized Light Microscopy.
4. "Asbestos-Containing Waste Material": any waste that contains asbestos. This term includes filters or other materials contaminated with asbestos. This term also includes regulated asbestos-containing material waste and materials contaminated with asbestos including disposable equipment and clothing.
5. "Asbestos debris": pieces of ACM that can be identified by color, texture, or composition, or dust, if the dust is determined by an accredited inspector to be ACM.
6. "Asbestos Designer": a person who determines how asbestos abatement work should be conducted and who prepares for purposes of an abatement project, plans, designs, procedures, work scope or other substantive direction or criteria.
7. "Certified Industrial Hygienist (C.I.H.)": one certified in the practice of industrial hygiene by the American Board of Industrial Hygiene.
8. "Competent person" : an individual who meets the requirements of OSHA as a "competent person" for the specific activity involved in the work. The "competent person" must meet the requirements of 29 CFR 1926.32(f), and 29 CFR 1926.1101.

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REFERENCE STANDARDS AND DEFINITIONS – ASBESTOS

9. "Filter": A media component used to remove solid or liquid particles from air and water.
10. "Friable Asbestos": any asbestos-containing material that when dry, can be crumbled, pulverized, or reduced to powder by hand pressure.
11. "Grinding" : to reduce to powder or small fragments and includes manual or mechanical chipping or drilling.
12. "HEPA Filter": A High Efficiency Particulate Air (HEPA) filter capable of trapping and retaining 99.97 percent of all mono-dispersed particles of 0.3 microns in diameter.
13. "HEPA Filter Vacuum Collection Equipment (or vacuum cleaner)": High efficiency particulate air filtered vacuum collection equipment with a HEPA filter.
14. "Intact" : that the ACM has not crumbled, been pulverized, or otherwise deteriorated so that the asbestos is no longer likely to be bound with its matrix.
15. "Leak-tight" : that solids or liquids cannot escape or spill out. It also means dust-tight.
16. "Negative Pressure Enclosure (NPE) ": A pressure differential and ventilation system where the work area is maintained at a negative pressure relative to air pressure outside the work area.
17. "Nonfriable Material" : any material that, when dry, cannot be crumbled, pulverized, or reduced to powder by hand pressure and has not been rendered friable.
18. "Personal Monitoring": Sampling of the asbestos fiber concentrations within the breathing zone of an employee.
19. "Surfacing material" : material that is sprayed, troweled-on or otherwise applied to surfaces (such as acoustical plaster on ceilings and fireproofing materials on structural members, or other materials on surfaces for acoustical, fireproofing, and other purposes).
20. "Thermal system insulation (TSI)" : insulation applied to pipes, fittings, boilers, breeching, tanks, ducts or other components to prevent heat loss or gain.
21. "Time Weighted Average (TWA)": The average concentration of a contaminant in air during a specific time period as determined by the method prescribed in Appendix A of 29 CFR part 1926.1101.

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- 21. "Visible Emissions": Any emissions containing particulate material that are visually detectable without the aid of instruments. This does not include condensed uncombined water vapor.
- 22. "Working Day" : Monday through Friday and includes holidays that fall on any of the days Monday through Friday as indicated in the notification requirements.

1.3 SPECIFICATION FORMAT AND CONTENT EXPLANATION

- A. Specification Format: These Specifications are organized into Divisions and Sections based on CSRF's 16-Division format and MasterFormat's numbering system.
- B. Specification Content: This Specification uses certain conventions regarding the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations or circumstances. These conventions are explained as follows:
 - 1. Abbreviated Language: Language used in Specifications and other Contract Documents is abbreviated. Words and meanings shall be interpreted as appropriate. Words implied, but not stated, shall be interpolated as the sense requires. Singular words will be interpreted as plural and plural words interpreted as singular where applicable as the context of the Contract Documents indicates.
 - 2. Streamlined Language: The Specifications generally use the imperative mood and streamlined language. Requirements expressed in the imperative mood are to be performed by the Contractor. At certain locations in the Text, subjective language is used for clarity to describe responsibilities that must be fulfilled indirectly by the Contractor or by others when so noted.

1.4 INDUSTRY STANDARDS

- A. Applicability of Standards: Except where the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into the Contract Documents to the extent referenced. Such standards are made a part of the Contract Documents by reference.
- B. Publication Dates: Comply with the standards in effect as of the date of the Contract Documents.
- C. Conflicting Requirements: Where compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer to the Designer before proceeding for a decision on requirements that are different but apparently equal, and where it is uncertain which requirement is the most stringent.

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REFERENCE STANDARDS AND DEFINITIONS – ASBESTOS

1. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum acceptable. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of the requirements. Refer uncertainties to the Designer for a decision before proceeding.
- D. Copies of Standards: Each entity engaged in construction on the Project is required to be familiar with industry standards applicable to its construction activity. Copies of applicable standards are not bound with the Contract Documents.
1. Where copies of standards are needed to perform a required construction activity, the Contractor shall obtain copies directly from the publication source.
- E. Standards: which apply to asbestos abatement work or hauling and disposal of asbestos waste materials include but are not limited to the following:
1. American National Standards Institute (ANSI)
OPERATIONS HEADQUARTERS
25 West 43rd Street 1819 L Street NW
Fourth Floor Sixth Floor
New York, New York 10036 Washington, DC 20036
p.(212) 642-4900 f. (212) 398-0023 p. (202) 293-8020 f. (202) 293-9287
www.ansi.org
 - a. Fundamentals Governing the Design and Operation of Local Exhaust Systems Publication Z9.2
 - b. Practices for Respiratory Protection Publication Z88.2
 2. American Society for Testing and Materials (ASTM)
100 Bar Harbor Drive
P.O. Box C700
West Conshohocken, PA 19428-2959
p. (610) 832-9500 f. (610) 832-9555
www.astm.org
 - a. Safety and Health Requirements Relating to Occupational Exposure to Asbestos E 849
 - b. ASTM Standard Practice for Encapsulants for Spray-or-Trowel-Applied Friable Asbestos-Containing Building Materials E1494
- F. Abbreviations and Names: Trade association names and titles of general standards are frequently abbreviated. The following acronyms or abbreviations, as referenced in the Contract Documents, are defined to mean the associated names. Names and addresses are subject to change and are believed, but are not assured, to be accurate and up-to-date as of the date of the Contract Documents.

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1. ACI American Concrete Institute
P.O. Box 9094 38800 Country Club Drive
Farmington Hills, MI 48333 Farmington Hills, MI 48331
p. (248) 848-3700 f. (248) 848-3701
www.concrete.org
2. ACIL American Council of Independent Laboratories
1629 K St., NW
Suite 400
Washington, DC 20006-1633
p. (202) 887-5872 f. (202) 887-0021
www.acil.org
3. ACPA American Concrete Pipe Association
1303 West Walnut Hill Lane
Suite 305
Irving, TX 75038-3008
p. (972) 506-7216 f. (972) 506-7682
www.concrete-pipe.org
4. ACGIH American Conference of Governmental Industrial Hygienists
1330 Kemper Meadow Dr.
Cincinnati, OH 45240
p. (513) 742-2020 Customers/members p. (513) 742-6163 administrative
f. (513) 742-3355
www.acgih.org
5. AIA The American Institute of Architects
1735 New York Ave., NW
Washington, DC 20006-5292
p. (202) 626-7300 f. (202) 626-7547
www.aia.org
6. AIHA American Industrial Hygiene Assoc.
2700 Prosperity Ave
Suite 250
Fairfax, VA 22031
p. (703) 849-8888 f. (703) 207-3561
www.aiha.org
7. ANSI American National Standards Institute
OPERATIONS HEADQUARTERS
25 West 43rd Street 1819 L Street NW
Fourth Floor Sixth Floor
New York, New York 10036 Washington, DC 20036
p.(212) 642-4900 f. (212) 398-0023 p. (202) 293-8020 f. (202) 293-9287
www.ansi.org

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8. ASHRAE American Society of Heating, Refrigerating and Air-Conditioning Engineers
1791 Tullie Circle, NE
Atlanta, GA 30329
p. (404) 636-8400 f. (404) 321-5478
www.ashrae.org
9. ASME American Society of Mechanical Engineers
HEADQUARTERS WASHINGTON CENTER
Three Park Avenue 1828 L. Street NW Suite 906
New York, NY 10016-5990 Washington, DC 20036-5104
p. (212) 591-7158 or (800) 843-2763 p. (202) 785-3756 f. (202) 429-9417
f. (212) 591-7739
www.asme.org
10. ASPE American Society of Plumbing Engineers
8614 Catalpa Avenue
Suite 1007
Chicago, IL 60656-1116
p. (773) 693-2773 f. (773) 695-9007
www.aspe.org
11. ASTM American Society for Testing and Materials
100 Bar Harbor Drive
P.O. Box C700
West Conshohocken, PA 19428-2959
p. (610) 832-9500 f. (610) 832-9555
www.astm.org
12. CGA Compressed Gas Assoc.
4221 Walney Road
Fifth Floor
Chantilly, VA 20151-2923
p. (703) 788-2700 f. (703) 961-1831
www.cganet.com
13. FM Factory Mutual Systems
CORPORATE
1301 Atwood Avenue
P.O. Box 7500
Johnston, RI 02919
p. (401) 275-3000 f. (401) 275-3029
www.fmglobal.com
14. GA Gypsum Association
810 First St., NE
Suite 510
Washington, DC 20002

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p. (202) 289-5440 f. (202) 289-3707
www.gypsum.org

15. IEEE Institute of Electrical and Electronic Engineers
Three Park Avenue
17th Floor
New York, NY 10016-5997
p. (212) 419-7900 f. (212) 752-4929
www.ieee.org
16. NETA InterNational Electrical Testing Assoc.
3050 Old Centre Avenue
Suite 102
Portage, MI 49024
p. (269) 488-6382 f. (269) 488-6383
www.netaworld.org
17. IRI Industrial Risk Insurers
P.O. Box 5010
85 Woodland St.
Hartford, CT 06102-5010
(860) 520-7412
18. ISA Instrument Society of America
P.O. Box 12277
67 Alexander Dr.
Research Triangle Park, NC 27709
p. (919) 549-8411 f. (919) 549-8288
www.isa.org
19. ISO International Standards Organization
1 ch.de la Voie-Creuse
Case Postale 56
Ch-1211 Geneva 20, Switzerland
p. +41 22 749 0111
f. +41 22 733 3430
www.iso.org
20. NEC National Electrical Code (from NFPA)
One Batterymarch Park
P.O. Box 9101
Quincy, MA 02169-9101
p. (617) 770-3000 or (800) 344-3555 f. (617) 770-0700
www.nfpa.org
21. NECA National Electrical Contractors Assoc.
3 Bethesda Metro Center
Suite 1100
Bethesda, MD 20814

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p. (301) 657-3110 f. (301) 215-4500
www.necanet.org

22. NEMA National Electrical Manufacturers Association
1300 North 17th Street
Suite 1752
Rosslyn, VA 22209
p. (703) 841-3200 f. (730) 841-5900
www.nema.org
23. NFPA National Fire Protection Association
One Batterymarch Park
P.O. Box 9101
Quincy, MA 02169-9101
p. (617) 770-3000 or (800) 344-3555 f. (617) 770-0700
www.nfpa.org
24. NRCA National Roofing Contractors Assoc.
10255 W. Higgins Rd.
Suite 600
Rosemont, IL 60018-5607
p. (847) 299-9070 f. (847) 299-1183
www.nrca.net
25. RFCI Resilient Floor Covering Institute
115 Broad Street
Suite 201
LaGrange, GA 30240
p. (706) 882-3833 f. (706) 882-3880
www.rfci.com
26. UL Underwriters Laboratories
333 Pfingsten Rd.
Northbrook, IL 60062
p. (847) 272-8800 f. (847) 272-8129
www.ul.com
27. White Lung Association
PO Box 1483
Baltimore, MD 21203
p. (410) 243-5864
www.whitelung.org

- G. Federal Government Agencies: Names and titles of federal government standard- or Specification-producing agencies are often abbreviated. The following acronyms or abbreviations referenced in the Contract Documents indicate names of standard- or Specification-producing agencies of the federal government. Names and addresses are subject to change and are believed, but are not assured, to be accurate and up-to-date as of the date of the Contract Documents.

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1. CE Corps of Engineers
(U.S. Department of the Army) HEADQUARTERS
New Orleans District Public Affairs Office Public Affairs Office
7400 Leake Avenue 441G Street
P.O. Box 60267 (zip 70160) Washington, DC 20314
New Orleans, LA 70118
p. (202) 761-0010 f. (202) 761-1803 p. (504) 862-2201
www.usace.army.mil f. (504) 862-1724
2. CFR Code of Federal Regulations
(Available from the Government Printing Office)
U.S. Government Printing Office
732 North Capitol Street NW
Washington, DC 20401
p. (202) 512-0000 or (202) 512-1957 f. (202) 512-2104
www.gpoaccess.gov
(Material is usually first published in the "Federal Register")
3. CPSC Consumer Product Safety Commission
U.S. Consumer Product Safety Commission
4330 East West Hwy
Bethesda, MD 20814
p. (301) 504-7923 f. (301) 504-0124
www.cpsc.gov
4. CS Commercial Standard
U.S. Government Printing Office
732 North Capitol Street NW
Washington, DC 20401
p. (202) 512-0000 or (202) 512-1957 f. (202) 512-2104
www.gpoaccess.gov
5. DOC Department of Commerce
U.S. Department of Commerce
1401 Constitution Ave., NW
Washington, DC 20230
p. (202) 482-2000
www.commerce.gov
6. DOT Department of Transportation
U.S. Department of Transportation
1200 New Jersey Ave., SE
Washington, DC 20590

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p. (202) 366-4000

www.dot.gov

7. EPA Environmental Protection Agency
HEADQUARTERS REGIONAL DISTRICT 6
Ariel Rios Building Fountain Place 12th Floor
1200 Pennsylvania Ave., NW 1445 Ross Ave.
Washington, DC 20460 Dallas, TX 75202-2733
p. (202) 272-0167 p. (214) 665-2200 or (800) 887-6063
(214) 665-7113
www.epa.gov www.epa.gov/region6
8. FS Federal Specification (from GSA)
HEADQUARTERS
U.S. General Services Administration
1800 F Street NW
Washington, DC 20405
www.gsa.gov
REGIONAL DISTRICT 6
Carol Sue Henry Larry P. Rexroat
Occupational Safety & Health Spec Supervisor Environmental Scientist
12A 12th Floor #425
819 Taylor St (7PMV) 819 Taylor St
Fort Worth, TX 76102 Fort Worth, TX 76102
p. (817) 978-4436 f. (817) 978-2577 p.(817) 978-7260 or (817) 822-6618
carol.henry@gsa.gov larry.rexroat@gsa.gov
9. GSA General Services Administration
U.S. General Services Administration
1800 F Street NW
Washington, DC 20405
p. (202) 708-5082
www.gsa.gov
10. MIL Military Standardization Documents
Defense Automated Printing Service U.S. Department of Defense
700 Robbins Ave 1400 Defense Pentagon
Building 4D Washington, DC 20301-1400
Philadelphia, PA 19111-5094 p. (703) 545-6700 or
Attn: DODSSP p. (703) 428-0711
(For all printed documents)
f. (215) 697-1462
www.defenselink.mil

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11. NIST National Institute of Standards and Technology
100 Bureau Drive
Stop 1070
Gaithersburg, MD 20899-1070
p. (301) 975-6478
www.nist.gov
 12. OSHA Occupational Safety and Health Administration
HEADQUARTERS REGIONAL DISTRICT 6
200 Constitution Ave., NW 525 Griffin St., Room 602
Washington, DC 20210 Dallas, TX 75202
p. (202) 219-6091 or (800) 321-6742 p.(972) 850-4145 f.(972) 850-4149
www.osha.gov
 13. PS Product Standard of NIST
100 Bureau Drive
Stop 1070
Gaithersburg, MD 20899-1070
p. (301) 975-6478
www.nist.gov
 14. USPS U.S. Postal Service
475 L'Enfant Plaza, SW
Washington, DC 20260-0010
p. (202) 268-2000
www.usps.com
 15. LADEQ Louisiana Department of Environmental Quality
Galvez Building
602 N. Fifth Street
P.O. Box 4301 (zip 70821)
Baton Rouge, LA 70802
p. (225) 219-5337 or (225) 219-3953 f. (225) 219-3971
www.deq.louisiana.gov
- H. Trade Union Jurisdictions: The Contractor shall maintain, and require subcontractors to maintain, complete current information on jurisdictional matters, regulations and pending actions, as applicable to construction activities. The manner in which Contract Documents have been organized and subdivided is not intended to be indicative of trade union or jurisdictional agreements.
1. Discuss new developments at project meetings at the earliest feasible dates. Record relevant information and actions agreed upon.

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REFERENCE STANDARDS AND DEFINITIONS – ASBESTOS

2. Assign and subcontract construction activities, and employ tradesmen and laborers in a manner that will not unduly risk jurisdictional disputes that could result in conflicts, delays, claims and losses.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 02 82 21

SECTION 02 82 23
CODES, REGULATIONS, AND STANDARDS – ASBESTOS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this section.

1.2 SUMMARY

- A. This section sets forth governmental regulations which are included and incorporated herein by reference and made a part of the specification. This section also sets forth those notices and permits which are known to the Owner and which either must be applied for and received, or which must be given to governmental agencies before start of work.
 - 1. Requirements include adherence to work practices and procedures set forth in applicable codes, regulations and standards.
 - 2. Requirements include obtaining permits, licenses, inspections, releases and similar documentation, as well as payments, statements and similar requirements associated with codes, regulations, and standards.

1.3 CODES, REGULATIONS AND STANDARDS

- A. General Applicability of Codes, Regulations and Standards: Except to the extent that more explicit or more stringent requirements are written directly into the Contract Documents, all applicable codes and regulations have the same force and effect (and are made a part of the contract documents by reference) as if copied directly into the Contract Documents, or as if published copies are bound herewith.
- B. Contractor Responsibility: The Contractor shall assume full responsibility and liability for the compliance with all applicable Federal, State, and local regulations pertaining to work practices, hauling, disposal, and protection of workers, visitors to the site, and persons occupying areas adjacent to the site. The Contractor is responsible for providing medical examinations and maintaining medical records of personnel as required by the applicable Federal, State, and local regulations. The Contractor shall hold the Owner and Designer harmless for failure to comply with any applicable work, hauling, disposal, safety, health or other regulation on the part of the contractor, the contractor's employees, or subcontractors.

SECTION 02 82 23
CODES, REGULATIONS, AND STANDARDS – ASBESTOS

- C. Federal Requirements: which govern asbestos abatement work or hauling and disposal of asbestos waste materials include but are not limited to the following:
1. OSHA: U.S. Department of Labor, Occupational Safety and Health Administration, (OSHA), including but not limited to:
 - a. Occupational Exposure to Asbestos, Tremolite, Anthophyllite, and Actinolite;
Final Rules Title 29, Part 1910, Section 1001 of the Code of Federal Regulations
Final Rules Title 29, Part 1926, Section 1101 of the Code of Federal Regulations
 - b. Respiratory Protection
Title 29, Part 1910, Section 134 of the Code of Federal Regulations
Title 29, Part 1926, Section 103 of the Code of Federal Regulations
 - c. Personal Protective Equipment for General Industry
Title 29, Part 1910, Section 132 of the Code of Federal Regulations
Title 29, Part 1926, Sections 95 - 107 of the Code of Federal Regulations
 - d. Access to Employee Exposure and Medical Records
Title 29, Part 1926, Section 33 of the Code of Federal Regulations
 - e. Hazard Communication
Title 29, Part 1926, Section 59 of the Code of Federal Regulations
 - f. Specifications for Accident Prevention Signs and Tags
Title 29, Part 1910, Section 145 of the Code of Federal Regulations
 - g. Permit Required Confined Space
Title 29, Part 1910, Section 146 of the Code of Federal Regulations
 - h. Construction Industry
Title 29, Part 1910, Section 1001 of the Code of Federal Regulations
Title 29, Part 1926, Section 1101 of the Code of Federal Regulations
 - i. Construction Industry - General Duty Standards
Title 29, Part 1926, Sections 20 through 35 of the Code of Federal Regulations
 2. DOT: U. S. Department of Transportation, including but not limited to:
 - a. Hazardous Substances

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CODES, REGULATIONS, AND STANDARDS – ASBESTOS

- Title 49, Part 171 and 172 of the Code of Federal Regulations
 - b. Hazardous Material Regulations
General Awareness and Training Requirements for Handlers, Loaders and Drivers
Title 49, Parts 171-180 of the Code of Federal Regulations
 - c. Hazardous Material Regulations
Editorial and Technical Revisions
Title 49, Parts 171-180 of the Code of Federal Regulations
 - 3. EPA: U. S. Environmental Protection Agency (EPA), including but not limited to:
 - a. Asbestos Hazard Emergency Response Act (AHERA) Regulation
Title 40, Part 763, Sub-part E of the Code of Federal Regulations
 - b. EPA Model Accreditation Plan - Asbestos Containing Materials
Final Rule & Notice
Title 40, Part 763, Sub-part E, Appendix C of the Code of Federal Regulations
 - c. National Emission Standard for Hazardous Air Pollutants (NESHAP)
National Emission Standard for Asbestos
Title 40, Part 61, Sub-part A, and Sub-part M (Revised Sub-part B) of the Code of Federal Regulations
- D. State Requirements: which govern asbestos abatement work or hauling and disposal of asbestos waste materials include but are not limited to the following:
- 1. Louisiana Department of Environmental Quality
 - a. LAC 33:III. Chapter 51. Emission Standard for Asbestos
 - b. LAC 33:III. Chapter 27. Asbestos-Containing Materials in Schools and State Buildings.
 - c. LAC 33:VII Solid Waste
 - d. LAC 33:V Hazardous Waste

Abide by all local requirements which govern asbestos abatement work or hauling and disposal of asbestos waste materials.

1.4 NOTICES

A. LOUISIANA DEPARTMENT OF ENVIRONMENTAL QUALITY (LDEQ)

- 1. Postmark or Deliver Written Notification as required by LAC 33:III.Chapter 51.Subchanter M.Asbestos to the LDEQ. Contact at least 10 working days

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CODES, REGULATIONS, AND STANDARDS – ASBESTOS

prior to beginning any work on asbestos-containing materials (ACM). Send notification to the following address:

- a. Louisiana Department of Environmental Quality
Air Quality Division
P.O. Box 4314
Baton Rouge, LA 70821
Phone: (225) 219-3488
Fax: (225) 219-3240
Email: deqairassess@LA.GOV

2. Notification: Include the following information in the notification sent to the LADEQ:

- a. Indication whether the notification is the original or revised notification
- b. Name, address, and telephone number of owner or operator.
- c. Name, address, and telephone number of contractor.
- d. Type of Operation (demolition or renovation).
- e. Description of the facility or affected part of the facility being demolished or renovated, including the size (square feet [square meters], number of floors), age, present and prior use of the facility.
- f. Estimate of the approximate amount of RACM to be removed from the facility in terms of linear meters [linear feet] of pipe, and surface area in square meters [square feet] of other facility components. Also estimate the approximate amount of Category I and Category II nonfriable ACM in the affected part of the facility that will not be removed before demolition.
- g. For facilities in which the amount of friable asbestos materials less than 80 linear meters (260 linear feet) on pipes and less than 15 square meters (160 square feet) or 1 cubic meter (35 cubic feet) if the length and width could not be measured. On other facility components, explain techniques of estimation. The most current DEQ form and its requirements shall be followed as outlined and requested from DEQ.
- h. Location and street address (including building number or name and floor or room number, if appropriate), city county, and state, of the facility being demolished or renovated.
- i. Scheduled starting and completion dates of asbestos removal work (or any other activity, such as site preparation that would break up, dislodge, or similarly disturb asbestos material) in a demolition or renovation; planned renovation operations involving individual nonscheduled operations shall only include the beginning and

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CODES, REGULATIONS, AND STANDARDS – ASBESTOS

- ending dates of the report period in Subsection F.1.d.i. of LAC 33:III.Chapter 51.Subchapter M.Asbestos.
- j. Scheduled starting and completion dates of demolition or renovation.
 - k. Nature of planned demolition or renovation and method(s) to be used, including demolition or renovation techniques to be used and description of affected facility components.
 - l. Procedures to be used to comply with the requirements of LAC 33:III.Chapter 51.Subchapter M.Asbestos.
 - m. Name and location of the waste disposal site where the asbestos containing waste material will be deposited.
 - n. A certification that at least one person trained and accredited as required by Subsection F.3.h of LAC 33:III.Chapter 51.Subchapter M.Asbestos will supervise the stripping and removal described by this notification.
 - o. Description of procedures to be followed in the event that the unexpected RACM is found or Category II nonfriable ACM becomes crumbled, pulverized, or reduced to powder.
 - p. Name, address, and telephone number of the waste transporter.

B. OCCUPATIONAL SAFETY & HEALTH ADMINISTRATION

- 1. Send a copy of evaluation and certification of alternative work procedures to the national office of OSHA, Office of Technical Support, Room N3653, 200 Constitution Avenue, NW, Washington, DC 20210 before work which involves the removal of more than 25 linear or 10 square feet (7.5 linear meters or 3 square meters) of thermal system insulation or surfacing material is begun using an alternative method.

C. STATE AND LOCAL AGENCIES:

- 1. Send written notification as required by state and local regulations prior to beginning any work on ACM.

1.5 PERMITS

- A. Permit: All asbestos containing waste is to be transported by an entity maintaining a current "Industrial waste hauler permit" specifically for ACM, as required for transporting of waste ACM to a disposal site.
- B. Contractor is responsible for obtaining any demolition, building, renovation or other permits, and for paying application fees, if any, where required by State or Local jurisdictions.

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CODES, REGULATIONS, AND STANDARDS – ASBESTOS

1.6 LICENSES

- A. Licenses: Maintain current licenses as required by applicable state or local jurisdictions for the removal, transporting, disposal or other regulated activity relative to the work of this contract.

1.7 POSTING AND FILING OF REGULATIONS

- A. Posting and Filing of Regulations: Post all notices required by applicable federal, state and local regulations. Maintain two (2) copies of applicable federal, state and local regulations and standard. Maintain one copy of each at job site. Keep on file in Contractor's office one copy of each.

1.8 SUBMITTALS

- A. Before Start of Work: Submit the following to the Designer for review. No work shall begin until these submittals are returned with Designer's action stamp indicating that the submittal is returned for unrestricted use or final-but-restricted use.
 - 1. Permits, Licenses, and Certificates: For the Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, and similar documents, correspondence and records established in conjunction with compliance with standards and regulations bearing upon performance of the Work including:
 - a. State and Local Regulations: Submit copies of codes and regulations applicable to the work.
 - 2. Notices: Submit notices required by federal, state and local regulations together with proof of timely transmittal to agency requiring the notice.
 - 3. Permits: Submit copies of current valid permits required by state and local regulations.
 - 4. Licenses: Submit copies of all State and local licenses and permits necessary to carry out the work of this contract.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 02 82 23

SECTION 02 82 24
SUBMITTALS CHECKLIST – ASBESTOS ABATEMENT

SUBMITTAL CHECKLIST

The following is a listing of the submittals required by each section.

02 82 10 Summary of Work - Asbestos Abatement

Before Start of Work:
Plan of Action
Pre-construction Inspection
Schedule of Values
Inventory of Disposed Items
Schedule of Work

02 82 11 Application for Payment - Asbestos Abatement

Before Start of Work:
Schedule of Values
Periodically During Work:
Refer to section for specific requirements for Payment Requests

02 82 12 Project Coordination - Asbestos Abatement

Before Start of Work:
Contractors Construction Schedule
Contingency Plans
Telephone Numbers
Notifications sent to other entities at the work site.
Notifications sent to emergency service agencies.
Resume: of general superintendent.
Accreditation: Certificate of accreditation of general superintendent
Staff Names:
Periodically During Work:
Daily Logs
Event Reports
Accident Reports
Discovered Condition Reports

02 82 23 Codes, Regulations and Standards - Asbestos Abatement

Before Start of Work:
State Regulations
Licenses
Notifications. AAC-2 Form

SECTION 02 82 24
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02 82 40 Temporary Facilities - Asbestos Abatement

Before Start of Work:
Scaffolding
Hot water heater
Decontamination Unit Sub-panel
Ground Fault Circuit Interrupters (GFCI)
Fire Extinguishers: product data, location schedule

02 82 60 Temporary Pressure Differential & Air Circulation System

Before Start of Work:
Pressure Differential System Design
HEPA Filtered Fan Units: Product data
Monitoring Equipment: Product data
Periodically During Work:
Pressure Differential Monitoring Results

02 82 61 Temporary Enclosures

Before Start of Work:
Spray Cement: Product data.
Spray Cement: Manufacturer's installation instructions.
Spray Cement: Safety Data Sheet.
Sheet Plastic: Test reports on NFPA 701 test.
Signs: Samples
Caulking: Product Data
Caulking: Safety Data Sheet

02 82 73 Worker Protection - Asbestos Abatement

Before Start of Work:
AHERA Accreditation: for each worker.
State and Local License: for each worker.
Historic Airborne Fiber Data.
Certificate Worker Acknowledgment: for each worker.
Training Program: Training Certification
Report from Medical Examination: of each worker.
Notarized Certifications.
Periodically During Work:
Personnel Air Samples Analysis
Area Air Samples Analysis

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SUBMITTALS CHECKLIST – ASBESTOS ABATEMENT

02 82 75 Respiratory Protection

Before Start of Work:
Product Data.
NIOSH and MSHA Certifications.
Respiratory Protection Program: written manual.
Respiratory Protection Program: form at end of section.
Historic Airborne Fiber Data.

02 82 77 Decontamination Units

Before Start of Work:
Personnel Decontamination Unit: shop drawing.
Equipment Decontamination Unit: shop drawing.
Filters: product data.
Filters: shop drawing.
Lumber: product data on fire resistance treatment.
Sump Pump: product data.
Signs: samples.

02 82 80 Project/Contractor Closeout - Asbestos Abatement

Periodically During Work:
Refer to section

02 82 81 Project Decontamination

Periodically During Work:
Fire Test on Lock Back Encapsulants used.

02 83 30 Removal of Asbestos-Containing Materials

Before Start of Work:
Surfactant: product data.
Removal Encapsulant: product data.
NESHAP Certification: on surfactant or removal encapsulant.
Safety Data Sheet: for each surfactant and encapsulant

02 83 32 Disposal of Regulated Asbestos-Containing Material

Before Start of Work:
Waste Hauler State License
Waste Hauler Local License

SECTION 02 82 24
SUBMITTALS CHECKLIST – ASBESTOS ABATEMENT

Name and address of landfill.
Landfill contact person and telephone number.
Waste Manifest Form.
Disposal Bag: samples.
Label Samples.
Periodically During Work:
On a weekly basis: copies of manifests and disposal site receipts.

END OF SUBMITTAL CHECKLIST

END OF SECTION 02 82 24

SECTION 02 82 25
SUBMITTALS – ASBESTOS ABATEMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for submittals required for performance of the Work, including the following:
 - 1. Submittal schedule.
 - 2. Daily construction reports.
 - 3. Shop Drawings.
 - 4. Product Data.
 - 5. Samples.
 - 6. Quality Assurance Submittals
- B. Administrative Submittals: Refer to other Division 1 Sections and other Contract Documents for requirements for administrative submittals. Such submittals include, but are not limited to, the following:
 - 1. Permits
 - 2. Applications for payment
 - 3. Performance and payment bonds
 - 4. Insurance certificates
 - 5. List of Subcontractors
- C. RELATED SECTIONS
 - 1. The following Sections contain requirements that relate to this Section:

SECTION 02 82 25
SUBMITTALS – ASBESTOS ABATEMENT

- a. Division 1 Section "Applications for Payment - Asbestos Abatement" specifies requirements for submittal of the Schedule of Values.
- b. Division 1 Section "Coordination" specifies requirements governing submittal and distribution of meeting and conference minutes.
- c. Division 1 Section "Project Closeout-Asbestos Abatement" specifies requirements for submittal of Project Record Documents and warranties at project closeout.

1.3 SUBMITTAL PROCEDURES

- A. Coordination: Coordinate preparation and processing of submittals with performance of construction activities. Transmit each submittal sufficiently in advance of performance of related construction activities to avoid delay.
 - 1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
 - 2. Coordinate transmittal of different types of submittals for related elements of the Work so processing will not be delayed by the need to review submittals concurrently for coordination.
 - a. The Designer reserves the right to withhold action on a submittal requiring coordination with other submittals until all related submittals are received.
- B. Processing: To avoid the need to delay installation as a result of the time required to process submittals, allow sufficient time for submittal review, including time for resubmittals.
 - 1. Allow one week for initial review. Allow additional time if the Designer must delay processing to permit coordination with subsequent submittals.
 - 2. If an intermediate submittal is necessary, process the same as the initial submittal.
 - 3. Allow one week for reprocessing each submittal.
 - 4. No extension of Contract Time will be authorized because of failure to transmit submittals to the Designer sufficiently in advance of the Work to permit processing.

SECTION 02 82 25
SUBMITTALS – ASBESTOS ABATEMENT

- C. Submittal Preparation: Place a permanent label or title block on each submittal for identification. Indicate the name of the entity that prepared each submittal on the label or title block.
1. Provide a space approximately 4 by 5 inches (100 by 125 mm) on the label or beside the title block on Shop Drawings to record the Contractor's review and approval markings and the action taken.
 2. Include the following information on the label for processing and recording action taken.
 - a. Project name.
 - b. Date.
 - c. Name and address of the Designer.
 - d. Name and address of the Contractor.
 - e. Name and address of the subcontractor.
 - f. Name and address of the supplier.
 - g. Name of the manufacturer.
 - h. Number and title of appropriate Specification Section.
 - i. Drawing number and detail references, as appropriate.
- D. Submittal Transmittal: Package each submittal appropriately for transmittal and handling. Transmit each submittal from the Contractor to the Designer using a transmittal form. The Designer will not accept submittals received from sources other than the Contractor.
1. On the transmittal, record relevant information and requests for data. On the form, or separate sheet, record deviations from Contract Document requirements, including variations and limitations. Include Contractor's certification that information complies with Contract Document requirements.
- E. Transmittal Form: Use AIA Document G810.

1.4 SUBMITTAL SCHEDULE

- A. Listing: At the end of this section is a listing of the principal submittals required for the work. This listing is not necessarily complete, nor does the listing reflect the significance of each submittal requirement. The listing is included only for the convenience of users of the Contract Documents.
- B. Submittal Schedule: After development and acceptance of the Contractor's Construction Schedule, prepare a complete schedule of submittals. Submit the schedule within 10 days of the date required for submittal of the Contractor's Construction Schedule.

SECTION 02 82 25
SUBMITTALS – ASBESTOS ABATEMENT

1. Coordinate Submittal Schedule with the list of subcontracts, Schedule of Values, and the list of products as well as the Contractor's Construction Schedule.
 2. Prepare the schedule in chronological order. Provide the following information:
 - a. Scheduled date for the first submittal.
 - b. Related Section number.
 - c. Submittal category (Shop Drawings, Product Data, or Samples).
 - d. Name of the subcontractor.
 - e. Description of the part of the Work covered.
 - f. Scheduled date for resubmittal.
 - g. Scheduled date for the Designer's final release or approval.
- C. Distribution: Following response to the initial submittal, print and distribute copies to the Designer, Owner, subcontractors, and other parties required to comply with submittal dates indicated. Post copies in the Project meeting room and field office.
1. When revisions are made, distribute to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in construction activities.
- D. Schedule Updating: Revise the schedule after each meeting or activity where revisions have been recognized or made. Issue the updated schedule concurrently with the report of each meeting.

1.5 SHOP DRAWINGS

- A. Submit newly prepared information drawn accurately to scale. Highlight, encircle, or otherwise indicate deviations from the Contract Documents. Do not reproduce Contract Documents or copy standard information as the basis of Shop Drawings. Standard information prepared without specific reference to the Project is not a Shop Drawing.
- B. Shop Drawings include fabrication and installation Drawings, setting diagrams, schedules, patterns, templates and similar Drawings. Include the following information:
 1. Dimensions.

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2. Identification of products and materials included by sheet and detail number.
 3. Compliance with specified standards.
 4. Notation of coordination requirements.
 5. Notation of dimensions established by field measurement.
- C. Sheet Size: Except for templates, patterns and similar full-size Drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches (215 by 280 mm) but no larger than 36 by 48 inches (890 by 1220 mm).
- D. Initial Submittal: Submit two (2) blue- or black-line prints for the Designer's review. The Designer will return one print.
- E. Final Submittal: Submit three (3) blue- or black-line prints; submit five prints where required for maintenance manuals. The Designer will retain two (2) prints and return the remainder.
1. One of the prints returned shall be marked up and maintained as a "Record Document."
 2. Do not use Shop Drawings without an appropriate final stamp indicating action taken.

1.6 PRODUCT DATA

- A. Collect Product Data into a single submittal. Product Data includes printed information such as manufacturer's installation instructions, catalog cuts, standard wiring diagrams and performance curves. Where Product Data must be specially prepared because standard printed data is not suitable for use, submit as "Shop Drawings."
1. Mark each copy to show applicable choices and options. Where printed Product Data includes information on several products, some of which are not required, mark copies to indicate the applicable information. Include the following information:
 - a. Manufacturer's printed recommendations.
 - b. Compliance with recognized trade association standards.
 - c. 1w. Compliance with recognized testing agency standards.
 - d. Application of testing agency labels and seals.
 - e. Notation of dimensions verified by field measurement.

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- f. Notation of coordination requirements.
- 2. Do not submit Product Data until compliance with requirements of the Contract Documents has been confirmed.
- B. Preliminary Submittal: Submit a preliminary single-copy of Product Data where selection of options is required.
- C. Submittals: Submit three (3) copies of each required submittal. The Designer will retain two (2), and will return the one marked with action taken and corrections or modifications required.
 - 1. Unless noncompliance with Contract Document provisions is observed, the submittal may serve as the final submittal.
- D. Distribution: Furnish copies of final submittal to installers, subcontractors, suppliers, manufacturers, fabricators, and others required for performance of construction activities. Show distribution on transmittal forms.
 - 1. Do not proceed with installation until a final submittal is in the installer's possession.
 - 2. Do not permit use of unmarked copies of Product Data in connection with construction.

1.7 QUALITY ASSURANCE SUBMITTALS

- A. Submit quality-control submittals, including design data, certifications, manufacturer's instructions, manufacturer's field reports, and other quality-control submittals as required under other Sections of the Specifications.
- B. Certifications: Where other Sections of the Specifications require certification that a product, material, or installation complies with specified requirements, submit a notarized certification from the manufacturer certifying compliance with specified requirements.
 - 1. Signature: Certification shall be signed by an officer of the manufacturer or other individual authorized to sign documents on behalf of the company.

1.8 MISCELLANEOUS SUBMITTALS

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- A. Safety Data Sheets: Process Safety Data Sheets as “product data.” These are submitted for information purposes only, they will be returned with the action stamp, “Received - Not Reviewed.”
- B. Records of Actual Work: Furnish four (4) copies of records of actual work, one will be returned for inclusion in the record documents as specified in section "Project Closeout".
- C. Closeout Submittals: Refer to section "Project Closeout" and to individual sections of these specifications for specific submittal requirements of project closeout information.

1.9 DESIGNER’S ACTION

- A. Except for submittals for the record or information, where action and return is required, the Designer will review each submittal, mark to indicate action taken, and return promptly.
 - 1. Compliance with specified characteristics is the Contractor's responsibility.
- B. Action Stamp: The Designer will stamp each submittal with a uniform, action stamp. The Designer will mark the stamp appropriately to indicate the action taken, as follows:
 - 1. Final Unrestricted Release: When the Designer marks a submittal "Approved," the Work covered by the submittal may proceed provided it complies with requirements of the Contract Documents. Final payment depends on that compliance.
 - 2. Final-But-Restricted Release: When the Designer marks a submittal "Approved as Noted," the Work covered by the submittal may proceed provided it complies with notations or corrections on the submittal and requirements of the Contract Documents. Final payment depends on that compliance.
 - 3. Returned for Resubmittal: When the Designer marks a submittal "Not Approved, Revise and Resubmit," do not proceed with Work covered by the submittal, including purchasing, fabrication, delivery, or other activity. Revise or prepare a new submittal according to the notations; resubmit without delay. Repeat if necessary to obtain different action mark.

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- a. Do not use, or allow others to use, submittals marked "Not Approved, Revise and Resubmit" at the Project Site or elsewhere where Work is in progress.
 - 4. Received - Not Reviewed: When the Designer marks a submittal "Received - Not Reviewed" this acknowledges that the submittal has been received. This action applies to materials that are to be submitted for information purposes only, and where no review or action by the Designer is required.
 - 5. Other Action: Where a submittal is for information or record purposes or special processing or other activity, the Designer will return the submittal marked "Action Not Required."
- C. Unsolicited Submittals: The Designer will return unsolicited submittals to the sender without action.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 02 82 25

SECTION 02 82 30
AIR MONITORING – ASBESTOS ABATEMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to work of this section.
 - 1. Air Monitoring: during work area clearance is described in Section 02 82 84 Work Area Clearance.

1.2 DESCRIPTION OF THE WORK

- A. This section describes work being performed by the Contractor's representative.
- B. This section describes air monitoring carried out by the Contractor to verify that the building beyond the work area and the outside environment remains uncontaminated. This section also sets forth airborne fiber levels both inside and outside the work area as action levels, and describes the action required by the Contractor if an action level is met or exceeded.
- C. Industrial Hygienist will develop air sampling strategies for obtaining area baseline air samples prior to commencement of abatement work, area monitoring samples during removal work and final area clearance samples for releasing contractor. Each facility will be assigned a certified asbestos supervisor who will work under the direction of the Project's Industrial Hygienist. They will perform the area monitoring with high volume eclectic pumps. The contractor will conduct personal air monitoring of at least 25 percent of his employees working within enclosed work areas.
- D. Air monitoring required by OSHA is work of the Contractor and is not covered in this section.

1.3 AIR MONITORING

- A. Work Area Isolation: The purpose of the Contractor's air monitoring is to detect faults in the work area isolation such as:
- B. Contamination of the building outside of the work area with airborne asbestos fibers,
- C. Failure of filtration or rupture in the differential pressure system,
- D. Contamination of air outside the building envelope airborne asbestos fibers.

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- E. Should any of the above occur immediately cease asbestos abatement activities until the fault is corrected. Do not recommence work until authorized by the Owner's Representative.
- F. Work Area Airborne Fiber Count: The contractor will monitor airborne fiber counts in the Work Area. The purpose of this air monitoring will be to detect airborne asbestos concentrations which may challenge the ability of the Work Area isolation procedures to protect the balance of the building or outside of the building from the contamination by airborne fibers. Contractor will also use personal air monitoring for 25 percent of workers to comply with OSHA regulations.
- G. Work Area Clearance: To determine if the elevated airborne fiber counts encountered during abatement operations have been reduced to an acceptable level, the Contractor will sample and analyze air per Section 02 82 84 Work Area Clearance.
- H. The Contractor will be conducting air monitoring throughout the course of the project.

1.4 STOP ACTION LEVELS

- A. Inside Work Area: Maintain an average airborne count in the Work Area of less than 0.1 fibers per cubic centimeter. If the fiber counts rise above this figure for any sample taken, revise work procedures to lower fiber counts. If the Time Weighted Average (TWA) fiber count for any work shift or 8 hour period exceeds 0.1 fibers per cubic centimeter, stop all work, leave Pressure Differential System in operation and notify Owner's Representative.
- B. If airborne fiber counts exceed 1.0 fibers per cubic centimeter for any period of time cease all work except corrective action until fiber counts fall below 0.5 fibers per cubic centimeter and notify Owner's Representative. After correcting cause of high fiber levels, do not recommence work for 24 hours unless otherwise authorized, in writing, by Owner's Representative.
- C. Inside Work Area: Maintain an average airborne count in the work area of less than the Stop Action Level given below for the type of respiratory protection in use. If the fiber counts rise above this figure for any sample taken, revise work procedures to lower fiber counts. If the Time Weighted Average (TWA) fiber count for any work shift or 8 hour period exceeds the Stop Action Level, stop all work except corrective action, leave pressure differential and air circulation system in operation and notify Owner's Representative. After correcting cause of

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high fiber levels, do not recommence work for 24 hours unless otherwise authorized, in writing, by Owner's Representative.

STOP ACTION LEVEL (f/cc)	IMMEDIATE STOP LEVEL (f/cc)	MINIMUM RESPIRATOR REQUIRED	MINIMUM PROTECTION FACTOR
0.1	1.0	Full Face	1000

If airborne fiber counts exceed Immediate Stop Level given above for type of respiratory protection in use for any period of time cease all work except corrective action. Notify Owner's Representative. Do not recommence work until fiber counts fall below AStop Action Level given above for the type of respiratory protection in use. After correcting cause of high fiber levels, do not recommence work for 24 hours unless otherwise authorized, in writing, by Owner's Representative.

- D. Outside Work Area: If any air sample taken outside of the Work Area exceeds the base line established below, immediately and automatically stop all work except corrective action. The Owner's Representative will determine the source of the high reading and so notify the Contractor in writing.
- E. If the high reading was the result of a failure of Work Area isolation measures initiate the following actions:
1. Immediately erect new critical barriers as set forth in Section 02 82 61 Temporary Enclosures to isolate the affected area from the balance of the building. Erect Critical Barriers at the next existing structural isolation of the involved space (e.g. wall, ceiling, floor).
 2. Decontaminate the affected area in accordance with Section 02 83 83 Cleaning and Decontamination Procedures.
 3. Require that respiratory protection as set forth in Section 02 82 75 Respiratory Protection be worn in affected area until area is cleared for reoccupancy in accordance with Section 02 82 84 Work Area Clearance.
 4. Leave Critical Barriers in place until completion of work and insure that the operation of the pressure differential system in the Work Area results in a flow of air form the balance of the building into the affected area.

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5. If the exit from the clean room of the personnel decontamination unit enters the affected area, establish a decontamination facility consisting of a Shower Room and Changing Room as set forth in Section 02 82 77 Decontamination Units at entry point to affected area.
 6. After Certification of Visual Inspection in the Work Area remove critical barriers separating the work area from the affected area. Final air samples will be taken within the entire area as set forth in Section 02 82 83 Work Area Clearance.
- F. Fibers Counted: The following procedure will be used to resolve any disputes regarding fiber types when a project has been stopped due to excessive airborne fiber counts.
- G. Large Fibers: “Airborne Fibers” referred to above include all fibers regardless of composition as counted by phase contrast microscopy (PCM), unless additional analysis by transmission or scanning electron microscopy demonstrates to the satisfaction of the Owner’s Representative that non-asbestos fibers are being counted. “Airborne Fibers” counted in samples analyzed by scanning or transmission electron microscopy shall be asbestos fibers, greater than 5 microns in length and greater than 0.25 microns in diameter. For purposes of stop action levels, subsequent to analysis by electron microscopy, the number of “Airborne Fibers” shall be determined by multiplying the number of fibers, regardless of composition, counted by PCM by a number equal to asbestos fibers counted divided by all fibers counted in the electron microscopy analysis.
- H. Small Structures: “Airborne Fibers” referred to above include asbestos structures (fibers, bundles, clusters, or matrices) of any diameter and any length greater than 0.5 microns.

1.5 ANALYTICAL METHODS

The following methods will be used by the Contractor in analyzing filters used to collect air samples. Sampling rates may be varied from printed standards to allow for high volume sampling.

- A. Phase Contrast Microscopy (PCM): will be performed using the NIOSH 7400 method. This analysis may be carried out at the job site and/or accredited laboratory.
- B. Transmission Electron Microscopy will be performed using the analysis method set forth in the AHERA regulation 40 CFR Part 763 Subpart E Appendix A.

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AIR MONITORING – ASBESTOS ABATEMENT

1.6 SAMPLE VOLUMES

- A. General: The number and volume of air samples taken by the Contractor will be in accordance with the following schedule. Sample volumes given may vary depending upon the analytical method used.

1.7 SCHEDULE OF AIR SAMPLES

- A. Before Start of Work:

1. The Contractor will secure the following Air Samples to establish a base line before start of work.
2. Samples cassettes: Samples will be collected on 25 mm. cassettes as follows:

PCM: 0.8 micrometer mixed cellulose ester.

TEM: 0.45 micrometer mixed cellulose ester or 0.40 micrometer polycarbonate, with 5.0 micron cellulose ester backing filter.

- B. Sampling sensitivity in the table below refers to:

1. Detection Limit for PCM analysis as set forth in the analytical method used

Analytical Sensitivity for TEM analysis as set forth in the analytical method used or the AHERA regulation.

Location Sampled	Number of Samples	Analysis Method	Sampling Sensitivity Fibers/cc.	Minimum Volume (Liter)	Rate LPM
Each Work Area*	1	PCM	0.01	1,200	1-10
Each Work Area*	1	hold for TEM	0.005	1,300	1-10
Outside Each Work Area*	5	PCM	0.01	1,200	1-10
Outside Each Work Area*	1	hold for TEM	0.005	1,300	1-10
Outside Building	5	PCM	0.01	1,200	1-10
Outside Building	1	hold for TEM	0.005	1,300	1-10

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*Work areas may have to be less than 3,000 square feet or 1,000 linear feet to comply with AHERA regulations for determining clearance requirements by PCM and not TEM.

- C. Base Line: an action level expressed in fibers per cubic centimeter which is 25 percent greater than the largest of the following:
- D. Average of the PCM samples collected outside each Work Area
- E. Average of the PCM samples collected outside the building
- F. 0.01 fibers per cubic centimeter
Samples collected for TEM analysis will be held without analysis. These samples will be analyzed under the conditions and terms set forth in “Fibers Counted” and “Affect on Contract Sum.” TEM Analysis may be required if clearance criteria is not officially met and there is some doubt as to the type and size of fibers in clearance samples.
- G. Daily:
From start of work of Section 02 82 61 Temporary Enclosures through the work of Section 02 82 81 Project Decontamination, the Owner may be taking the following samples on a daily basis.
- H. Samples will be collected on 25 mm. cassettes with the following filter media:
PCM: 0.8 micrometer mixed cellulose ester.

Location Sampled	Number of Samples	Analysis Method	Detection Limit Fibers/cc.	Minimum Volume (Liters)	Rate LPM
Each Work Area	2	PCM	0.01	1,200	1-10
OR AS REQUIRED BY CONDITIONS					
~~Outside Each Work Area at Critical Barrier~~	~~1~~	~~PCM~~	~~0.01~~	~~1,200~~	~~1-10~~
Clean Room	1	PCM	0.01	1,200	1-10
Equip Decon	1	PCM	0.01	1,200	1-10
Outside Building Output Pressure	1	PCM	0.01	1,200	1-10
Differential System	1	PCM	0.01	1,200	1-10

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Additional samples may be taken at Owner's or Owner's Representatives discretion. If airborne fiber counts exceed allowed limits additional samples will be taken as necessary to monitor fiber levels.

1.8 LABORATORY TESTING

- A. The services of a testing laboratory may be employed by the Contractor to perform laboratory analyses of the air samples. A technician will be at the job site, and samples will be sent daily by carrier for next day delivery, so that verbal reports on air samples can be obtained within 24 hours. Industrial Hygienist will coordinate and monitor this job function very closely to assess that maximum respiratory protection is being provided to personnel working at the Owner's Facility.
- B. A complete record of all air monitoring and results will be furnished to the Owner's Representative, the Owner, and the Contractor.
- C. The Owner will have access to all air monitoring tests and results, but will require excellent communication between all parties.
- D. Written Reports: of all air monitoring tests will be posted at the job site on a daily basis or verbally presented to the workers during the prework day staffing's or safety meetings.

PART 2 - PRODUCTS (NOT APPLICABLE)

PART 3 - EXECUTION

3.1 ADDITIONAL TESTING

- A. The Owner may conduct his own air monitoring and laboratory testing. If he elects to do this the cost of such air monitoring and laboratory testing shall be at no additional cost to the Contractor.

3.2 PERSONAL MONITORING

- A. Owner will not be performing air monitoring to meet Contractor's OSHA requirements for personnel sampling or any other purpose. It is the Contractor's responsibility to monitor the work area and his own personnel to assure compliance with OSHA and EPA requirements.

END OF SECTION 02 82 30

SECTION 02 82 40
TEMPORARY FACILITIES – ASBESTOS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings, general provisions of Contract, including General and Supplementary Conditions, and other Division 1, and Division 2 Specification Sections apply to work of this section.

1.2 SUMMARY

- A. This Section includes requirements for construction facilities and temporary controls, including temporary utilities, support facilities, and security and protection.
- B. Temporary utilities include, but are not limited to, the following:
 - 1. Water service and distribution
 - 2. Temporary electric power and light
 - 3. Temporary heat
 - 4. Ventilation
 - 5. Telephone service
 - 6. Sanitary facilities, including drinking water
 - 7. Storm and sanitary sewer.
- C. Support facilities include, but are not limited to, the following:
 - 1. Field offices, laboratories and storage sheds
 - 2. Temporary enclosures
 - 3. Hoists.
- D. Security and protection facilities include, but are not limited to, the following:
 - 1. Temporary fire protection.
 - 2. Barricades, warning signs, and lights.

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1.3 DESCRIPTION OF REQUIREMENTS

- A. General: Provide temporary connection to existing building utilities or provide temporary facilities as required herein or as necessary to carry out the work.

1.4 SUBMITTALS

- A. Before the Start of Work: Submit the following to the Owner's Asbestos Consultant for review. Begin no work until these submittals are returned with Owner's Asbestos Consultant's action stamp indicating that the submittal is returned for unrestricted use or final-but-restricted use.
1. Scaffolding: Submit list of rolling and fixed scaffolding intended for use on the project. Submit sufficient detail to indicate compliance with applicable worker safety regulations or other requirements.
 2. Hot Water Heater: Submit manufacturer's name, model number, size in gallons, heating capacity, power requirements.
 3. Decontamination Unit Sub-panel: Submit product data.
 4. Ground Fault Circuit Interrupters (GFCI): Submit product data.
 5. Lamps and Light Fixtures: Submit product data.
 6. Temporary Heating Units: Provide product data.
 7. Temporary Cooling Units: Provide product data and installation instructions.
 8. First Aid Supplies: Provide list of contents of first aid kit. Submit in form of check list.
 9. Fire Extinguishers: Provide product data. Submit schedule indicating location at job site.
 10. Temporary Utilities: Submit reports of tests, inspections, meter readings, and similar procedures performed on temporary utilities.

1.5 QUALITY ASSURANCE

- A. Regulations: Comply with industry standards and applicable laws and regulations of authorities having jurisdiction including, but not limited to, the following:

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2. Health and safety regulations.
 3. Utility company regulations.
 4. Police, fire department, and rescue squad rules.
 5. Environmental protection regulations.
- B. Standards: Comply with NFPA 241 “Standard for Safeguarding Construction, Alterations, and Demolition Operations,” ANSI A 10 Series standards for “Safety Requirements for Construction and Demolition,” and NECA Electrical Design Library “Temporary Electrical Facilities.”
- C. Electrical Services: Comply with NEMA, NECA, and UL standards and regulations for temporary electric service. Install service in compliance with NFPA 70 “National Electric Code.”
- D. Inspections: Arrange for authorities having jurisdiction to inspect and test each temporary utility before use. Obtain required certifications and permits.

1.6 PROJECT CONDITIONS

- A. Temporary Utilities: Prepare a schedule indicating dates for implementation and termination of each temporary utility. At the earliest feasible time, when acceptable to the Owner, change over from use of temporary service to use of permanent service.
- B. Condition of Use: Keep temporary services and facilities clean and neat in appearance. Operate in a safe and efficient manner. Relocate temporary services and facilities as the Work progresses. Do not overload facilities or permit them to interfere with progress. Take necessary fire-prevention measures. Do not allow hazardous, dangerous, or unsanitary conditions, or public nuisances to develop or persist on-site.

PART 2 - PRODUCTS

2.1 MATERIALS AND EQUIPMENT

- A. General: Provide new or used materials and equipment that are undamaged and in serviceable condition. Provide only materials and equipment that are recognized as being suitable for the intended use and are in compliance with appropriate standards.

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TEMPORARY FACILITIES – ASBESTOS

1. For fences and vision barriers, provide minimum 3/8-inch thick exterior plywood.

2.2 SCAFFOLDING

- A. Provide all scaffolding, ladders and/or staging, etc. as necessary to accomplish the work of this contract. Scaffolding may be of suspension type or standing type such as metal tube and coupler, tubular welded frame, pole or outrigger type or cantilever type. The type, erection and use of all scaffolding shall comply with all applicable OSHA provisions.

1. Equip rungs of all metal ladders, etc. with an abrasive non-slip surface.
2. Provide a non-skid surface on all scaffold surfaces subject to foot traffic.

2.3 WATER SERVICE

- A. Temporary Water Service Connection: All connections to the Owner's water system shall include backflow protection. Valves shall be rated for operation at the temperatures and pressures encountered. After completion of use, connections and fittings shall be removed without damage or alteration to existing water piping and equipment. Leaking or dripping valves shall be piped to the nearest drain or located over an existing sink or grade where water will not damage existing finishes or equipment.
- B. Water Hoses: Employ heavy-duty abrasion-resistant hoses with a pressure rating greater than the maximum pressure of the water distribution system to provide water into each work area and to each Decontamination Unit. Provide fittings as required to allow for connection to existing wall hydrants or spouts, as well as temporary water heating equipment, branch piping, showers, shut-off nozzles and equipment.
- C. Hot Water Heater: Provide UL rated 40 gallon electric hot water heater to supply hot water for the Decontamination Unit shower. Activate from 30 amp circuit breaker located within the Decontamination Unit subpanel. Provide with relief valve compatible with water heater operation; pipe relief valve down to drip pan on floor with type L copper. Drip pans shall consist of a 12 inches x 12 inches x 6 inches deep pan, made of 19 gauge galvanized steel, with handles. A 3-quart kitchen saucepan may be substituted for this purpose. Drip pan shall be securely fastened to the hot water heater with bailing wire or similar material. Wiring of the hot water heater shall be in compliance with NEMA, NECA, and UL standards.

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- A. General: Comply with applicable NEMA, NECA and UL standards and governing regulations for materials and layout of temporary electric service.
- B. Temporary Power: Provide service to Decontamination Unit subpanel with minimum 60 amp, two pole circuit breaker or fused disconnect. Subpanel and disconnect shall be sized and equipped to accommodate all electrical equipment required for completion of the work.
- C. Voltage Differences: Provide identification warning signs at power outlets which are other than 110-120 volt power. Provide polarized outlets for plug-in type outlets, to prevent insertion of 110-120 volt plugs into higher voltage outlets. Dry type transformers shall be provided where required to provide voltages necessary for work operations.
- D. Ground Fault Protection: Equip all circuits for any purpose entering Work Area with ground fault circuit interrupters (GFCI).
 - 1. Locate GFCI's exterior to Work Area so that all circuits are protected prior to entry to Work Area. Provide circuit breaker type ground fault circuit interrupters (GFCI) equipped with test button and reset switch for all circuits to be used for any purpose in work area, decontamination units, exterior, or as otherwise required by national electrical code, OSHA or other authority. Locate in panel exterior to Work Area.
- E. Electrical Power Cords: Use only grounded extension cords; use "hard-service" cords where exposed to abrasion and traffic. Use single lengths or use waterproof connectors to connect separate lengths of electric cords, if single lengths will not reach areas of work.
- F. Lamps and Light Fixtures: Provide general service incandescent lamps or fluorescent lamps of wattage indicated or required for adequate illumination as required by the work or this section. Protect lamps with guard cages or tempered glass enclosures, where fixtures are exposed to breakage by construction operations. Provide vapor tight fixtures in work area and decontamination units. Provide exterior fixtures where fixtures are exposed to the weather or moisture.

2.5 TEMPORARY STRUCTURES

- A. Temporary Offices: Provide prefabricated or mobile units or similar job-built construction with lockable entrances, operable windows, and serviceable finishes. Provide heated and air-conditioned units on foundation adequate for normal loading.
- B. Temporary Toilet Units: Provide self-contained, single-occupant toilet units of the chemical, aerated recirculation, or combustion type. Provide units properly vented

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and fully enclosed with a glass-fiber-reinforced polyester shell or similar non-absorbent material.

2.6 FIRE EXTINGUISHERS

- A. Fire Extinguishers: Provide Type “A” fire extinguishers for temporary offices and similar spaces where there is minimal danger of electrical or grease-oil-flammable liquid fires. In other locations provide type “ABC” dry chemical extinguishers, or a combination of several extinguishers of NFPA recommended types for the exposures in each case.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. General: Use qualified tradesmen for installation of temporary services and facilities. Locate temporary service and facilities where they will serve the entire project adequately and result in minimum interference with the performance of the Work.
 - 1. Require that tradesmen accomplishing this work be licensed as required by local authority for the work performed.
 - 2. Relocate, modify and extend services and facilities as required during the course of work so as to accommodate the entire work of the project.

3.2 SCAFFOLDING

- A. During the erection and/or moving of scaffolding, care must be exercised so that the polyethylene floor covering is not damaged.
- B. Clean as necessary debris from non-slip surfaces.
- C. At the completion of abatement work clean all construction aids within the work area, wrap in one layer of 6 mil polyethylene sheet and seal before removal from the Work Area.

3.3 TEMPORARY UTILITY INSTALLATION

- A. General: Engage the appropriate local utility company to install temporary service or connect to existing service. Where company provides only part of the service, provide the remainder with matching, compatible materials and equipment. Comply with company recommendations.
 - 1. Arrange with company and existing users for a time when service can be

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TEMPORARY FACILITIES – ASBESTOS

interrupted, if necessary, to make connections for temporary services.

B. Water Service:

1. Water connection (without charge) to Owner's existing potable water system is limited to one 3/4 inch pipe-size connection, and a maximum flow of 10 gpm to cold water supply. Install using vacuum breakers or other backflow preventer as required by local authority. Supply hot and cold water to the Decontamination Unit in accordance with Section 02 82 77. Hot water shall be supplied at a minimum temperature of 100 degrees.
 - a. Maintain hose connections and outlet valve in leakproof condition. Where finish work below an outlet might be damaged by spillage or leakage, provide a drip pan of suitable size to minimize the possibility of water damage. Drain water promptly from pans as it accumulates.

C. Electrical Service:

1. Provide a weatherproof, grounded temporary electric power service and distribution system of sufficient size, capacity, and power characteristics to accommodate performance of work during the construction period. Install temporary lighting adequate for the work area.
2. Lockout: Lockout all existing power to or through the work area as described below. Unless specifically noted otherwise existing power and lighting circuits to the Work Area are not to be used. All power and lighting to the Work Area and Decontamination facilities are to be provided from temporary electrical panel described below.
 - a. Lockout power to Work Area by switching off all breakers serving power or lighting circuits in work area. Label breakers with tape over breaker with notation "DANGER circuit being worked on". Lock panel and have all keys under control of Contractor's Superintendent or Owner's designated Asbestos Consultant.
 - b. Lockout power to circuits running through Work Area wherever possible by switching off all breakers serving these circuits. Label breakers with tape over breaker with notation "DANGER circuit being worked on". Sign and date danger tag. Lock panel and supply keys to Contractor, Owner and Owner's Asbestos Consultant. If circuits cannot be shut down for any reason, label at intervals 4 feet – 0 inches on center with tags reading, "DANGER live electric circuit. Electrocution hazard."
3. Temporary Electrical Panel: Provide temporary electrical panel sized and

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TEMPORARY FACILITIES – ASBESTOS

equipped to accommodate all electrical equipment and lighting required by the work. Connect temporary panel to existing building electrical system. Protect with circuit breaker or fused disconnect. Locate temporary panel as directed by Owner or Owner's Asbestos Consultant.

4. Power Distribution System: Provide circuits of adequate size and proper characteristics for each use. In general run wiring overhead, and rise vertically where wiring will be at least exposed to damage from construction operations.
5. Circuit Protection: Protect each circuit with a ground fault circuit interrupter (GFCI) of proper size located in the temporary panel. Do not use outlet type GFCI devices.
6. Temporary Wiring: In the Work Area shall be type UF non-metallic sheathed cable located overhead and exposed for surveillance. Do not wire temporary lighting with plain, exposed (insulated) electrical conductors. Provide liquid tight enclosures or boxes for wiring devices.
7. Number of Branch Circuits: Provide sufficient branch circuits as required by the work. All branch circuits are to originate at temporary electrical panel. At minimum provide the following:
 - a. One (1) Circuit for each HEPA filtered fan unit.
 - b. For power tools and task lighting, provide on temporary 4-gang outlet in the following locations. Provide a separate 110-120 volt, 20 amp circuit for each 4-gang outlet (4 outlets per circuit).
 - c. One (1) outlet in the work area for each 2500 square feet of work area.
 - d. One (1) outlet at each decontamination unit, located in equipment room.
8. 110-120 volt 20 amp branch circuit with 4-gang outlet for Owner's exclusive use while conducting air sampling during the work as follows.
 - a. One (1) in each work area.
 - b. One (1) at clean side of each decontamination unit.
 - c. One (1) at each exhaust location found for HEPA filtered fan units.
9. 110-120 volt 20 amp branch circuits with 4-gang outlet for Owner's exclusive use for conducting final air sampling as set forth in Section 02 82 83 Work Area Clearance as follows:
 - a. Five (5) inside work area.
 - b. Two (2) outside work area in location designated by Contractor's

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Asbestos Consultant.

D. Temporary Lighting

1. Lockout: Lock out all existing power to lighting circuits in Work Area as described in Section 02 82 61 Temporary Enclosures. Unless specifically noted otherwise existing lighting circuits to the Work Area are not to be used. All lighting to the Work Area and Decontamination facilities is to be provided from temporary electrical panel described above.
2. Provide the following or equivalent where natural lighting or existing building lighting does not meet the required light level:
 - a. One (1) 200-watt incandescent lamp per 1000 square feet of floor area, uniformly distributed, for general construction lighting, or equivalent illumination of a similar nature. In corridors and similar traffic areas provide one 100-watt incandescent lamp every 50 feet. In stairways and at ladder runs, provide one lamp minimum per story, located to illuminate each landing and flight. Provide sufficient temporary lighting to ensure proper workmanship everywhere; by combined use of daylight, general lighting, portable plug-in task lighting.
 - b. Provide adequate lighting in areas where work is being performed as required and to comply with OSHA and governing authority requirements.
 - c. Provide lighting in any area being subjected to a visual inspection as required.
 - d. Provide lighting in the decontamination unit as required to supply a 50 foot candle minimum light level.
3. Number of Lighting Circuits: Provide sufficient lighting circuits as required by the work. All lighting circuits are to originate at temporary electrical panel.
4. Circuit Protection: Protect each circuit with a ground fault circuit interrupter (GFCI) of proper size located in the temporary panel.

3.4 SUPPORT FACILITIES INSTALLATION

- A. Construction Job Trailer: Contractor to provide construction job trailer suitable for storage of contractor's and air monitoring firm's equipment. Trailer must be lockable and secure. Trailer must also have a small office with counter for telephone and abatement documents.

3.5 TEMPORARY PHONE SERVICE

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- A. Contractor shall maintain a phone and active line telephone service during the duration of the project. Owner's phones shall not be utilized by any of the Contractor's or sub-contractor's employees. Phone shall be suitably located to be accessible for emergency use.

3.6 SANITARY FACILITIES

- A. Toilets: Contractor shall supply portable toilet facilities and shall not use facility's toilets unless approved by the Owner's Asbestos Consultant.

3.7 FIRE EXTINGUISHERS

- A. Fire Extinguishers: Comply with the applicable recommendations of NFPA Standard 10 "Standard for Portable Fire Extinguishers". Locate fire extinguishers where they are most convenient and effective for their intended purpose, but provide not less than one extinguisher in each work area in equipment room and one outside work area in clean room.

END OF SECTION 02 82 40

SECTION 02 82 60
TEMPORARY PRESSURE DIFFERENTIAL AIR CIRCULATIONS SYSTEM – ASBESTOS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and other Division 1, and Division 2 Specification Section, apply to work of this section.

1.2 SUBMITTALS

- A. Before Start of Work: Submit design of pressure differential system to the Owner's Asbestos Consultant for review. So to begin work until submittal is returned with the Owner's Asbestos Consultant's action stamp indicating that the submittal is returned for unrestricted use. Include in the submittal at a minimum:
 - 1. Number of HEPA filtered fan units required and the calculations necessary to determine the number of machines
 - 2. Description of projected air flow within Work Area and methods required to provide adequate air flow in all portions of the work area
 - 3. Anticipated pressure differential across Work Area enclosures
 - 4. Description of methods of testing for correct air flow and pressure differentials
 - 5. Manufacturer's product data on the HEPA filtered fan units to be used
 - 6. Location of the machines in the Work Area
 - 7. Method of supplying adequate power to the machines and designation of building electrical panel(s) which will be supplying the power
 - 8. Description of work practices to insure that airborne fiber travel away from workers
 - 9. Manufacturer's product data on equipment used to monitor pressure differential between inside and outside of Work Area

PART 2 - PRODUCTS

2.1 HEPA FILTERED FAN UNITS

- A. General: Supply the required number of HEPA filtered fan units to the site in

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accordance with these specifications. Use units that meet the following requirements.

- B. Cabinet: Constructed of durable materials able to withstand damage from rough handling and transportation. The width of the cabinet should be less than 30 inches to fit through standard-size doorways. Provide units whose cabinets are:
 - 1. Factory-sealed to prevent asbestos-containing dust from being released during use, transport, or maintenance
 - 2. Arranged to provide access to and replacement of all air filters from intake end
 - 3. Mounted on casters or wheels
- C. Fans: Rate capacity of fan according to usable air-moving capacity under actual operating conditions.
- D. HEPA Filters: Provide units whose final filter is the HEPA type with the filter media (folded into closely pleated panels) completely sealed on all edges with a structurally rigid frame.
 - 1. Provide units with a continuous rubber gasket located between the filter and the filter housing to form a tight seal.
 - 2. Provide HEPA filters that are individually tested and certified by the manufacturer to have an efficiency of not less than 99.97 percent when challenged with 0.3 um dioctylphthalate (DOP) particles when tested in accordance with Military Standard Number 282 and Army Instruction Manual 136-300-175A. Provide filters that bear a UL586 label to indicate ability to perform under specified conditions.
 - 3. Provide filters that are marked with: the name of the manufacturer, serial number, air flow rating, efficiency and resistance, and the direction of test air flow.
 - 4. Prefilters, which protect the final filter by removing the larger particles, are required to prolong the operating life of the HEPA filter. Two (2) stages of prefiltration are required. Provide units with the following prefilter:
 - a. First-stage prefilter: low-efficiency type (e.g., for particles 100 um and larger)

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- b. Second-stage (or intermediate) filter: medium efficiency (e.g., effective for particles down to 5 um).
 - c. Provide units with prefilters and intermediate filters installed either on or in the intake grid of the unit and held in place with special housings or clamps.
- E. Safety and Warning Devices: Provide units with the following safety and warning devices:
 - 1. Electrical (or mechanical) lockout to prevent fan from operating without a HEPA filter
 - 2. Automatic shutdown system to stop fan in the event of a rupture in the HEPA filter or blocked air discharge
 - 3. Warning lights to indicate normal operation (green), too high a pressure drop across the filters (i.e., filter overloading) (yellow), and too low of a pressure drop (i.e., rupture in HEPA filter or obstructed discharge) (red)
 - 4. Audible alarm if unit fails to shut down due to operation of safety systems
- F. Electrical components: Provide units with electric components approved by the National Electrical Manufacturers Association (NEMA) and Underwriter's Laboratories (UL). Each unit is to be equipped with overload protection sized for the equipment. The motor, fan, fan housing, and cabinet are to be grounded.

PART 3 - EXECUTION

3.1 PRESSURE DIFFERENTIAL ISOLATION

- A. Isolate the Work Area from all adjacent areas or systems of the building with a Pressure Differential that will cause a movement of air from outside to inside at any breach in the physical isolation of the Work Area.
- B. Relative Pressure in Work Area: Continuously maintain the work area at an air pressure that is lower than that in any surrounding space in the building, or at any location in the immediate proximity outside of the building envelope. This pressure differential when measured across any physical or critical barrier must equal or exceed a static pressure of:
 - 1. 0.02 inches of water.
- C. Accomplish the pressure differential by exhausting a sufficient number of HEPA filtered fan units from the work area. The number of units required will depend

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on machine characteristics, the seal at barriers, and required air circulation. The number of units will increase with increased make-up air or leaks into the Work Area. Determine the number of units required for pressure isolation by the following procedure:

1. Establish required air circulation in the work area, personnel and equipment decontamination units.
2. Establish isolation by increased pressure in adjacent areas or as part of seals where required.
3. Exhaust a sufficient number of units from the work area to develop the required pressure differential.
4. The required number of units is the number determined above plus one additional unit.
5. Vent HEPA filtered fan units to outside of building unless authorized in writing by Owner's Asbestos Consultant.
6. Mount units to exhaust directly or through disposable ductwork.
7. Use only new ductwork except for sheet metal connections and elbows.
8. Use ductwork and fittings of same diameter or larger than discharge connection on fan unit.
9. Use inflatable, disposable flex duct in lengths not greater than 50 feet.
10. Use spiral wire-reinforced disposable plastic ductwork in lengths not greater than 100 feet.
11. Arrange exhaust as required to inflate duct to a rigidity sufficient to prevent flapping.
2. If direction of discharge from fan unit is not aligned with duct use sheet metal elbow to change direction. Use 6 feet of spiral wire reinforced flex duct after direction change.

3.2 AIR CIRCULATION IN THE WORK AREA

- A. Air Circulation: For purposes of this section air circulation refers to either the introduction of outside air to the Work Area or the circulation and cleaning of air within the Work Area.

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- B. Air circulation in the Work Area is a minimum requirement intended to help maintain airborne fiber counts at a level that does not significantly challenge the work area isolation measures. The Contractor may also use this air circulation as part of the engineering controls in his worker protection program.
- C. Determining the Air circulation Requirements: Provide a fully operational air circulation system supplying a minimum of the following air circulation rate:
1. Four (4) air changes per hour. Provide additional air changes if it is determined that high fiber counts in the work area require it.
- D. Determine Number of Units needed to achieve required air circulation according to the following procedure:
1. Determine the volume in cubic feet of the work area by multiplying floor area by ceiling height. Determine total air circulation requirement in cubic feet per minute (CFM) for the work area by dividing this volume by the air change rate and multiplying by 60.
 2. Air Circulation Required in Cubic Feet of Air per Minute (CFM) =
$$\frac{\text{Volume of work area (cu. ft.)}}{60 \text{ (minutes per hour)}} \times \text{Number of air changes per hour}$$
 3. Divide the air circulation requirement (CFM) above by capacity of HEPA filtered fan unit(s) used. Capacity of a unit for purposes of this section is the capacity in cubic feet per minute with fully loaded filters (pressure differential which causes loaded filter warning light to come on) in the machines labeled operating characteristics.
Number of Units Needed =
$$\frac{\text{Air circulation Requirement (CFM)}}{\text{Capacity of Unit with Loaded Filters (CFM)}}$$
 4. Add one additional unit as backup in case of equipment failure or machine shutdown for filter changing.

3.3 EXHAUST SYSTEM

- A. Pressure differential isolation and air circulation in the Work Area are to be accomplished by an exhaust system as described below.
1. Exhaust all units from the Work Area to meet air circulation requirement of this section.

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2. Location of HEPA Filtered Fan Units: Locate fan unit(s) so that makeup air enters work area primarily through decontamination facilities and traverses Work Area as much as possible. This may be accomplished by positioning the HEPA filtered fan unit(s) at a maximum distance from the worker access opening or other makeup air sources.
3. Place End of Unit an intake duct or its exhaust duct through an opening in the plastic barrier or wall covering. Seal plastic around the unit or duct with tape.
4. Vent to Outside of Building, unless authorized in writing by the Owner's Project Designer.
5. Decontamination Units: Arrange Work Area and decontamination units so that the majority of make-up air comes through the Decontamination Units. Use only personnel or equipment Decontamination Unit at any time and seal the other so that make up air passes through unit in use.
6. Supplemental Makeup Air Inlets: Provide where required for prior air flow through the Work Area in location approved by the Owner's Asbestos Consultant by making openings in the plastic sheeting that allow clean air from outside the building into the Work Area. Locate auxiliary makeup air inlets as far as possible from the fan unit(s) (e.g., on an opposite wall), off the floor (preferably near the ceiling), and away from barriers that separate the Work Area from occupied clean areas. Cover with flaps to reseal automatically if the pressure differential system should shut down for any reason. Spray flap and around opening with spray adhesive so that if flap closes meeting surfaces are both covered with adhesive. Use adhesive that forms contact bond when dry. Filter these openings with HEPA Pre-Filter Material double taped to the opening.

3.4 RECIRCULATION SYSTEM

- A. Pressure differential isolation and air circulation in the Work Area are to be accomplished by a recirculation system as described below.

1. Recirculate air in the Work Area through HEPA filtered fan units to accomplish air circulation requirements of this section.
2. Location of Fan Units: Locate HEPA filtered fan units so that air is circulated through all parts of the Work Area, and so that required pressure is maintained at all parts of Work Area geometry. Move units as necessary so that in any location where asbestos-containing materials are being disturbed the discharge from one HEPA filtered fan unit is blowing

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contamination away from workers. Direct air flow in these locations so that it is predominantly toward workers' backs at the breathing zone elevation.

3.5 AIR CIRCULATION IN DECONTAMINATION UNITS

- A. Pressure Differential Isolation: Continuously maintain the pressure differential required for the work area in the:
 - 1. Personnel Decontamination Unit: across the Shower Room with the Equipment room at a lower pressure than in the Clean Room.
 - 2. Equipment Decontamination Unit: Across the Holding Room with the Wash Room at a lower pressure than the Clean Room.
- B. Air Circulation: continuously maintain air circulation in Decontamination Units at same level as required for Work Area.
- C. Air Movement: Arrange air circulation through the Personnel Decontamination Unit so that it produces a movement of air from the Clean Room through the Shower Room into the Equipment Room. Maintain continuous minimum velocities of 60 feet per minute in the breathing zone area of the shower and 30 feet per minute in all other locations of the shower.

3.6 USE OF THE PRESSURE DIFFERENTIAL AND AIR CIRCULATION SYSTEM

- A. General: Each unit shall be serviced by a dedicated minimum 115V-20A circuit with ground fault circuit interrupter (GFCI) supplied from temporary power supply installed under requirements of Section 02 82 40 "Temporary Facilities."
- B. Air Flow Tests: The Contractor will check air flow patterns before removal operations begin, at least once per operating shift and any time there is a question regarding the integrity of the enclosure. The primary test for air flow is to trace air currents with smoke tubes or other visual methods. Flow checks will be made at each opening and at each doorway to demonstrate that air is being drawn into the enclosure and at each worker's position to show that air is being drawn away from the workers location and toward the HEPA filtration unit.
- C. Demonstrate Condition of Equipment for each HEPA filtered fan unit including proper operation of the following:
 - 1. Squareness of HEPA Filter

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3. Proper operation of all lights
 4. Proper operation of automatic shut down if exhaust is blocked
 5. Proper operation of alarms
 6. Proper operation of Magnehelic gauge.
- D. Demonstrate Operation of the pressure differential system to the Designer prior to beginning abatement operations. The demonstration should include, but not be limited to, the following:
1. Plastic barriers and sheeting move lightly in toward Work Area,
 2. Curtain of decontamination units move lightly in toward Work Area,
 3. There is noticeable movement of air through the Decontamination Unit.
 4. Use of a smoke tube to demonstrate air movement from Clean Room through Shower Room to Equipment Room.
 5. Use of a smoke tube to show a definite motion of air across all areas in which work is to be performed.
 6. Use of a manometer to demonstrate the required pressure differential at every barrier separating the Work Area from the balance of the building, equipment, ductwork or outside.
- E. Modify the Pressure Differential System as necessary to obtain the above.
- F. Use of System During Abatement Operations:
1. Start fan units before beginning work (before any asbestos-containing material is disturbed). After abatement work has begun, run units continuously to maintain a constant pressure differential and air circulation until decontamination of the work area is complete. Do not turn off units at the end of the work shift or when abatement operations temporarily stop.
 2. Do not shut down air pressure differential system during encapsulating procedures, unless authorized by the Owner's Project Designer in writing. Supply sufficient pre-filters to allow frequent changes.
 3. Start abatement work at a location farthest from the fan units and proceed toward them. If an electric power failure occurs, immediately stop all

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abatement work and do not resume until power is restored and fan units are operating again.

4. At completion of abatement work, allow fan units to run as specified under section 02 82 81, to remove airborne fibers that may have been generated during abatement work and cleanup and to purge the Work Area with clean makeup air. The units may be required to run for a longer time after decontamination, if dry or only partially wetted asbestos material was encountered during any abatement work.

G. Dismantling the System:

1. When a final inspection and the results of final air tests indicate that the area has been decontaminated, fan units may be removed from the Work Area, remove and properly dispose of pre-filter decontaminate exterior of machine and seal intake to the machine with 6 mil polyethylene to prevent environmental contamination from the filters. Clean all machine parts within the decontamination unit.

END OF SECTION 02 82 60

SECTION 02 82 61
TEMPORARY ENCLOSURES – ASBESTOS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to work of this section.

1.2 SUBMITTALS

- A. Before Start of Work submit the following to the Designer for review. Do not begin work until these submittals are returned with the Designer's action stamp indicating that the submittal is returned for unrestricted use.

PART 2 - PRODUCTS

2.1 SHEET PLASTIC

- A. Polyethylene Sheet: Provide flame-resistant polyethylene film that conforms to requirements set forth by the National Fire Protection Association Standard 701, Small Scale Fire Test for Flame-Resistant Textiles and Films. Provide largest size possible to minimize seams, 6.0 mil (0.15 mm) thick frosted or black as indicated.
- B. Reinforced Polyethylene Sheet: Where plastic sheet constitutes the only barrier between the work area and the building exterior, provide translucent, nylon reinforced or woven polyethylene, laminated, flame-resistant, polyethylene film that conforms to requirements set forth by the National Fire Protection Association Standard 701, Small Scale Fire Test for Flame-resistant Textiles and Films. Provide largest size possible to minimize seams, 6.0 mil (0.15 mm) thick, frosted or black as indicated.

2.2 MISCELLANEOUS MATERIALS

- A. Duct Tape: Provide duct tape in 2 inch or 3 inch (50 mm or 75 mm) widths as indicated, with an adhesive which is formulated to stick aggressively to sheet polyethylene.
- B. Spray Cement: Provide spray adhesive in aerosol cans which is specifically formulated to stick tenaciously to sheet polyethylene.

PART 3 - EXECUTION

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- A. Carry out work of this section sequentially. Complete each of the following activities in accordance with requirements before proceeding to the next.
1. Provide emergency exits and emergency lighting.
 2. Control access.
 3. Provide respiratory and worker protection.
 4. Provide Critical Barriers.
 5. Prepare Area.
 6. Provide Primary Barriers.
 7. Provide Isolation Areas as required.
 8. Provide Secondary Barrier.

3.2 GENERAL

- A. Work Area: the location where asbestos abatement work occurs. The Work Area is a variable of the extent of work of the Contract. It may be a portion of a room, a single room, or a complex of rooms. A "Work Area" is considered contaminated during the work, and must be isolated from the balance of the building, and decontaminated at the completion of the asbestos control work.
- B. Completely isolate the Work Area from other parts of the building so as to prevent asbestos-containing dust or debris from passing beyond the isolated area. Should the area beyond the Work Area(s) become contaminated with asbestos-containing dust or debris as a consequence of the work, clean those areas in accordance with the procedures indicated in Section 02 82 81. Perform all such required cleaning or decontamination at no additional cost to owner.
- C. Construct enclosures to provide an air-tight seal around ducts and openings into existing ventilation systems and around penetrations for electrical conduits, telephone wires, water lines, drain pipes, etc. Construct enclosures to be both airtight and watertight except for those openings designed to provide entry and/or air flow control.
- D. Size: Construct enclosure with sufficient volume to encompass all of the working surfaces yet allow unencumbered movement by the worker(s), provide

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unrestricted air flow past the worker(s), and ensure walking surfaces can be kept free of tripping hazards.

- E. Shape: The enclosure may be any shape that optimizes the flow of ventilation air past the worker(s).
- F. Structural Integrity: The walls, ceilings and floors must be supported in such a manner that portions of the enclosure will not fall down during normal use.
- G. Barrier Supports: Provide frames as necessary to support all unsupported spans of sheeting.
- H. Openings: It is not necessary that the structure be airtight; openings may be designed to direct air flow. Such openings are to be located at a distance from active removal operations. They are to be designed to draw air into the enclosure under all anticipated circumstances. In the event that negative pressure is lost, they are to be fitted with either HEPA filters to trap dust or automatic trap doors that prevent dust from escaping the enclosure. Openings for exits are to be controlled by an airlock or a vestibule.
- I. Place all tools, scaffolding, staging, etc. necessary for the work in the area to be isolated prior to completion of Work Area isolation.
- J. Areas Within an Enclosure: Each enclosure consists of a work area, a decontamination area, and waste storage area. The work area where the asbestos removal operations occur are to be separated from both the waste storage area and the contamination control area by physical curtains, doors, and/or airflow patterns that force any airborne contamination back into the work area.
- K. Removing Mobile Objects: Clean movable objects and remove them from the work area before an enclosure is constructed unless moving the objects creates a hazard. Mobile objects will be assumed to be asbestos contaminated and are to be either cleaned with amended water and a HEPA vacuum and then removed from the area or wrapped and then disposed of as asbestos-contaminated waste.
- L. Disabling HVAC Systems: The power to the heating, ventilation, and air conditioning systems that service the regulated area must be deactivated and locked out. All ducts, grills, access ports, windows and vents must be sealed off with two (2) layers of plastic to prevent entrainment of contaminated air.
- M. Operating HVAC Systems in the regulated Area: If components of a HVAC system located in the regulated area are connected to a system that will service another zone during the project, the portion of the duct in the regulated area must be sealed and pressurized. Necessary precautions include caulking the duct joints, covering all cracks and openings with two (2) layers of sheeting, and pressurizing

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the duct throughout the duration of the project by restricting the return air flow. The power to the fan supplying the positive pressure should be locked "on" to prevent pressure loss.

1. If fan providing positive pressure fails for any reason, immediately stop asbestos removal work, mist the area to reduce airborne fiber levels. Notify the Owner. Do not re-start asbestos removal work until authorized by the Designer.
- N. Lockout power to Work Area by switching off all breakers serving power or lighting circuits in work area. A lock and tag shall be placed on each breaker used to de-energize circuits and equipment with notation "DANGER circuit being worked on". Lock panel and have all keys under control of authorized person who has applied the locks.
- O. Lockout power to circuits running through work area wherever possible by switching off all breakers or removing fuses serving these circuits. Label breakers with tape over breaker with notation "DANGER circuit being worked on". Lock panel and have all keys under control of authorized person who applied locks. If circuits cannot be shut down for any reason, label at intervals 4 feet (1.22 m) on center with signs reading, "DANGER live electric circuit. Electrocution hazard." Label circuits in hidden locations but which may be affected by the work in a similar manner.
- P. Inspection Windows: Install inspection windows in locations shown on the plans or as directed by the Designer. Each inspection window is to have a 24 inch by 24 inch (610 by 610 mm) viewing area fabricated from 1/4 inch (6.35 mm) acrylic or polycarbonate sheet. Install window with top at 6 feet-6 inches (1.98 m) above floor height in a manner that provides unobstructed vision from outside to inside of the Work Area. Protect window from damage from scratching, dirt or any coatings used during the work. A sufficient number of windows are to be installed to provide observation of all portions of the Work Area that can be made visible from adjacent areas. Inspection windows that open into uncontrolled area are to be covered with a removable plywood hatch secured by lock and key. Provide keys to Designer for all such locks.

3.3 EMERGENCY EXITS

- A. Provide emergency exits and emergency lighting as set forth below:
1. Emergency Exits: At each existing exit door from the Work Area provide the following means for emergency exiting:
 2. Arrange exit door so that it is secure from outside the Work area but permits exiting from the Work Area.

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TEMPORARY ENCLOSURES – ASBESTOS

3. Mark outline of door on Primary and Critical Barriers with luminescent paint at least 1 inch wide. Hang a razor knife on a string beside outline. Arrange Critical and Primary barriers so that they can be easily cut with one pass of razor knife. Paint words "EMERGENCY EXIT" inside outline with luminescent paint in letters at least 1 foot high and 2 inches wide.
4. Provide lighted EXIT sign at each exit.
5. Provide battery-operated emergency lighting that switches on automatically in the event of a power failure.

3.4 CONTROL ACCESS

- A. Isolate the Work Area to prevent entry by building occupants into Work Area or surrounding controlled areas. Accomplish isolation by the following:
 1. Submit to Designer a list of doors and other openings that must be secured to isolate Work Area. Include on list notation if door or opening is in an indicated exit route.
 2. After receiving written authorization from the Designer, construct partitions or closures across any opening into Work Area. Partitions are to be a minimum of 8 feet high.
 3. Fabricate partitions from 3-5/8 inch, 25 gauge metal studs with 1/2 inch gypsum board on both faces. Brace at intervals of 4 feet on center.
 4. Rigid-type folding partitions: remove operating bar and latch on clean side of folding partitions. Fasten down operating lever with hook and chain or other secure device on Work Area side. At completion of all abatement work reinstall bar and latch and adjust for proper operation.
- B. Locked Access: Arrange Work Area so that the only access into Work Area is through lockable doors to personnel and equipment decontamination units.
 1. Install temporary doors with entrance type locksets that are key lockable from the outside and always unlocked and operable from the inside. Do not use deadbolts or padlocks.
- C. Visual Barrier: Where the Work Area is immediately adjacent to or within view of occupied areas, provide a visual barrier of opaque polyethylene sheeting at least 6 mil (0.15 mm) in thickness so that the work procedures are not visible to

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building occupants. Where this visual barrier would block natural light, substitute frosted or woven rip-stop sheet plastic in locations approved by the Designer.

- D. Demarcation. Demarcate the regulated area in any manner that minimizes the number of persons within the area and protects persons outside the area from exposure to airborne concentrations of asbestos. Where critical barriers or negative pressure enclosures are used, they may demarcate the regulated area.
- E. Access. Limit access to regulated areas to authorized persons as defined by OSHA, and to the Owner, Designer, Project Administrator or a representative authorized by one of these entities.
- F. Provide Warning Signs at each locked door leading to Work Area reading as follows:
1. Provide Warning Signs at each locked door leading to Work Area reading as follows

<u>Legend</u>	<u>Notation</u>
KEEP OUT	3 inch Sans Serif Gothic or Block
CONSTRUCTION	1 inch Sans Serif Gothic or Block
WORK AREA	1 inch Sans Serif Gothic or Block
PROTECTIVE CLOTHING REQUIRED	
BEYOND THIS POINT	14 Point Gothic
 2. Immediately inside door and outside critical barriers post an approximately 20 inches by 14 inches manufactured caution sign displaying the following legend with letter sizes and styles of a visibility required by 29 CFR 1926:

<u>Legend</u>
DANGER
ASBESTOS
CANCER AND LUNG DISEASE HAZARD
AUTHORIZED PERSONNEL ONLY
RESPIRATORS AND PROTECTIVE CLOTHING ARE REQUIRED IN THIS AREA
 3. Provide spacing between respective lines at least equal to the height of the respective upper line.

3.5 ALTERNATE METHODS OF ENCLOSURE

- A. Alternate methods of containing the Work Area may be submitted to the Designer for approval in accordance with procedures set forth in Section 02 82 79

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Substitutions. Do not proceed with any such method(s) without prior written approval of the Designer.

- B. Notification: Before work which involves the removal of more than 25 linear or 10 square feet of thermal system insulation or surfacing material is begun using an alternative method which has been the subject of required evaluation and certification. Send a copy of such evaluation and certification to the national office of OSHA, Office of Technical Support, Room N3653, 200 Constitution Avenue, NW, Washington, DC 20210 and to the Designer.
- C. Use a control method that encloses, contains or isolates the processes or source of airborne asbestos dust, or otherwise captures or redirects such dust before it enters the breathing zone of employees.
- D. Certification: Submit a certification from a Certified Industrial Hygienist (CIH) or licensed professional engineer who is also qualified as a project designer, who has evaluated the work area, the projected work practices and the engineering controls and who certifies in writing that the planned control method is adequate to reduce direct and indirect employee exposure to below the PELs and any requirements of Section 02 82 75 “Respiratory Protection” under worst-case conditions of use, and that the planned control method will prevent asbestos contamination outside the regulated area, as measured by clearance sampling which meets the requirements of EPA's Asbestos in Schools rule issued under AHERA, or perimeter monitoring which meets the criteria of OSHA 1926.1101, and as determined in accordance with the portion of Section 02 82 10 “Summary of Work - Asbestos Abatement” that describes the Owner’s monitoring of the project.

3.6 RESPIRATORY AND WORKER PROTECTION

- A. Before proceeding beyond this point in providing Temporary Enclosures:
 - 1. Provide Worker Protection per Section 02 82 73
 - 2. Provide Respiratory Protection per Section 02 82 75
 - 3. Provide Personnel Decontamination Unit per Section 02 82 77

3.7 CRITICAL BARRIERS

- A. Completely Separate the Work Area from other portions of the building, and the outside by closing all openings with sheet plastic barriers at least 6 mil (0.15 mm) in thickness, or by sealing cracks leading out of Work Area with duct tape.
- B. Individually seal all ventilation openings (supply and exhaust), lighting fixtures,

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clocks, doorways, windows, convectors and speakers, and other openings into the Work Area with duct tape alone or with polyethylene sheeting at least 6 mil (0.15 mm) in thickness, taped securely in place with duct tape. Maintain seal until all work including Project Decontamination is completed. Take care in sealing of lighting fixtures to avoid melting or burning of sheeting.

- C. Provide Sheet Plastic barriers at least 6 mil (0.15 mm) in thickness as required to seal openings completely from the Work Area into adjacent areas. Seal the perimeter of all sheet plastic barriers with duct tape or spray cement.
- D. Mechanically Support sheet plastic independently of duct tape or spray cement seals so that seals do not support the weight of the plastic. Following are acceptable methods of supporting sheet plastic barriers. Alternative support methods may be used if approved in writing by the Designer.
 - 1. Plywood squares 6 inch by 6 inch by 3/8 inch held in place with one 6d smooth masonry nail or electro-galvanized common nail driven through center of the plywood and duct tape on plastic so that plywood clamps plastic to the wall. Locate plywood squares at each end, corner and at maximum 4 feet on centers.
 - 2. Nylon or polypropylene rope or wire with a maximum unsupported span of 10 feet, minimum 1/4 inch in diameter suspended between supports securely fastened on either side of opening at maximum 1 foot below ceiling. Tighten rope so that it has 2 inches maximum dip. Drape plastic over rope from outside Work Area so that a 2 foot long flap of plastic extends over rope into Work Area. Staple or wire plastic to itself 1 inch below rope at maximum 6 inches on centers to form a sheath over rope. Lift flap and seal to ceiling with duct tape or spray cement. Seal loop at bottom of flap with duct tape. Erect entire assembly so that it hangs vertically without a "shelf" upon which debris could collect.
- E. Provide Pressure Differential System per Section 02 82 60.
 - 1. Clean housings and ducts of all overspray materials prior to erection of any Critical Barrier that will restrict access.

3.8 PREPARE AREA

- A. Scaffolding: If fixed scaffolding is to be used to provide access HEPA vacuum and wet clean area prior to scaffolding installation.
- B. Remove all electrical and mechanical items, such as lighting fixtures, clocks, diffusers, registers, escutcheon plates, etc. which cover any part of the surface to be worked on with the work.

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- C. Remove all general construction items such as cabinets, casework, door and window trim, moldings, ceilings, trim, etc., which cover the surface of the work as required to prevent interference with the work.
- D. Clean All Surfaces In Work Area with a HEPA filtered vacuum or by wet wiping prior to the installation of primary barrier.
- E. Cleaning and Sealing Surfaces: After cleaning with water and a HEPA vacuum, surfaces of stationary objects should be covered with two (2) layers of plastic sheeting. The sheeting should be secured with duct tape or an equivalent method to provide a tight seal around the object.

3.9 PRIMARY BARRIER

- A. Protect building and other surfaces in the Work Area from damage from water and high humidity or from contamination from asbestos-containing debris, slurry or high airborne fiber levels by covering with a primary barrier as described below.
- B. Sheet Plastic: Protect surfaces in the Work Area with two (2) layers of plastic sheeting on floor and walls, or as otherwise directed on the Contract Drawings or in writing by the Designer. Perform work in the following sequence.
 - 1. All seams in the sheeting should overlap, be staggered and not be located at corners or wall-to-floor joints.
 - 2. Cover Floor of Work Area with two (2) individual layers of clear polyethylene sheeting, each at least 6 mil (0.15 mm) in thickness, turned up walls at least 12 inches. Form a sharp right angle bend at junction of floor and wall so that there is no radius which could be stepped on causing the wall attachment to be pulled loose. Both spray-glue and duct tape all seams in floor covering. Locate seams in top layer 6 feet from, or at right angles to, seams in bottom layer. Install sheeting so that top layer can be removed independently of bottom layer.
 - 3. Stairs and Ramps: Do not cover stairs or ramps with unsecured sheet plastic. Where stairs or ramps are covered with plastic, provide 3/4 inch exterior grade plywood treads securely held in place, over plastic. Do not cover rungs or rails with any type of protective materials.
 - 4. Repair of Damaged Polyethylene Sheeting: Remove and replace plastic sheeting which has been damaged by removal operations or where seal has failed allowing water to seep between layers. Remove affected sheeting

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and wipe down entire area. Install new sheet plastic only when area is completely dry.

3.10 ISOLATION AREA

- A. Maintain isolation areas between the Work Area and adjacent building area:

3.11 STOP WORK

- A. If the Critical or Primary barrier falls or is breached in any manner stop asbestos removal work immediately and comply with “Stop Work requirements of Section 02 82 10 “Summary of Work - Asbestos Abatement”. Do not start work until authorized in writing by the Designer.

3.12 EXTENSION OF WORK AREA

- A. Extension of Work Area: If the Critical Barrier is breached in any manner that could allow the passage of asbestos debris or airborne fibers, then add affected area to the Work Area, enclose it as required by this Section of the specification and decontaminate it as described in Section 02 82 81 Project Decontamination.

3.13 SECONDARY BARRIER

- A. Secondary layer of plastic as a drop cloth to protect the primary layer from debris generated by the asbestos abatement work is specified in the appropriate work sections.

END OF SECTION 02 82 61

SECTION 02 82 73
WORKER PROTECTION – ASBESTOS ABATEMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to work of this section.

1.2 DESCRIPTION OF WORK

- A. This section describes the equipment and procedures required for protecting workers against asbestos contamination and other workplace hazards except for respiratory protection.

1.3 RELATED WORK SPECIFIED ELSEWHERE

- A. Respiratory Protection: is specified in Section 02 82 75.

1.4 WORKER TRAINING

- A. AHERA Accreditation: All workers are to be accredited as Abatement Workers as required by the EPA Model Accreditation Plan (MAP) asbestos abatement worker training (40 CFR Part 763, Subpart E, Appendix C).
- B. State and Local License: All workers are to be trained, certified and accredited as required by state or local code or regulation.
- C. Training - Class I: Train in accordance with 29 CFR 1926.1101. Provide training for all workers who will perform Class I operations that is the equivalent in curriculum, training method and length to the EPA Model Accreditation Plan (MAP) asbestos abatement worker training (40 CFR Part 763, Subpart E, Appendix C).

1.5 MEDICAL SURVEILLANCE

- A. Provide a medical surveillance program for all employees who are:
 - 1. engaged in Class I, II and III work for a combined total of 30 or more days per year or,
 - a. For the purposes of this paragraph, any day in which a worker engages in Class II or Class III work or a combination thereof for one hour or less (taking into account the entire time spent on the

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removal operation, including cleanup) and, while doing so, adheres fully to the work practices specified in the OSHA standard (29 CFR 1926.1101) is not counted.

2. are exposed at or above the permissible exposure limit or excursion limit or,
 3. before an employee can be assigned to work requiring use of a respirator.
- B. Provide a medical surveillance program and physician's opinion before a respirator is assigned as required by 29 CFR 1910.134 and 29 CFR 1926.103(e)(10) .
- C. Provide medical examination that as a minimum meets OSHA requirements as set forth in 29 CFR 1926.1101. In addition, require that the physician provide an evaluation of the individual's ability to work in environments capable of producing heat stress in the worker.

1.6 SUBMITTALS

- A. Before Start of Work: Submit the following to the Designer for review. Do not start work until these submittals are returned with Designer's action stamp indicating that the submittal is returned for unrestricted use.
1. AHERA Accreditation: Submit copies of certificates from an EPA-approved AHERA Abatement Workers course for each worker as evidence that each asbestos Abatement Worker is accredited as required by the EPA Interim Final Model Accreditation Plan (MAP) asbestos abatement worker training (40 CFR Part 763, Subpart E, Appendix C).
 2. State and Local License: Submit evidence that all workers have been trained, certified and accredited as required by state or local code or regulation.
 3. Certificate Worker Acknowledgment: Submit an original signed copy of the Certificate of Worker's Acknowledgment found at the end of this section, for each worker who is to be at the job site or enter the Work Area.
 4. Report from Medical Examination: conducted within last 12 months as part of compliance with OSHA medical surveillance requirements for each worker who is to enter the Work Area. Submit, at a minimum, for each worker the following:

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- a. Name and Social Security Number
 - b. The physician's written opinion as to whether the employee has any detected medical conditions that would place the employee at an increased risk of material health impairment from exposure to asbestos;
 - c. Any recommended limitations on the employee or on the use of personal protective equipment such as respirators; and
 - d. A statement that the employee has been informed by the physician of the results of the medical examination and of any medical conditions that may result from asbestos exposure.
 - e. A statement that the employee has been informed by the physician of the increased risk of lung cancer attributable to the combined effect of smoking and asbestos exposure (29 CFR 1926.1101(m)).
 - f. A legible typed version of the physician's name, the physician's signature, and date of examination.
5. Notarized Certifications: Submit certification signed by an officer of the abatement contracting firm and notarized that exposure measurements, medical surveillance, and worker training records are being kept in conformance with 29 CFR 1926.

PART 2 - EQUIPMENT

2.1 PROTECTIVE CLOTHING

- A. General. Provide and require the use of protective clothing, such as coveralls or similar whole-body clothing, head coverings, gloves, and foot coverings for any employee exposed to airborne concentrations of asbestos that exceed the TWA and/or excursion limit prescribed by 29 CFR 1926.1101 or for which a required negative exposure assessment is not produced, and for any employee performing Class I operations which involve the removal of over 25 linear or 10 square feet of TSI or surfacing ACM or PACM.
- B. Coveralls: Provide disposable full-body coveralls and disposable head covers, and require that they be worn by all workers in the Work Area. Provide a sufficient number for all required changes, for all workers in the Work Area.
- C. Additional Protective Clothing: Provide each worker with the protective clothing as required by Federal State and local regulations. This includes, but is not necessary limited by hard hats, cold weather gear, gloves, boots and goggles.

2.2 ADDITIONAL PROTECTIVE EQUIPMENT

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- A. Disposable coveralls, head covers, and footwear covers shall be provided by the Contractor for the Owner, Designer, Project Administrator, and other authorized representatives who may inspect the job site. Provide six complete coveralls per day.

PART 3 - EXECUTION

3.1 GENERAL

- A. Provide worker protection as required by the most stringent OSHA and/or EPA standards applicable to the work. The following procedures are minimums to be adhered to regardless of fiber count in the Work Area.
- B. Each time Work Area is entered remove all street clothes in the Changing Room of the Personnel Decontamination Unit and put on new disposable coverall, new head cover, and a clean respirator. Proceed through shower room to equipment room and put on work boots.

3.2 DECONTAMINATION PROCEDURES

- A. Require all workers to adhere to the following personal decontamination procedures whenever they leave the Work Area:
 - 1. Type C Supplied Air or Powered Air-Purifying Respirators: Require that all workers use the following decontamination procedure as a minimum requirement whenever leaving the Work Area:
 - a. When exiting area, remove disposable coveralls, disposable head covers, and disposable footwear covers or boots in the equipment room.
 - b. Still wearing respirators, proceed to showers. Showering is mandatory. Care must be taken to follow reasonable procedures in removing the respirator to avoid asbestos fibers while showering. The following procedure is required as a minimum:
 - c. Thoroughly wet body including hair and face. If using a Powered Air-Purifying Respirator (PAPR) hold blower unit above head to keep canisters dry.
 - d. With respirator still in place thoroughly wash body, hair, respirator face piece, and all parts of the respirator except the blower unit and battery pack on a PAPR. Pay particular attention to seal between face and respirator and under straps.
 - e. Take a deep breath, hold it and/or exhale slowly, completely wet hair, face, and respirator. While still holding breath, remove

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- respirator and hold it away from face before starting to breath.
 - f. Carefully wash face piece of respirator inside and out.
- 2. If using PAPR: shut down in the following sequence, first cap inlets to filter cartridges, then turn off blower unit (this sequence will help keep debris which has collected on the inlet side of filter from dislodging and contaminating the outside of the unit). Thoroughly wash blower unit and hoses. Carefully wash battery pack with wet rag. Be extremely cautious of getting water in battery pack as this will short out and destroy battery.
 - a. Shower completely with soap and water.
 - b. Rinse thoroughly.
 - c. Rinse shower room walls and floor prior to exit.
 - d. Proceed from shower to Changing Room and change into street clothes or into new disposable work items.
- 3. Air Purifying-Negative Pressure Respirators: Require that all workers use the following decontamination procedure as a minimum requirement whenever leaving the Work Area with a half or full face cartridge type respirator:
 - a. When exiting area, remove disposable coveralls, disposable head covers, and disposable footwear covers or boots in the Equipment Room.
 - b. Still wearing respirators, proceed to showers. Showering is mandatory. Care must be taken to follow reasonable procedures in removing the respirator and filters to avoid asbestos fibers while showering. The following procedure is required as a minimum:
 - c. Thoroughly wet body from neck down.
 - d. Wet hair as thoroughly as possible without wetting the respirator filter if using an air purifying type respirator.
 - e. Take a deep breath, hold it and/or exhale slowly, complete wetting of hair, thoroughly wetting face, respirator and filter (air purifying respirator). While still holding breath, remove respirator and hold it away from face before starting to breath.
 - f. Dispose of wet filters from air purifying respirator.
 - g. Carefully wash face piece of respirator inside and out.
 - h. Shower completely with soap and water.
 - i. Rinse thoroughly.
 - j. Rinse shower room walls and floor prior to exit.
 - k. Proceed from shower to Changing Room and change into street clothes or into new disposable work items.

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- B. Remote Shower: The procedures above are to be used if the decontamination facility is used as a remote shower. If a worker cannot gain direct access to the Equipment Room require that he enter Decontamination Unit and proceed directly through Shower Room to Equipment Room. Decontamination procedure is then completed as required above.
- C. Within Work Area:
 - 1. Require that workers NOT eat, drink, smoke, chew tobacco or gum, or apply cosmetics in the Work Area. To eat, chew, drink or smoke, workers shall follow the procedure described above, then dress in street clothes before entering the non-Work Areas of the building.

3.3 CERTIFICATE OF WORKER'S ACKNOWLEDGMENT

Following this section is a Certificate of Worker Training. After each worker has been included in the Contractor's Respiratory Protection Program, completed the training program and medical examination, secure a fully executed copy of this form.

END OF SECTION 02 82 73

SECTION 02 82 74
CERTIFICATE WORKER PROTECTION – ASBESTOS ABATEMENT

CERTIFICATE OF WORKER'S ACKNOWLEDGMENT

PROJECT NAME _____ DATE _____

PROJECT ADDRESS _____

CONTRACTOR'S NAME _____

WORKING WITH ASBESTOS CAN BE DANGEROUS. INHALING ASBESTOS FIBERS HAS BEEN LINKED WITH VARIOUS TYPES OF CANCER. IF YOU SMOKE AND INHALE ASBESTOS FIBERS THE CHANCE THAT YOU WILL DEVELOP LUNG CANCER IS GREATER THAN THAT OF THE NON-SMOKING PUBLIC.

Your employer's contract with the Owner for the above project requires that: You be supplied with the proper respirator and be trained in its use. You be trained in safe work practices and in the use of the equipment found on the job. You receive a medical examination. These things are to have been done at no cost to you.

RESPIRATORY PROTECTION: You must have been trained in the proper use of respirators, and informed of the type respirator to be used on the above referenced project. You must be given a copy of the written respiratory protection manual issued by your employer. You must be equipped at no cost with the respirator to be used on the above project.

TRAINING COURSE: You must have been trained in the dangers inherent in handling asbestos and breathing asbestos dust and in proper work procedures and personal and area protective measures. This training must have been the equivalent in curriculum, training method and length to the EPA Model Accreditation Plan (MAP) asbestos abatement worker training (40 CFR Part 763, Subpart E, Appendix C).

MEDICAL EXAMINATION: You must have had a medical examination within the past 12 months at no cost to you. This examination must have included: health history, pulmonary function tests and may have included an evaluation of a chest x-ray.

By signing this document you are acknowledging only that the Owner of the building you are about to work in has advised you of your rights to training and protection relative to your employer.

Signature _____ Social Security No _____

Printed Name _____

Witness _____

SECTION 02 82 76
RESPIRATORY PROTECTION INITIAN-ASSESSMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to work of this section.

1.2 DESCRIPTION OF WORK

- A. Instruct and train each worker involved in asbestos abatement or maintenance and repair of friable asbestos-containing materials (ACM) in proper respiratory use and require that each worker always wear a respirator, properly fitted on the face in the Work Area from the start of any operation which may cause airborne asbestos fibers until the Work Area is completely decontaminated. Use respiratory protection appropriate for the fiber level encountered in the work place or as required for other toxic or oxygen-deficient situations encountered.

1.3 DEFINITIONS

- A. "Negative Pressure Respirator": A respirator in which the air pressure inside the respiratory-inlet covering is positive during exhalation in relation to the air pressure of the outside atmosphere and negative during inhalation in relation to the air pressure of the outside atmosphere.
- B. "Protection Factor": The ratio of the ambient concentration of an airborne substance to the concentration of the substance inside the respirator at the breathing zone of the wearer. The protection factor is a measure of the degree of protection provided by a respirator to the wearer.
- C. "Respirator": A device designed to protect the wearer from the inhalation of harmful atmospheres.

1.4 STANDARDS

- A. Except to the extent that more stringent requirements are written directly into the Contract Documents, the latest edition of the following regulations and standards have the same force and effect (and are made a part of the Contract Documents by reference) as if copied directly into the Contract Documents, or as if published copies were bound herewith. Where there is a conflict in requirements set forth in these regulations and standards, meet the more stringent requirement.

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1. OSHA - U.S. Department of Labor Occupational Safety and Health Administration, Safety and Health Standards Section 29 CFR 1910.1001, Section 1910.134, and Section 29 CFR 1926.1101.
2. CGA - Compressed Gas Association, Inc., New York, Pamphlet G-7, "Compressed Air for Human Respiration", and Specification G-7.1 "Commodity Specification for Air".
3. CSA - Canadian Standard Association, Rexdal, Ontario, Standard Z180.1, "Compressed Breathing Air".
4. ANSI - American National Standard Practices for Respiratory Protection, ANSI Z88.2.
5. NIOSH - National Institute for Occupational Safety and Health
 - NIOSH Respirator Decision Logic (May 1987) DHHS/NIOSH Publication No. 87-108;
 - NIOSH/EPA, "A Guide to Respiratory Protection for the Asbestos Abatement Industry" EPA-560-OPTS-86-001 (September 1986);
 - 42 CFR 84, NIOSH Standard for Certification of Non-Powered Air Purifying Respirator filters;
 - 30 CFR 11, NIOSH - Certification of Respirators
6. MSHA - Mine Safety and Health Administration

1.5 SUBMITTALS

- A. Before Start of Work submit the following to the Designer for review. Do not begin work until these submittals are returned with the Designer's action stamp indicating that the submittal is returned for unrestricted use.
 1. Product Data: Submit manufacturer's product information for each component used, including NIOSH and MSHA Certifications for each component in an assembly and/or for entire assembly.
 2. System Diagram: When a supplied air respiratory system is required by the work, submit drawing showing assembly of components into a complete supplied air respiratory system. Include diagram showing location of compressor, filter banks, backup air supply tanks, hose line connections in Work Area(s), routing of air lines to Work Area(s) from compressor.

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RESPIRATORY PROTECTION -ASBESTOS

3. Operating Instruction: Submit complete operating and maintenance instructions for all components and systems as a whole. Submittal is to be in bound manual form suitable for field use.
4. Respiratory Protection Program: Submit Contractor's written respiratory protection program manual as required by OSHA 1926.1101.
5. Initial Exposure Assessment: Submit level of respiratory protection intended for each operation required by the project. Base this selection on an Initial Exposure Assessment as required by OSHA 29 CFR 1926.1101. Submit information to support this "Initial Exposure Assessment on the form included at the end of this Section.
 - a. Submit data from exposure monitoring for the PEL and EL from prior asbestos jobs within 12 months;
 - b. Submit monitoring and analysis that were performed in compliance with the OSHA asbestos standard in effect;
 - c. Submit data that was obtained under workplace conditions "closely resembling" those that will exist during the Work;
 - d. Submit data from past asbestos jobs where the type of asbestos abatement and other work, material, control methods, work practices, and environmental conditions closely resemble those that will exist during the Work;
 - e. Submit exposure data from prior asbestos jobs where the work that was conducted by employees whose training and experience are no more extensive than that of employees performing the current job;
 - f. Based on the exposure data from the previous asbestos jobs, select respiratory protection for the Work that will, to a high degree of certainty, prevent worker exposures (inside the respirator) that exceed the Permissible Exposure Limits (PEL) set forth in this Section of the specifications.
6. Resume information: Submit resume and information on training for individual monitoring the operation of supplied air respiratory systems. Submit training certifications where applicable.

1.6 AIR QUALITY FOR SUPPLIED AIR RESPIRATORY SYSTEMS

- A. Provide air used for breathing in supplied air respiratory systems that meets or exceeds standards set for C.G.A. Type 1 (Gaseous Air) Grade H or CSA Z180.1 whichever presents the more stringent quality standard.

1.7 ALLOWABLE CONTAMINANTS

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- A. Supply air that has an asbestos concentration no greater than outside ambient conditions.
- B. Supply air that meets the level of contaminants allowed according to the air quality standard specified.

1.8 DELIVERY

- A. Deliver replacement parts, etc., not otherwise labeled by NIOSH or MSHA to job site in manufacturer's containers.

PART 2 - EQUIPMENT

2.1 AIR PURIFYING RESPIRATORS

- A. Respirator Bodies: Provide half face or full face type respirators. Equip full face respirators with a nose cup or other anti-fogging device as would be appropriate for use in air temperatures less than 32 degrees Fahrenheit (0 degrees Celsius).
- B. Filter Cartridges: Provide, at a minimum, HEPA type filters labeled with NIOSH and MSHA Certification for "Radionuclides, Radon Daughters, Dust, Fumes, Mists including Asbestos-Containing Dusts and Mists" and color coded in accordance with 42 CFR Part 84 and ANSI Z228.2. Also, additional cartridge sections may be added, if required, for solvents, etc., in use. In this case, provide cartridges that have each section of the combination canister labeled with the appropriate color code and NIOSH/MSHA Certification.
- C. Non-permitted respirators. Do not use single use, disposable or quarter face respirators.

2.2 SUPPLIED AIR RESPIRATOR SYSTEMS

- A. Provide equipment capable of producing air of the quality and volume required by the above reference standards applied to the job site conditions and crew size. Comply with provisions of this specification if more stringent than the governing standard.
- B. Face piece and Hose: Provide full Face piece and hose by same manufacturer that has been certified by NIOSH/MSHA as an approved Type "C" respirator assembly operating in pressure demand mode with a positive pressure Face piece.
- C. Escape air supply: In atmospheres which are oxygen deficient (less than 19.5 percent oxygen) provide a pressure-demand full Face piece supplied air respirator

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incorporating an auxiliary self-contained breathing apparatus (SCBA) which automatically maintains an uninterrupted air supply in pressure demand mode with a positive pressure face piece.

- D. Backup air supply: Provide a reservoir of compressed air located outside the Work Area which will automatically maintain a continuous uninterruptible source of air automatically available to each connected Face piece and hose assembly in the event of compressor shut-down, contamination of air delivered by compressor, power loss or other failure. Provide sufficient capacity in the back-up air supply to allow a minimum escape time of one-half hour times the number of connections available to the Work Area. Air requirement at each connection is the air requirement of the respirators in use plus the air requirement of an average-sized adult male engaged in moderately strenuous activity.
- E. Warning device: Provide a warning device that will operate independently of the building's power supply. Locate so that alarm is clearly audible above the noise level produced by equipment and work procedures in use, in all parts of the Work Area and at the compressor. Connect alarm to warn of:
 - 1. Compressor shut down or other fault requiring use of backup air supply
 - 2. Carbon Monoxide (CO) levels in excess of 5 PPM/V
- F. Carbon Monoxide (CO) Monitor: Continuously monitor and record on a strip chart recorder Carbon Monoxide (CO) levels. Place monitors in the air line between compressor and back-up air supply and between backup air supply and workers. Connect monitors so that they also sound an alarm as specified under "Warning Devices".
- G. Compressor Shut Down: Interconnect monitors, alarms and compressor so that compressor is automatically shut down and the alarms sound if any of the following occur:
 - 1. Carbon Monoxide (CO) concentrations exceed 5 PPM/v in the air line between the filter bank and backup air supply
 - 2. Compressor temperature exceeds normal operating range
- H. Compressor Location: Locate compressor outside of building in location that will not impede access to the building, and that will not cause a nuisance by virtue of noise or fumes to occupied portions of the building.
- I. Air Intake: Locate air intake remotely from any source of automobile exhaust or any exhaust from engines, motors, auxiliary generator or buildings.

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- J. After-Cooler: Provide an after-cooler at entry to filter system which is capable of reducing temperatures to outside ambient air temperatures.
- K. Self Contained Breathing Apparatus (SCBA): Configure system to permit the recharging of 1/2 hour 2260 PSI (15.58 MPa) SCBA cylinders.

PART 3 - EXECUTION

3.1 GENERAL

- A. Respiratory Protection Program: Comply with ANSI Z88.2 "Practices for Respiratory Protection" and OSHA 29 CFR 1910.314 and 1926.103.
- B. Require that respirators be used in the following circumstances:
 - 1. During all Class I asbestos jobs.
 - 2. During all Class II work where the ACM is not removed in a substantially intact state,
 - 3. During all Class II and III work which is not performed using wet methods.
 - 4. During all Class II and III asbestos jobs where the employer does not produce a "negative exposure assessment".
 - 5. During all Class III jobs where TSI or surfacing ACM or PACM is being disturbed.
 - 6. During all Class IV work performed within regulated areas where employees performing other work are required to wear respirators.
 - 7. During all work covered by this section where employees are exposed above the OSHA PEL (TWA, or excursion limit).
 - 8. In emergencies. During emergencies where the airborne asbestos fiber concentration is not known, a self-contained breathing apparatus (SCBA) must be used.
- C. Require that respiratory protection be used at all times that there is any possibility of disturbance of ACM whether intentional or accidental.

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- D. Require that a respirator be worn by anyone in a Work Area at all times, regardless of activity, during a period that starts with any operation which could cause airborne fibers until the area has been cleared for re-occupancy in accordance with Section 02 82 73.
- E. Regardless of Airborne Fiber Levels: Require that the minimum level of respiratory protection used be half-face air-purifying respirators with high efficiency filters.
- F. Do not allow the use of single-use, disposable, or quarter-face respirators for any purpose.

3.2 FIT TESTING

- A. Initial Fitting: Provide initial fitting of respiratory protection during a respiratory protection course of training set up and administered by an individual qualified to do fit testing. Fit types and sizes of respirator to be actually worn by each individual. Allow an individual to use only those respirators for which training and fit testing has been provided.
- B. On a Weekly Basis, check the fit of each worker's respirator by having irritant smoke blown onto the respirator from a smoke tube.
- C. Upon Each Wearing: Require that each time an air-purifying respirator is put on it be checked for fit with a positive and negative pressure fit test in accordance with the manufacturer's instructions or ANSI Z88.2.

3.3 TYPE OF RESPIRATORY PROTECTION REQUIRED

- A. General: After reducing airborne asbestos levels to the lowest feasible level with engineering controls and work practices, provide respiratory protection as necessary to ensure that workers are not exposed to an airborne concentration of asbestos in excess of the Specified Permissible Exposure Limits (SPEL) set forth in this Section.
- B. Level of Respiratory Protection: Determine the proper level of respiratory protection by dividing the expected or actual airborne fiber count in the Work Area by the "protection factors" given below. The level of respiratory protection which supplies an airborne fiber level inside the respirator, at the breathing zone of the wearer, at or below the Specified Permissible Exposure Limits (PEL) set forth in this Section is the minimum level of protection allowed.
- C. Specific Respiratory Protection Requirements: Provide respiratory protection as indicated below as a minimum requirement:

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RESPIRATORY PROTECTION -ASBESTOS

1. Half-face or full face Negative Pressure Air-Purifying Respirators: Provide half-face or full face negative pressure air-purifying respirators during installation of Critical or Primary Barriers or other removal activities where there has been an "Initial Exposure Assessment" that has determined that airborne asbestos fiber levels will not exceed 0.1 fiber per cubic centimeter (0.1 f/cc). Provide a PAPR where a half-face negative pressure air-purifying respirator is allowed to any worker who so requests.
 2. Powered Air-Purifying Respirators (PAPR): Provide powered air-purifying respirators (PAPR) during removal of asbestos-containing thermal system insulation (TSI) or surfacing material where there has been an "Initial Exposure Assessment" that has determined that airborne asbestos fiber levels will not exceed 1.0 fiber per cubic centimeter (1.0 f/cc).
 3. Type "C" Supplied-air respirators: full Face piece pressure demand supplied air respirators may be used by all workers engaged in the removal of thermal system insulation (TSI) or surfacing materials, or demolition of pipes, structures, or equipment covered or insulated with asbestos, or in the removal or demolition of asbestos insulation or coverings, or any other activity which results in or may result in airborne asbestos fiber levels above 1.0 fibers per cubic centimeter (1.0 f/cc).
- D. Provide a full Face piece supplied air respirator operated in the pressure demand mode equipped with an auxiliary positive pressure self-contained breathing apparatus for all workers within a regulated area where Class I work is being performed and for which an initial exposure assessment has not been produced. After an initial exposure assessment is made, use the level of respiratory protection required by that assessment and requirements of this specification and the OSHA Asbestos Construction Standard 29 CFR 1926.1101.

3.4 SPECIFIED PERMISSIBLE EXPOSURE LIMITS (SPEL)

- A. Specified Permissible Exposure Limits (SPEL): Ensure that no worker is exposed to an airborne concentration of asbestos in excess of the Time-Weighted Average (TWA) limit, and Excursion Limit (EL) set forth below.
1. Time Weighted Average (TWA) limit - Concentration of airborne asbestos fibers to which any worker may be exposed as an eight hour time-weighted average (TWA) shall not exceed the following.
 - a. 0.01 fibers per cubic centimeter

**SECTION 02 82 75
RESPIRATORY PROTECTION -ASBESTOS**

2. Excursion Limit (EL) - Concentration of airborne asbestos fibers to which any worker may be exposed as averaged over a sampling period of 30 minutes shall not exceed the following.
 - a. 1.0 fibers per cubic centimeter
- B. Fibers: For purposes of this section, fibers are defined as all fibers regardless of composition as counted in the OSHA Reference Method (ORM), or NIOSH 7400 procedure.
 1. Electron Microscopy: If Electron Microscopy is used to determine airborne fiber levels, only asbestos fibers will be enumerated, but fibers of any size detected by the testing of Section 02 82 81 Project Decontamination will be counted.

3.5 RESPIRATORY PROTECTION FACTOR

A.	Respirator Type	Protection Factor
1.	Air purifying: Negative pressure respirator High efficiency filter Half Face piece	10
2.	Air purifying: Negative pressure respirator High efficiency filter Full Face piece	50
3.	Powered Air Purifying (PAPR): Positive pressure respirator High efficiency filter Half Face piece	50
4.	Supplied air: Positive pressure respirator Pressure demand or other positive pressure mode Full face piece Equipped with an auxiliary HEPA Cartridge or positive pressure Self-contained breathing apparatus (SCBA) for escape	1,000

SECTION 02 82 75
RESPIRATORY PROTECTION -ASBESTOS

- A. Negative pressure - half or full face mask: Supply a sufficient quantity of respirator filters approved for asbestos, so that workers can change filters during the work day. Require that respirators be wet-rinsed, and filters discarded, each time a worker leaves the Work Area. Require that new filters be installed each time a worker re-enters the Work Area. Store respirators and filters at the job site in the changing room and protect totally from exposure to asbestos prior to their use.
- B. Powered air purifying - half or full face mask: Supply a sufficient quantity of high efficiency respirator filters approved for asbestos so that workers can change filters at any time that flow through the Face piece decreases to the level at which the manufacturer recommends filter replacement. Require that regardless of flow, filter cartridges be replaced after 40 hours of use. Require that HEPA elements in filter cartridges be protected from wetting during showering. Require entire exterior housing of respirator, including blower unit, filter cartridges, hoses, battery pack, face mask, belt, and cords, be washed each time a worker leaves the Work Area. Caution should be used to avoid shorting battery pack during washing. Provide an extra battery pack for each respirator so that one can be charging while one is in use.

3.7 SUPPLIED AIR RESPIRATOR

- A. Air Systems Monitor: Continuously monitor the air system operation including compressor operation, filter system operation, backup air capacity and all warning and monitoring devices at all times that system is in operation. Assign an individual, trained by manufacturer of the equipment in use or by a Certified Industrial Hygienist, in the operation and maintenance of the system to provide this monitoring. Assign no other duties to this individual which will take him away from monitoring the air system.

END OF SECTION 02 82 75

SECTION 02 82 76
RESPIRATORY PROTECTION INITIAN-ASSESSMENT

INITIAL EXPOSURE ASSESSMENT

Project No:_____

Date:

Project Name:

Facility:

Work Area(s):

Reference Job:

Description of Work:

Asbestos Containing Materials

Asbestos/Type Percentage

Task	Personal Monitoring Level			Respirator Worn	Comments
	High	Low	Average		
Prep / Set up	_____		_____	_____	
Removal of Surfacing	_____		_____	_____	
Removal of TSI	_____		_____	_____	
Removal of Misc Mat	_____		_____	_____	
Bag Out	_____		_____	_____	
Clean Up	_____		_____	_____	
Other	_____		_____	_____	

Experience Level of Work Force:

Reference Job:

Description of Work:

Asbestos Containing Materials

Asbestos/Type Percentage

	Personal Monitoring Level			Respirator	Comments
	High	Low	Average		
Prep / Set up			_____	_____	_____
Removal of Surfacing			_____	_____	_____
Removal of TSI			_____	_____	_____
Removal of Misc Mat.			_____	_____	_____
Bag Out			_____	_____	_____
Clean Up			_____	_____	_____
Other			_____	_____	_____

Experience Level of Work Force:

SECTION 02 82 76
RESPIRATORY PROTECTION -ASSESSMENT

Expected Conditions of This Job

Task	Anticipated Level	Respirator	Comments
Prep / Set up	_____ f/cc	_____	_____
Removal of Surfacing	_____ f/cc	_____	_____
Removal of TSI	_____ f/cc	_____	_____
Removal of Misc Mat.	_____ f/cc	_____	_____
Bag Out	_____ f/cc	_____	_____
Clean Up	_____ f/cc	_____	_____
Other	_____ f/cc	_____	_____

Experience Level of Work Force:

SECTION 02 82 77
DECONTAMINATION UNITS - ASBESTOS

PART 1- GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and other Division 1 Specification sections, apply to work of this section.

1.2 DESCRIPTION OF WORK

- A. Provide separate Personnel and Equipment Decontamination facilities. Require that the Personnel Decontamination Unit be the only means of ingress and egress for the Work Area. Require that all materials exit the Work Area through the Equipment Decontamination Unit.

1.3 RELATED WORK SPECIFIED ELSEWHERE

- A. Refer to Section 02 82 40 Temporary Facilities - Asbestos Abatement for electrical requirements and requirements relative to connection of decontamination facilities to building systems such as water, sewer, and electrical.

1.4 SUBMITTALS

- A. Before the Start of Work: Submit the following to the Designer for review. Do not begin work until these submittals are returned with Designer's action stamp indicating that the submittal is returned for unrestricted use or final-but-restricted use.
 - 1. Personnel Decontamination Unit: Provide shop drawing showing location and assembly of personnel decontamination units.
 - 2. Equipment Decontamination Unit: Provide shop drawing showing location and assembly of equipment decontamination units.
 - 3. Shower Pan: Provide shop drawing.
 - 4. Shower Walls: Provide product data.
 - 5. Shower Head and Controls: Provide product data.
 - 6. Filters: Provide product data and shop drawing of installation on decontamination unit.

SECTION 02 82 77
DECONTAMINATION UNITS - ASBESTOS

7. Hose Bib: Provide product data.
8. Shower Stall: for Wash Down Station provide product data and shop drawing showing and modifications.
9. Lumber: Provide product data on fire resistance treatment.
10. Sump Pump: Provide product data.
11. Signs: Submit samples of signs to be used.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Polyethylene Sheet: Provide flame resistant polyethylene film that conforms to requirements set forth by the National Fire Protection Association Standard 701, Small Scale Fire Test for Flame-resistant Textiles and Films. Provide largest size possible to minimize seams, 6.0 mil (0.15 mm) thick, frosted or black as indicated.
- B. Reinforced Polyethylene Sheet: Where plastic sheet is the only separation between the Work Area and building exterior, provide translucent, nylon reinforced, laminated, flame resistant, polyethylene film that conforms to requirements set forth by the National Fire Protection Association Standard 701, Small Scale Fire Test for Flame-resistant Textiles and Films. Provide largest size possible to minimize seams, 6.0 mil (0.15 mm) thick, frosted or black as indicated.
- C. Duct Tape: Provide duct tape in 2 inch or 3 inch widths as indicated, with an adhesive which is formulated to stick aggressively to sheet polyethylene.
- D. Spray Adhesive: Provide spray adhesive in aerosol cans which is specifically formulated to stick tenaciously to sheet polyethylene.
- E. Shower Pan: Provide one piece waterproof shower pan.
- F. Shower Walls: Provide walls fabricated from rigid, impervious, waterproof material.
- G. Shower Head and Controls: Provide a factory-made shower head producing a spray of water which can be adjusted for spray size and intensity. Feed shower with water mixed from hot and cold supply lines. Arrange so that control of water temperature, flow rate, and shut off is from inside shower without outside aid.

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DECONTAMINATION UNITS - ASBESTOS

- H. Filters: Provide cascaded filter units on drain lines from showers or any other water source carrying asbestos-contaminated water from the Work Area. Provide units with disposable filter elements as indicated below. Connect so that discharged water passes primary filter and output of primary filter passes through secondary filter.
 - 1. Primary Filter - Passes particles 20 microns and smaller
 - 2. Secondary Filter - Passes particles 5 microns and smaller
- I. Hose Bib: Provide heavy bronze angle type with wheel handle, vacuum breaker, and 3/4 inch National Standard male hose outlet.
- J. Shower Stall: For Wash Down Station provide leak tight shower enclosure with integrated drain pan fabricated from fiberglass or other durable waterproof material, approximately 3 feet by 3 feet square with minimum 6 feet high sides and back. Structurally support as necessary for stability. Equip with hose bib, as specified in this section, mounted at approximately 4 feet above drain pan. Connect drain to a reservoir, pump water from reservoir through filters to a drain or store and use for amended water. Mount filters inside shower stall on back wall beneath hose bib.
- K. Lumber: Provide kiln dried lumber of any grade or species.
- L. Sump Pump: Provide totally submersible waterproof sump pump with integral float switch. Provide unit sized to pump two times the flow capacity of all showers or hoses supplying water to the sump, through the filters specified herein when they are loaded to the extent that replacement is required. Provide unit capable of pumping debris, sand, plaster or other materials washed off during decontamination procedures without damage to mechanism of pump. Adjust float switch so that a minimum of 3 inches remains between top of liquid and top of sump pan.

PART 3 - EXECUTION

3.1 PERSONNEL DECONTAMINATION UNIT

- A. Provide a Personnel Decontamination Unit consisting of a serial arrangement of connected rooms or spaces, Changing Room, Drying Room, Shower Room, and Equipment Room. Require all persons without exception to pass through this Decontamination Unit for entry into and exiting from the Work Area for any purpose. Do not allow parallel routes for entry or exit. Do not remove equipment or materials through Personnel Decontamination Unit. Provide temporary

SECTION 02 82 77
DECONTAMINATION UNITS - ASBESTOS

lighting within Decontamination Units as necessary to reach a lighting level of 100 foot candles (1076 lumens / sq meter).

- B. Changing Room (clean room): Provide a room that is physically and visually separated from the rest of the building for the purpose of changing into protective clothing.
1. Construct using polyethylene sheeting, at least 6 mil in thickness, to provide an airtight seal between the Changing Room and the rest of the building.
 2. Locate so that access to Work Area from Changing Room is through Shower Room.
 3. Separate Changing Room from the building by a sheet plastic flapped doorway.
 4. Require workers to remove all street clothes in this room, dress in clean, disposable coveralls, and don respiratory protection equipment. Do not allow asbestos-contaminated items to enter this room. Require Workers to enter this room either from outside the structure dressed in street clothes, or naked from the showers.
 5. An existing room may be utilized as the Changing Room if it is suitably located and of a configuration whereby workers may enter the Changing Room directly from the Shower Room. Protect all surfaces of room with sheet plastic as set forth in Section 02 82 61 Temporary Enclosures. Authorization for this must be obtained from the Designer in writing prior to start of construction. Submit written request in accordance with Section 02 82 79 "Substitutions" detailing layout and protective measures proposed.
 6. Maintain floor of changing room dry and clean at all times. Do not allow overflow water from shower to wet floor in changing room.
 7. Damp wipe all surfaces twice after each shift change with a disinfectant solution.
 8. Provide posted information for all emergency phone numbers and procedures.
 9. Provide one storage locker per employee.

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DECONTAMINATION UNITS - ASBESTOS

- C. Drying Room: Provide a drying room as an airlock and a place for workers to dry after showering.
1. Construct room by providing a pan continuous with or draining to Shower Room pan. Install a freely draining wooden or non-skid metal floor in pan at elevation of top of pan.
 2. Separate this room from the rest of the building with airtight walls fabricated of 6 mil (0.15 mm) polyethylene.
 3. Separate this room from the Changing Room and Shower Room with airtight walls fabricated of 6 mil (0.15 mm) polyethylene.
 4. Separate from Changing Room by a sheet plastic flapped doorway.
 5. Provide a continuously adequate supply of disposable bath towels.
- D. Shower Room: Provide a completely watertight operational shower to be used for transit by cleanly dressed workers heading for the Work Area from the Changing Room, or for showering by workers headed out of the Work Area after undressing in the Equipment Room.
1. Construct room by providing a shower pan and two (2) shower walls in a configuration that will cause water running down walls to drip into pan. Install a freely draining wooden floor in shower pan at elevation of top of pan.
 2. Separate this room from the rest of the building with airtight walls fabricated of 6 mil (0.15 mm) polyethylene.
 3. Separate this room from the Drying Room and Airlock with airtight walls fabricated of 6 mil (0.15 mm) polyethylene.
 4. Provide splashproof entrances to Drying Room and Airlock.
 5. Provide shower head and controls.
 6. Provide temporary extensions of existing hot and cold water and drainage, as necessary for a complete and operable shower.
 7. Provide a soap dish and a continuously adequate supply of soap and maintain in sanitary condition.
 8. Arrange so that water from showering does not splash into the Changing

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DECONTAMINATION UNITS - ASBESTOS

9. Arrange water shut off and drain pump operation controls so that a single individual can shower without assistance from either inside or outside of the Work Area.
 10. Provide flexible hose shower head.
 11. Pump waste water to drain or to storage for use in amended water. If pumped to drain, provide 20 micron and 5 micron waste water filters in line to drain or waste water storage. Change filters daily or more often if necessary. Locate filters inside shower unit so that water lost during filter changes is caught by shower pan.
 12. Provide hose bib.
- E. Airlock: Provide an airlock between Shower Room and Equipment Room. This is a transit area for workers. Separate this room from Equipment Room by a sheet plastic flap doorway.
1. Separate this room from the rest of the building with airtight walls fabricated of 6 mil (0.15 mm) polyethylene.
 2. Separate this room from the Equipment Room and Shower Room with airtight walls fabricated of 6 mil (0.15 mm) polyethylene.
 3. Separate from Equipment Room by a sheet plastic flapped doorway.
- F. Equipment Room (contaminated area): Require work equipment, footwear and additional contaminated work clothing to be left here. This is a change and transit area for workers.
1. Separate this room from the Work Area by a 6 mil (0.15 mm) polyethylene flapped doorway.
 2. Separate this room from the rest of the building with airtight walls fabricated of 6 mil (0.15 mm) polyethylene.
 3. Separate this room from the Shower Room and Work Area with airtight walls fabricated of 6 mil (0.15 mm) polyethylene.
 4. Provide a drop cloth layer of sheet plastic on floor in the Equipment Room for every shift change expected. Roll drop cloth layer of plastic from Equipment Room into Work Area after each shift change. Replace before

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next shift change. Provide a minimum of two (2) layers of plastic at all times. Use only clear plastic to cover floors.

- G. Work Area: Separate Work Area from the Equipment Room by polyethylene barriers. If the airborne asbestos level in the Work Area is expected to be high, as in dry removal, add an intermediate cleaning space between the Equipment Room and the Work Area. Damp wipe clean all surfaces after each shift change. Provide one additional floor layer of 6 mil (0.15 mm) polyethylene per shift change and remove contaminated layer after each shift.
- H. Decontamination Sequence: Require that all workers adhere to the following sequence when entering or leaving the Work Area.
 - 1. Entering Work Area: Worker enters Changing Room and removes street clothing, puts on clean disposable overalls and respirator, and passes through the Shower Room into the Equipment Room.
 - 2. Any additional clothing and equipment left in Equipment Room needed by the worker are put on in the Equipment Room.
 - 3. Worker proceeds to Work Area.
- I. Exiting Work Area:
 - 1. Before leaving the Work Area, require the worker to remove all gross contamination and debris from overalls and feet.
 - 2. The worker then proceeds to the Equipment Room and removes all clothing except respiratory protection equipment.
 - 3. Extra work clothing such as boots, hard hats, goggles, gloves are to be stored in contaminated end of the Equipment Room.
 - 4. Disposable coveralls are placed in a bag for disposal with other material.
 - 5. Require that Decontamination procedures found in Section 02 82 73 be followed by all individuals leaving the Work Area.
 - 6. After showering, the worker moves to the Changing Room and dresses in either new coveralls for another entry or street clothes if leaving.

3.2 EQUIPMENT DECONTAMINATION UNIT

McNeese President's Residence
Improvements | 1427

19-627-21-01, F.19002606 &
01-107-05B-13, F.01004560 (Supplement)
Site Code: 5-10-004 | State ID : S05519
April 14, 2025

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Decontamination Units - Asbestos

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- A. Provide an Equipment Decontamination Unit consisting of a serial arrangement of rooms, Clean Room, Holding Room, Wash Room for removal of equipment and material from Work Area. Do not allow personnel to enter or exit Work Area through Equipment Decontamination Unit.
- B. Arrange with airlocks between rooms as required below.
- C. Wash Down Station: Provide an enclosed Shower Unit located in Work Area just outside Wash Room as an equipment, bag and container cleaning station.
 - 1. Fabricate waterproof floor extending 6 feet beyond Wash Down station in all directions. Install seamless waterproof membrane over area and extend over curbs on all four sides. Form curbs from 2 inch by 4 inch lumber laid on the flat.
 - 2. Waterproof membrane is to be fabricated from minimum 10 mil (.254 mm) polyethylene.
 - 3. Do not allow water to collect on waterproof membrane. Remove continuously with a wet vacuum or mops.
- D. Wash Room: provide wash room for cleaning of bagged or containerized asbestos-containing waste materials passed from the Work Area.
 - 1. Construct wash room of metal stud and polyethylene sheeting, at least 6 mil (0.15 mm) in thickness and located so that packaged materials, after being wiped clean, can be passed to the Holding Room.
 - 2. Separate this room from the Work Area by a single flapped door of 6 mil (0.15 mm) polyethylene sheeting.
 - 3. Provide a drop cloth layer of plastic on floor in the Wash Room for every load-out operation. Roll this drop cloth layer of plastic from Wash Room into Work Area after each load-out. Provide a minimum of two (2) layers of plastic at all times. Use only clear plastic to cover floors.
- E. Airlock: Provide an airlock between Wash Room and Holding Room. This is a transit area.
 - 1. Separate this room from adjacent spaces by a sheet plastic flapped doorway.
 - 2. Separate this room from the rest of the building and adjacent spaces with airtight walls fabricated of 6 mil (0.15 mm) polyethylene.

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DECONTAMINATION UNITS - ASBESTOS

- F. Holding Room: Provide Holding Room as a drop location for bagged asbestos-containing materials passed from the Wash Room. Construct Holding Room of nominal 2 inch by 4 inch wood framing and polyethylene sheeting, at least 6 mil (0.15 mm) in thickness and located so that bagged materials cannot be passed from the Wash Room through the Holding Room to the Clean Room.
1. Separate this room from the adjacent rooms by flap doors fabricated from 6 mil (0.15 mm) sheet plastic.
- G. Airlock: Provide an airlock between Holding Room and Clean Room. This is a transit area.
1. Separate this room from adjacent spaces by a sheet plastic flap doorway.
 2. Separate this room from the rest of the building and adjacent spaces with airtight walls fabricated of 6 mil (0.15 mm) polyethylene.
- H. Clean Room: provide Clean Room to isolate the Holding Room from the building exterior. If possible locate to provide direct access to the Holding Room from the building exterior.
1. Erect Critical and Primary Barriers as described in Section 02 82 61 "Temporary Enclosures" in an existing space. If no space exists construct Clean Room of 2 inch by 4 inch wood framing and polyethylene sheeting, at least 6 mil (0.15 mm) in thickness.
 2. Separate this room from the exterior by a single flap door of 6 mil (0.15 mm) polyethylene sheeting.
- I. Load-out Area: The load-out area is the transfer area from the building to a truck or dumpster. It may be the Clean Room of the Equipment Decontamination unit or a separate room or loading dock area. Erect Critical and Primary barriers as described in Section 02 82 61 "Temporary Enclosures" in load-out area.
1. During transfer of material from load-out area erect primary barriers as described in Section 02 82 61 "Temporary Enclosures" as necessary to seal path from load-out area to truck or dumpster.
- J. Decontamination Sequence: Take all equipment or material from the Work Area through the Equipment Decontamination Unit according to the following procedure:

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DECONTAMINATION UNITS - ASBESTOS

1. At washdown station, thoroughly wet clean contaminated equipment or sealed polyethylene bags and pass into Wash Room.
2. When passing equipment or containers into the Wash Room, close all doorways of the Equipment Decontamination Unit, other than the doorway between the Washdown Station and the Wash Room. Keep all outside personnel clear of the Equipment Decontamination Unit.
3. Once inside the washroom, wet clean the bags and/or equipment.
4. When cleaning is complete pass items into Holding Room. Close all doorways except the doorway between the Holding room and the Clean Room.
5. Workers from the building exterior enter Holding Area and remove decontaminated equipment and/or containers for disposal.
6. Require these workers to wear full protective clothing and appropriate respiratory protection.
7. At no time is a worker from an uncontaminated area to enter the enclosure when a removal worker is inside.

3.3 CONSTRUCTION OF THE DECONTAMINATION UNITS

- A. Walls and Ceiling: Construct airtight walls and ceiling using polyethylene sheeting, at least 6 mil (0.15 mm) in thickness. Attach to existing building components or a temporary framework.
- B. Floors: Use two (2) layers (minimum) of 6 mil (0.15 mm) polyethylene sheeting to cover floors in all areas of the Decontamination Units. Use only clear plastic to cover floors.
- C. Flap Doors: Fabricated from three (3) overlapping sheets with openings a minimum of 3 feet wide. Configure so that sheeting overlaps adjacent surfaces. Weights at bottom of sheets as required so that they quickly close after being released. Put arrows on sheets to indicate direction of overlap and/or travel. Provide a minimum of 6 feet between entrance and exit of any room. Provide a minimum of 3 feet between doors to airlocks.
- D. If the Decontamination area is located within an area containing friable asbestos on overhead ceilings, ducts, piping, etc., provide the area with a minimum 1/4 inch hardboard or 1/2 inch plywood "ceiling" with polyethylene sheeting, at least 6 mil (0.15 mm) in thickness covering the top of the "ceiling".

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DECONTAMINATION UNITS - ASBESTOS

- E. Visual Barrier: Where the Decontamination area is immediately adjacent to and within view of occupied areas, provide a visual barrier of opaque polyethylene sheeting at least 6 mil (0.15 mm) in thickness so that worker privacy is maintained and work procedures are not visible to building occupants. Where the area adjacent to the Decontamination area is accessible to the public, construct a solid barrier on the public side of the sheeting to protect the sheeting. Construct barrier with metal studs covered with minimum 1/2 inch sheet rock. Where the solid barrier is provided, sheeting need not be opaque.
- F. Alternate methods of providing Decontamination facilities may be submitted to the Designer for approval. Do not proceed with any such method(s) without written authorization of the Designer.
- G. Electrical: Provide subpanel at Changing Room to accommodate all removal equipment. Power subpanel directly from a building electrical panel.
 - 1. Connect all electrical branch circuits in Decontamination unit and particularly any pumps in shower room to a ground-fault circuit protection device.

3.4 CLEANING OF DECONTAMINATION UNITS

- A. Clean debris and residue from inside of Decontamination Units on a daily basis or as otherwise indicated on Contract Drawings. Damp wipe or hose down all surfaces after each shift change. Clean debris from shower pans on a daily basis.
- B. If the Changing Room of the Personnel Decontamination Unit becomes contaminated with asbestos-containing debris, abandon the entire Decontamination Unit and erect a new Decontamination Unit. Use the former Changing Room as an inner section of the new Equipment Room.

3.5 SIGNS

- A. Post an approximately 20 inch by 14 inch manufactured caution sign at each entrance to the Work Area displaying the following legend with letter sizes and styles of a visibility required by 29 CFR 1926:
 - 1. Provide signs in both English and Spanish.
 - 2. Legend:
DANGER
ASBESTOS
CANCER AND LUNG DISEASE HAZARD

SECTION 02 82 77
DECONTAMINATION UNITS - ASBESTOS

AUTHORIZED PERSONNEL ONLY
RESPIRATORS AND PROTECTIVE CLOTHING ARE REQUIRED IN
THIS AREA

3. Provide spacing between respective lines at least equal to the height of the respective upper line.
- B. Post an approximately 10 inch by 14 inch manufactured sign at each entrance to each Work Area displaying the following legend with letter sizes and styles of a visibility at least equal to the following:
1. Provide signs in both English and Spanish.
 2. Legend Notation

NO FOOD, BEVERAGES OR TOBACCO PERMITTED	3/4 inch Block
ALL PERSONS SHALL DON PROTECTIVE	3/4 inch Block
CLOTHING (COVERINGS) BEFORE ENTERING THE WORK	
AREA	
ALL PERSONS SHALL SHOWER IMMEDIATELY	3/4 inch Block
AFTER LEAVING WORK AREA AND BEFORE	
ENTERING THE CHANGING AREA	

END OF SECTION 02 82 77

SECTION 02 82 78
MATERIALS AND EQUIPEMNT - ASBESTOS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A This Section includes administrative and procedural requirements governing the Contractor's selection of products for use in the Project.
- B. Related Sections: The following Sections contain requirements that relate to this Section:
 - 1. The Contractor's Construction Schedule is included under Section 02 82 12 Coordination - Asbestos Abatement.
 - 2. The Contractor's Schedule of Submittals is included under Section 02 82 25 Submittals - Asbestos Abatement respectively.
 - 3. The applicability of industry standards to products specified is included under Section 02 82 21 Reference Standards and Definitions - Asbestos Abatement respectively.
 - 4. The administrative procedures for handling requests for substitutions made after award of the Contract is included under Section 02 82 79 Substitutions - Asbestos Abatement.

1.3 DEFINITIONS

- A. Definitions used in this Article are not intended to change the meaning of other terms used in the Contract Documents, such as "specialties," "systems," "structure," "finishes," "accessories," and similar terms. Such terms are self-explanatory and have well-recognized meanings in the construction industry.
 - 1. "Products" are items purchased for incorporation in the Work, whether purchased for the Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.

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MATERIALS AND EQUIPEMNT - ASBESTOS

2. "Named Products" are items identified by the manufacturer's product name, including make or model number or other designation, shown or listed in the manufacturer's published product literature, that is current as of the date of the Contract Documents.
3. "Foreign Products" as distinguished from "domestic products," are items substantially manufactured (50 percent or more of value) outside the United States and its possessions. Products produced or supplied by entities substantially owned (more than 50 percent) by persons who are not citizens of, nor living within, the United States and its possessions are also considered to be foreign products.
4. "Materials" are products substantially shaped, cut, worked, mixed, finished, refined or otherwise fabricated, processed, or installed to form a part of the Work.
5. "Equipment" is a product with operational parts, whether motorized or manually operated, that requires service connections, such as wiring or piping.
6. "Equipment" are products that may be either operational or fixed.
 - a. Operational Equipment are products with operating parts, whether motorized or manually operated, that requires temporary or permanent service connections, such as wiring or piping.
 - b. Fixed Equipment are products necessary for accomplishing the work that are used as a temporary facility during the work and removed afterward.

1.4 SUBMITTALS

- A. Required submittals: A general listing of products requiring submittals is included at the end of Section 02 82 25 "Submittals." This listing may not be complete. Submittal requirements are found in each specification section. Prepare a schedule in tabular form showing each product listed. Include the manufacturer's name and proprietary product names for each item listed.
 1. Form: Prepare product list with information on each item tabulated under the following column headings:
 - a. Related Specification Section number.
 - b. Generic name used in Contract Documents.
 - c. Proprietary name, model number, and similar designations.
 - d. Manufacturer's name and address.

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2. Initial Submittal: Within 10 days after date of Notice of Award, submit three (3) copies of an initial product list. Provide a written explanation for omissions of data and for known variations from Contract requirements.
 - a. At the Contractor's option, the initial submittal may be limited to product selections and designations that must be established early in the Contract period.
3. Designer's Action: The Designer will respond in writing to Contractor within one week of receipt of the completed product list. No response within this period constitutes no objection to listed manufacturers or products but does not constitute a waiver of the requirement that products comply with Contract Documents. The Owner's representative's response will include a list of unacceptable product selections, containing a brief explanation of reasons for this action.

1.5 QUALITY ASSURANCE

- A. Source Limitations: To the fullest extent possible, provide products of the same kind from a single source.
 1. When specified products are available only from sources that do not, or cannot, produce a quantity adequate to complete project requirements in a timely manner, consult with the Owner's representative to determine the most important product qualities before proceeding. Qualities may include attributes, such as visual appearance, strength, durability, or compatibility. When a determination has been made; select products from sources producing products that possess these qualities to the fullest extent possible.
- B. Compatibility of Options: When the Contractor is given the option of selecting between two (2) or more products for use on the Project, the product selected shall be compatible with products previously selected, even if previously selected products were also options.
 1. The contractor is responsible for providing products and construction methods that are compatible with products and construction methods to be installed after completion of the work of this contract.
 2. If a dispute arises between contractors over concurrently selectable, but incompatible products, the Designer will determine which products shall be retained and which are incompatible and must be replaced.

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1.6 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and handle products according to the manufacturer's recommendations, using means and methods that will prevent damage, deterioration, and loss, including theft.
1. Schedule delivery to minimize long-term storage at the site and to prevent overcrowding of construction spaces.
 2. Coordinate delivery with installation time to assure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
 3. Deliver products to the site in an undamaged condition in the manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
 4. Inspect products upon delivery to ensure compliance with the Contract Documents and to ensure that products are undamaged and properly protected.
 5. Store products at the site in a manner that will facilitate inspection and measurement of quantity or counting of units.
 6. Store heavy materials away from the Project structure in a manner that will not endanger the supporting construction.
 7. Store products subject to damage by the elements above ground, under cover in a weather tight enclosure, with ventilation adequate to prevent condensation. Maintain temperature and humidity within range required by manufacturer's instructions.

PART 2 - PRODUCTS

2.1 PRODUCT SELECTION

- A. General Product Requirements: Provide products that comply with the Contract Documents, that are undamaged and, unless otherwise indicated, new at the time of installation.

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1. Provide products complete with accessories, trim, finish, safety guards, and other devices and details needed for a complete installation and the intended use and effect.
 2. Standard Products: Where available, provide standard products of types that have been produced and used successfully in similar situations on other projects.
- B. Product Selection Procedures: The Contract Documents and governing regulations govern product selection. Procedures governing product selection include the following:
1. Descriptive Specification Requirements: Where Specifications describe a product or assembly listing exact characteristics required with or without use of a brand or trade name provide a product or assembly that provides the characteristics and otherwise complies with Contract requirements.
 2. Performance Specification Requirements: Where Specifications require compliance with performance requirements, provide products that comply with these requirements and are recommended by the manufacturer for the application indicated.
 - a. Manufacturer's recommendations may be contained in published product literature or by the manufacturer's certification of performance.
 3. Compliance with Standards, Codes, and Regulations: Where Specifications only require compliance with an imposed code, standard, or regulation, select a product that complies with the standards, codes, or regulations specified.
 4. Allowances: Refer to individual Specification Sections and "Allowance" provisions in Division 1 for allowances that control product selection and for procedures required for processing such selections.

PART 3 - EXECUTION

3.1 INSTALLATION OF PRODUCTS

- A. Comply with manufacturer's instructions and recommendations for installation of products in the applications indicated. Anchor each product securely in place, accurately located and aligned with other Work.

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1. Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.

END OF SECTION 02 82 78

SECTION 02 82 79
Substitutions – Asbestos Abatement

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for handling requests for substitutions made after award of the Contract.
- B. Related Sections: The following Sections contain requirements that relate to the Section:
 - 1. Division 1 Section 02 82 21 “Reference Standards and Definitions - Asbestos Abatement” specifies the applicability of industry standards to products specified.
 - 2. Division 1 Section 02 82 12 “Coordination - Asbestos Abatement” specifies requirements for submitting the Contractor’s Construction Schedule.
 - 3. Division 1 Section 02 82 25 “Submittals - Asbestos Abatement” specifies requirements for submitting the Submittal Schedule.
 - 4. Division 1 Section 02 82 78 “Materials and Equipment - Asbestos Abatement” specifies requirements governing the Contractor’s selection of products and product options.

1.3 DEFINITIONS

- A. Definitions in this Article do not change or modify the meaning of other terms used in the Contract Documents.
- B. Substitutions: Changes in products, materials, equipment, and methods of construction required by the Contract Documents proposed by the Contractor after award of the Contract are considered to be requests for substitutions. The following are not considered to be requests for substitutions:
 - 1. Substitutions requested during the bidding period, and accepted by Addendum prior to award of the Contract, are included in the Contract

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Substitutions – Asbestos Abatement

Documents and are not subject to requirements specified in this Section for substitutions.

2. Revisions to the Contract Documents requested by the Owner or Designer.
3. Specified options of products and construction methods included in the Contract Documents.
4. The Contractor's determination of and compliance with governing regulations and orders issued by governing authorities.

1.4 SUBMITTALS

- A. Substitution Request Submittal: The Designer will consider requests for substitution if received within 60 days after commencement of the Work. Requests received more than 60 days after commencement of the Work may be considered or rejected at the discretion of the Designer.
1. Submit three (3) copies of each request for substitution for consideration. Submit requests in the form and according to procedures required for change-order proposals.
 2. Identify the product or the fabrication or installation method to be replaced in each request. Include related Specification Section and Drawing numbers.
 3. Provide complete documentation showing compliance with the requirements for substitutions, and the following information, as appropriate:
 - a. Coordination information, including a list of changes or modifications needed to other parts of the Work and to construction performed by the Owner and separate contractors that will be necessary to accommodate the proposed substitution.
 - b. A detailed comparison of significant qualities of the proposed substitution with those of the Work specified. Significant qualities may include elements, such as performance, weight, size, durability, and visual effect.
 - c. Product Data, including Drawings and descriptions of products and fabrication and installation procedures.
 - d. Samples, where applicable or requested.
 - e. A statement indicating the substitution's effect on the Contractor's Construction Schedule compared to the schedule without approval

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- of the substitution. Indicate the effect of the proposed substitution on overall Contract Time.
- f. Cost information, including a proposal of the net change, if any in the Contract Sum.
 - g. The Contractor's certification that the proposed substitution conforms to requirements in the Contract Documents in every respect and is appropriate for the applications indicated.
 - h. The Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of the failure of the substitution to perform adequately.
4. Designer's Action: If necessary, the Designer will request additional information or documentation for evaluation within one week of receipt of a request for substitution. The Designer will notify the Contractor of acceptance or rejection of the substitution within 2 weeks of receipt of the request, or one week of receipt of additional information or documentation, whichever is later. Acceptance will be in the form of a change order.
- a. Use the product specified if the Designer cannot make a decision on the use of a proposed substitute within the time allocated.

PART 2 - PRODUCTS

2.1 SUBSTITUTIONS

- A. Conditions: The Designer will receive and consider the Contractor's request for substitution when one or more of the following conditions are satisfied, as determined by the Designer. If the following conditions are not satisfied, the Designer will return the requests without action except to record noncompliance with these requirements.
- 1. Extensive revisions to the Contract Documents are not required.
 - 2. Proposed changes are in keeping with the general intent of the Contract Documents.
 - 3. The request is timely, fully documented, and properly submitted.
 - 4. The specified product or method of construction cannot be provided within the Contract Time.
 - 5. The Designer will not consider the request if the product or method cannot be provided as a result of failure to pursue the Work promptly or coordinate activities properly.

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- B. The Contractor's submittal and the Designer's acceptance of Shop Drawings, Product Data, or Samples for construction activities not complying with the Contract Documents do not constitute an acceptable or valid request for substitution, nor do they constitute approval.

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 02 82 79

SECTION 02 82 80
Project/Contractor Closeout – Asbestos Abatement

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for contract closeout including, but not limited to, the following:
 - 1. Inspection procedures.
 - 2. Project record document submittal.
 - 3. Submittal of warranties.
 - 4. Final cleaning.
- B. Closeout requirements for specific construction activities are included in the appropriate Sections in Divisions 2 through 16.

1.3 SUBSTANTIAL COMPLETION

- A. Preliminary Procedures: Before requesting inspection for certification of Substantial Completion, complete the following. List exceptions in the request.
 - 1. In the Application for Payment that coincides with, or first follows, the date Substantial Completion is claimed, show 100 percent completion for the portion of the Work claimed as substantially complete.
 - a. Include supporting documentation for completion as indicated in these Contract Documents and a statement showing an accounting of changes to the Contract Sum.
 - b. If 100 percent completion cannot be shown, include a list of incomplete items, the value of incomplete construction, and reasons the Work is not complete.
 - 2. Advise the Owner of pending insurance changeover requirements.

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Project/Contractor Closeout – Asbestos Abatement

3. Submit specific warranties, workmanship bonds, maintenance agreements, final certifications, and similar documents.
 4. Obtain and submit releases enabling the Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
 5. Complete final cleanup requirements.
- B. Inspection Procedures: On receipt of a request for inspection, the Designer will either proceed with inspection or advise the Contractor of unfilled requirements. The Designer will prepare the Certificate of Substantial Completion following inspection or advise the Contractor of construction that must be completed or corrected before the certificate will be issued.
1. The Designer will repeat inspection when requested and assured that the Work is substantially complete.
 2. Results of the completed inspection will form the basis of requirements for final acceptance.

1.4 FINAL ACCEPTANCE

- A. Preliminary Procedures: Before requesting final inspection for certification of final acceptance and final payment, complete the following. List exceptions in the request.
1. Submit the final payment request with releases and supporting documentation not previously submitted and accepted. Include insurance certificates for products and completed operations where required.
 2. Submit an updated final statement, accounting for final additional changes to the Contract Sum.
 3. Submit a certified copy of the Designer's final inspection list of items to be completed or corrected, endorsed and dated by the Designer. The certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance and shall be endorsed and dated by the Designer.
 4. Submit consent of surety to final payment.
 5. Submit a final liquidated damages settlement statement.

SECTION 02 82 80
Project/Contractor Closeout – Asbestos Abatement

6. Submit copy of daily log, final project photographs, damage or settlement surveys, and similar final record information.
- B. Reinspection Procedure: The Designer will reinspect the Work upon receipt of notice that the Work, including inspection list items from earlier inspections, has been completed, except for items whose completion is delayed under circumstances acceptable to the Designer.
 1. Upon completion of reinspection, the Designer will prepare a certificate of final acceptance. If the Work is incomplete, the Designer will advise the Contractor of Work that is incomplete or of obligations that have not been fulfilled but are required for final acceptance.
 2. If necessary, reinspection will be repeated.
- C. Miscellaneous Record Submittals: Refer to other Specification Sections for requirements of miscellaneous record keeping and submittals in connection with actual performance of the Work. Immediately prior to the date or dates of Substantial Completion, complete miscellaneous records and place in good order. Identify miscellaneous records properly and bind or file, ready for continued use and reference. Submit to the Designer for the Owner's records.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 FINAL CLEANING

- A. General: The General Conditions require general cleaning during construction. Regular site cleaning is included in Division 1 Section "Construction Facilities and Temporary Controls." The cleaning in this Section is in addition to cleaning which is part of decontamination work. This section is intended to return the facility to the Owner in presentable condition.
- B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to the condition expected in a normal, commercial building cleaning and maintenance program.
 1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion.
- C. Removal of Protection: Remove temporary protection and facilities installed for

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Project/Contractor Closeout – Asbestos Abatement

protection of the Work during construction.

- D. Compliance: Comply with regulations of authorities having jurisdiction and safety standards for cleaning. Do not burn waste materials. Do not bury debris or excess materials on the Owner's property. Do not discharge volatile, harmful, or dangerous materials into drainage systems. Remove waste materials from the site and dispose of lawfully.
 - 1. Where extra materials of value remain after completion of associated Work, they become the Owner's property. Dispose of these materials as directed by the Owner.

END OF SECTION 02 82 80

SECTION 02 82 81
PROJECT DECONTAMINATION – ASBESTOS ABATEMENT

PART 1 - GENERAL

1.1 SUMMARY

- A. Work of This Section includes the decontamination of air in the Work Area which has been, or may have been, contaminated by the elevated airborne asbestos fiber levels generated during abatement activities, or which may previously have had elevated fiber levels due to friable asbestos-containing materials (ACM) in the space.
- B. Work of This Section includes the cleaning, decontamination, and removal of temporary facilities installed prior to abatement work, including:
 - 1. Primary and Critical Barriers erected by work of Section 02 82 61
 - 2. Decontamination Unit erected by work of Section 02 82 77
 - 3. Pressure Differential System installed by work of Section 02 82 60
- C. Work of This Section includes the cleaning, and decontamination of all surfaces (ceiling, walls, floor) of the Work Area, and all furniture or equipment in the Work Area.

1.2 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to work of this section.

1.3 DESCRIPTION OF REQUIREMENTS

- A. General: Decontamination of the Work Area following asbestos abatement.
- B. If the asbestos abatement work is on damaged or friable materials the work is a four step procedure with two (2) cleanings of the Primary Barrier plastic prior to its removal and two (2) cleanings of the room surfaces to remove any new or existing contamination.
- C. If the asbestos abatement work is on undamaged and non-friable materials the decontamination procedure is a two (2) step procedure with two (2) cleanings of the Primary Barrier plastic to remove contamination, thus preventing contamination of the building when the Work Area isolation barriers are removed.

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PROJECT DECONTAMINATION – ASBESTOS ABATEMENT

- D. In both cases operation of the pressure differential system is used to remove airborne fibers generated by the abatement work.

1.4 RELATED WORK SPECIFIED ELSEWHERE

- A. Removal of Gross Debris is integral with the performance of abatement work and as such is specified in the appropriate work section(s) of these specifications:

- 1. Section 02 83 30 Removal of Asbestos-containing Materials

1.5 CLEARANCE AIR SAMPLING BY THE CONTRACTOR

- A. To determine if the elevated airborne asbestos structure concentration encountered during abatement operations has been reduced to the specified level, the Contractor will secure samples and analyze them according to the following procedures.

- 1. Aggressive sampling procedures as described below will be followed.
 - 2. TEM samples will be secured as indicated below and transmitted to the laboratory. Samples will be analyzed utilizing transmission electron microscopy (TEM) and the analytical protocol specified in the Louisiana Administrative Codes, Title 33, Part III Chapter 27, Section 2727, Subsection I, Paragraph 3 or Paragraph 4). If the area meets the TEM clearance criteria, the work of Section 02 82 81 Project Decontamination can continue.

1.6 AGGRESSIVE SAMPLING BY THE CONTRACTOR

- A. All Air Samples will be taken using aggressive sampling techniques as follows:
 - 1. Before sampling pumps are started the exhaust from forced-air equipment (leaf blower with an approximately 1 horsepower electric motor) will be swept against all walls, ceilings, floors, ledges and other surfaces in the room. This procedure will be continued for five minutes per 10,000 cubic feet of room volume.
 - 2. One 20 inch diameter fan per 10,000 cubic feet of room volume will be mounted in a central location at approximately 6 feet -6 inches above floor, directed toward ceiling and operated at low speed for the entire period of sample collection.

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PROJECT DECONTAMINATION – ASBESTOS ABATEMENT

3. Air samples will be collected in areas subject to normal air circulation away from room corners, obstructed locations, and sites near windows, doors of vents.
4. After air sampling pumps have been shut off, fans will be shut off.
5. In work areas where a dirt floor or exposed fibrous glass insulation is in the space, but outside the work area, maintain a critical barrier to prevent disturbance of these surfaces during aggressive sampling.

1.7 SCHEDULE OF CLEARANCE AIR SAMPLES BY CONTRACTOR

- A. Sample cassettes: Samples will be collected on 25 mm. cassettes as follows:
 1. TEM: 0.45 micrometer mixed cellulose ester or 0.40 micrometer polycarbonate, with 5.0 micron mixed cellulose ester backing filter.
- B. Number and Volume of Samples: The number and volume of air samples will be determined by the provisions in the Louisiana Administrative Codes, Title 33, Part III Chapter 27, Section 2727, Subsection I, Paragraph 3 or Paragraph 4,
- C. Sampling sensitivity:
 1. TEM: Analytical Sensitivity as set forth in the analytical method used or the AHERA regulation.

1.8 TRANSMISSION ELECTRON MICROSCOPY

- A. Regardless if Paragraph 3 or Paragraph 4 of the Louisiana Administrative Codes, Title 33, Part III Chapter 27, Section 2727, Subsection I is the clearance protocol chosen, a minimum of 13 samples will be taken for each work area. If Paragraph 3 is chosen, all 13 samples will be analyzed. If Paragraph 4 is chosen, just the five samples taken from the work area and the three blanks will be analyzed.

Location Sampled	Number of Samples	Analytical Sensitivity Struct/cc	Approx. Volume (Liters)	Rate Liters/ Minute
Each Work Area	5	0.005	1,300-1,800	1-10
Outside Each Work Area	5	0.005	1,300-1,800	1-10
Work Area Blank	1	0.005	0	Open for 30 Seconds

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Outside Blank	1	0.005	0	Open for 30 Seconds
Laboratory Blank	1	0.005	0	Do Not Open

- B. Analysis will be performed using the analysis method specified in the Louisiana Administrative Codes, Title 33, Part III Chapter 27, Section 2727, Subsection I, Paragraph 3 or Paragraph 4,)
- C. Asbestos Structures referred to in this Section include asbestos fibers, bundles, clusters or matrices, as defined by method of analysis.
- D. Release Criteria: Decontamination of the work site is complete if either of the following two (2) sets of conditions are met:
1. Work Area Samples are below filter background levels
 - a. All Work Area sample volumes are greater than 1,199 liters for a 25 mm. sampling cassette.
 - b. The average asbestos concentration of the three blanks is below the filter background level of 70 structures per square millimeter of filter area.
 - c. The average concentration of asbestos of the five Work Area Samples does not exceed the filter background level of 70 structures per square millimeter of filter area.
 2. Work Area Samples are not statistically different from Outside samples
 - a. All sample volumes except for blanks are greater than 560 liters for a 25 mm. sampling cassette.
 - b. The average asbestos concentration of the three blanks is below the filter background level of 70 structures per square millimeter of filter area.
 - c. Average asbestos concentrations in Work Area Samples are not statistically different from Outside samples, as determined by the Z-test calculation found in 40 CFR Part 763, Subpart E, Appendix A (Z is less than or equal to 1.65)
- E. If these conditions are not met then the decontamination is incomplete, repeat the cleaning procedures of this section.
- F. Termination of Analysis: if the arithmetic mean (average) asbestos concentration on the blank filters exceeds 70 structures per square millimeter of filter area the analysis will cease and new samples collected.

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PROJECT DECONTAMINATION – ASBESTOS ABATEMENT

1.9 LABORATORY TESTING BY THE CONTRACTOR

A. Phase Contrast Microscopy by the Contractor:

1. The services of a testing laboratory must be employed by the Contractor to perform laboratory analysis of the air samples. A microscope and technician will be set up at the job site, or samples will be sent daily by overnight mail, so that verbal reports on air samples can be obtained within 24 hours. A complete record, certified by the testing laboratory, of all air monitoring tests and results will be furnished to the Designer, the Owner, and the Contractor.

B. Transmission Electron Microscopy by the Contractor:

1. Samples will be sent by overnight courier for analysis by Transmission Electron Microscopy. Samples will not be carried on weekends, so that samples shipped on Friday will arrive on the following Monday. Verbal results will normally be available within 24 hours of receipt of samples by the laboratory. The laboratory shall be capable of analyzing a maximum of 13 such samples from this project at any one time. All Transmission Electron Microscopy results will be available to the Contractor, the Designer and the Owner.

1.10 SUBMITTALS

- A. Before Start of Work submit the following to the Designer for review. Do not begin work until these submittals are returned with the Designer's action stamp indicating that the submittal has been “Received - Not Reviewed.”**

1. Safety Data Sheet: Submit Safety Data Sheets, or equivalent, in accordance with the OSHA Hazard Communication Standard (29 CFR 1910.1200) for the following:

- a. “Lock-Back,” sealer.

PART 2 - PRODUCTS (NOT APPLICABLE)

PART 3 - EXECUTION

3.1 START OF WORK

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PROJECT DECONTAMINATION – ASBESTOS ABATEMENT

- A. Previous Work: During completion of the asbestos abatement work specified in other sections, the Secondary Barrier of polyethylene sheeting will have been removed and disposed of along with any gross debris generated by the asbestos abatement work.
- B. Visual inspection: Perform visual inspections of the work area along with the Project Administrator at each step of the decontamination process.
 - 1. Follow inspection procedures in EPA Purple Book.
- C. Start of Work: Work of this section begins with the cleaning of the Primary Barrier. At start of work the following will be in place:
 - 1. Primary Barrier: Two (2) layers of polyethylene sheeting on floor and one layer on walls.
 - 2. Critical Barrier: An airtight barrier between the Work Area and other portions of the building or the outside.
 - 3. Critical Barrier Sheeting: Over lighting fixtures and clocks, ventilation openings, doorways, convectors, speakers and other openings.
 - 4. Decontamination Units: For personnel and equipment in operating condition.
 - 5. Pressure Differential System: In operation.

3.2 FIRST CLEANING

- A. First Cleaning: Carry out a first cleaning of all surfaces of the work area including items of remaining sheeting, tools, scaffolding and/or staging by use of damp-cleaning and mopping, and/or a High Efficiency Particulate Air (HEPA) filtered vacuum. (Note: A HEPA vacuum may fail if used with wet material.) Do not perform dry dusting or dry sweeping. Use each surface of a cleaning cloth one time only and then dispose of as contaminated waste. Continue this cleaning until there is no visible debris from removed materials or residue on plastic sheeting or other surfaces.
 - 1. Remove All Filters in Air Handling System(s) and dispose of as asbestos-containing waste in accordance with requirements of Section 02 83 32 Disposal of Regulated Asbestos-Containing Material.

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PROJECT DECONTAMINATION – ASBESTOS ABATEMENT

2. After the surfaces have passed a visual inspection verifying that all debris and residue has been removed from the sheet plastic, allow a waiting period that is long enough for the HEPA-filtered fan units operating in the work area to provide 96 air changes to clean air of airborne asbestos fibers. Use oscillating fans as necessary to assure circulation of air in all parts of work areas during this period. Maintain Pressure Differential System in operation for the entire 96 air change period.

3.3 SECOND CLEANING

- A. Second Cleaning: Carry out a second cleaning of all surfaces in the work area in the same manner as the first cleaning.
- B. Visual inspection: Perform a visual inspection to determine if all ACM including debris and residue has been removed. When the area is visually clean, remove primary barriers.
 1. Surfaces to be covered with sealer have met the requirements for a visual inspection in this section.
- C. Removal of Primary Barriers:
 1. Immediately following the second cleaning of the Primary plastic, remove all Primary Barrier sheeting and Material Decontamination Unit, if there is one, leaving only:
 - a. Critical Barrier: Which forms the sole barrier between the Work Area and other portions of the building or the outside.
 - b. Critical Barrier Sheeting: Over lighting fixtures and clocks, ventilation openings, doorways, convectors, speakers, and other openings.
 - c. Decontamination Unit: For personnel, in operating condition.
 - d. Pressure Differential System: Maintain in continuous operation.

3.4 FINAL CLEANING

- A. Final Cleaning: Carry out a final cleaning of all surfaces in the Work Area in the same manner as the previous cleaning.
- B. Contractor's Testing: At the completion of the above cleaning visually inspect all surfaces. Reclean if any dust, debris, etc. is found. At completion of this inspection sweep entire Work Area including walls, ceilings, ledges, floors and other surfaces in the Work Area with exhaust from forced air equipment (leaf blower with approximately 1 horsepower electric motor or equivalent). Do not

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PROJECT DECONTAMINATION – ASBESTOS ABATEMENT

direct forced air equipment at any seal in any critical barrier. If any debris or dust is found repeat the final cleaning. Continue this process until no debris dust or other material is found while sweeping of all surfaces with forced air equipment.

- C. After a visual inspection, again wait for a period of time long enough for the HEPA-filtered fan units operating in the work area to provide 96 air changes to allow HEPA filtered fan units to clean air of airborne asbestos fibers. Use oscillating fans as necessary to assure circulation of air in all parts of Work Areas during this period. Maintain Pressure Differential System in operation for the entire 96 air change period.

3.5 VISUAL INSPECTION

- A. After Final Cleaning Perform a Complete Visual Inspection of the entire Work Area including: all surfaces, ceiling, walls, floor, decontamination unit, all plastic sheeting, seals over ventilation openings, doorways, windows, and other openings; look for debris from any source, residue on surfaces, dust or other matter. Perform visual inspection along with Owner's Representative during visual inspection sweep entire work area including walls, ceilings, ledges, floors, and other surfaces in the room with exhaust from forced air equipment (leaf blower with approximately 1 horsepower electric motor or equivalent). If any debris, residue, dust or other matter is found repeat final cleaning and continue decontamination procedure from that point. When the area is visually clean, and if after sweeping of all surfaces with leaf blower, no debris, residue, dust or other material is found, complete the certification at the end of this section. Visual inspection is not complete until confirmed in writing, on the certification, by Owner's Representative.
- B. Temporary lighting: Provide a minimum of 100 foot candles (1075 lumens / sq meter) of lighting on all surfaces in the areas to be subjected to visual inspection. Provide hand held lights providing 150 foot candles (1600 lumens / sq meter) at 4 feet (1.25 meter) capable of reaching all locations in work area.
- C. Lifts: Provide ladders, scaffolding, and lifts as required to provide access to all surfaces in the area to be subjected to visual inspection. Access is to allow touching of all surfaces.

3.6 CLEARANCE AIR SAMPLING BY CONTRACTOR (TEM)

- A. Transmission Electron Microscopy (TEM): After the Work Area is found to be visually clean, TEM air samples will be collected and analyzed by the Contractor in accordance with the procedure for Transmission Electron Microscopy set forth in Part 1 of this section.

SECTION 02 82 81
PROJECT DECONTAMINATION – ASBESTOS ABATEMENT

1. If Release Criteria are not met, repeat Final Cleaning and continue decontamination procedure from that point.
2. If Release Criteria are met the Owner will continue with the clearance air testing by Transmission Electron Microscopy.

3.7 LOCK-BACK

- A. Encapsulation of substrate: Perform encapsulation of substrate or installation of spray-applied finishes or fireproofing, where required, before Removal of Work Area Isolation as specified below. Maintain Pressure Differential System in operation during encapsulation work.

3.8 REMOVAL OF WORK AREA ISOLATION

- A. After all requirements of this section and Section 02 82 83 Work Area Clearance have been met:
 1. Shut down and remove the Pressure Differential System. Seal HEPA filtered fan units, HEPA vacuums and similar equipment with 6 mil (0.15 mm) polyethylene sheet and duct tape to form a tight seal at intake end before being moved from Work Area.
 2. Remove Personnel Decontamination Unit.
 3. Remove the Critical Barriers separating the Work Area from the rest of the building. Remove any small quantities of residual material found upon removal of the plastic sheeting with wet wiping, HEPA filtered vacuum cleaners and local area protection.
 4. Remove all equipment, materials, debris from the work site.
 5. Dispose of all asbestos-containing waste material as specified in Section 02 83 32 Disposal of Regulated Asbestos Containing Material.

3.9 SUBSTANTIAL COMPLETION OF ABATEMENT WORK

- A. Asbestos Abatement Work is Substantially Complete upon meeting the requirements of this section including submission of:
 1. Certificate of Visual Inspection
 2. Receipts Documenting proper disposal as required by Section 02 83 32 Disposal of Regulated Asbestos-Containing Material.

SECTION 02 82 81
PROJECT DECONTAMINATION – ASBESTOS ABATEMENT

3. Punch list detailing repairs to be made and incomplete items.

3.10 CERTIFICATE OF VISUAL INSPECTION

- A. Following this section is a "Certificate of Visual Inspection". This certification is to be completed by the Contractor and certified by the Owner's Representative. Submit completed Certificate with Application for Final Payment. Final payment will not be made until this Certification is executed.

END OF SECTION 02 82 81

SECTION 02 82 82
CERTIFICATE VISUAL INSPECTION – ASBESTOS ABATEMENT

CERTIFICATION OF VISUAL INSPECTION

In accordance with Section 02 82 81 "Project Decontamination" the Contractor hereby certifies that he has visually inspected the Work Area (all surfaces including pipes, beams, ledges, walls, ceiling and floor, Decontamination Unit, sheet plastic, etc.) and has found no dust, debris or residue.

by: (Signature)_____ Date _____

(Print Name)_____

(Print Title)_____

OWNER’S REPRESENTATIVE CERTIFICATION

The Owner’s Representative hereby certifies that he has accompanied the Contractor on the Contractor’s visual inspection and verifies that this inspection has been thorough and to the best of their knowledge and belief, the Contractor's Certification above is a true and honest one.

by: (Signature)_____ Date _____

(Print Name)_____

(Print Title)_____

SECTION 02 82 83
Cleaning and Decontamination Procedures – Asbestos Abatement

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and other Division-1 Specification Sections, apply to work of this section.

1.2 DESCRIPTION OF THE WORK:

- A. The extent of cleaning and decontamination work is shown on the drawings.

1.3 RELATED WORK SPECIFIED ELSEWHERE:

- A. Work Area Clearance: Specified in Section 02 82 84 Work Area Clearance.

PART 2 - PRODUCTS (NOT APPLICABLE)

PART 3 - EXECUTION

3.1 GENERAL:

- A. Complete the following before start of work of this section:
 - 1. 02 82 76 Respiratory Protection
 - 2. 02 82 74 Worker Protection - Repair and Maintenance

3.2 WET CLEANING:

- A. Accomplish wet cleaning during decontamination with paper towels or disposable rags.
- B. Immerse paper towel or rag in container of amended water or dilute removal encapsulant.
- C. Wring out. Fold into quarters.
- D. Wipe surface once and refold to a fresh face of cloth. Proceed in this manner until all available faces of paper towel or rag have been used.
- E. Dispose of paper towel or rag

SECTION 02 82 83
Cleaning and Decontamination Procedures – Asbestos Abatement

- F. Do not place rag back in container to rinse out or for any other purpose. If a used towel or rag comes in contact with water, empty container and refill.
- G. Material adhered to a surface with removal encapsulant may require the application of additional removal encapsulant to facilitate cleaning.

3.3 REMOVAL OF ASBESTOS-CONTAINING DEBRIS

- A. Remove asbestos-containing debris and decontaminate the area involved using the following sequence:
 - 1. Shut down all ventilation into room.
 - 2. Seal entry to work area with 6 mil (0.15 mm) polyethylene. Slit polyethylene for entry. Install a flap to cover the slit automatically; tape slit closed after entry.
 - 3. Start HEPA vacuum before entering the area.
 - 4. Use the HEPA vacuum to clean a path at least 6 feet (1.83 m) wide from the entry point of the work area to the site of the fallen material.
 - 5. Remove all small debris with the HEPA vacuum.
 - 6. HEPA vacuum surfaces of all pieces too large to be removed by the suction of the HEPA vacuum.
 - 7. Pick up such pieces and place in the bottom of a 6 mil (0.15 mm) polyethylene disposal bag conforming to the requirements of Section 02 83 Disposal of Regulated Asbestos-Containing Material. Place pieces in the bag without dropping and avoiding unnecessary disturbance and release of material.
 - 8. Remove all remaining visible debris with HEPA vacuum.
 - 9. HEPA vacuum an area 3 feet (0.91 m) beyond the location in which any visible debris was found in two (2) directions each at right angles to the other.
 - 10. Place a 6 mil (0.15 mm) polyethylene drop cloth immediately on top of the HEPA vacuumed area before performing any repair work on site from which fall-out occurred.

SECTION 02 82 83
Cleaning and Decontamination Procedures – Asbestos Abatement

11. HEPA vacuum the site from which material fell removing all loose material which can be removed by the vacuums suction.
12. Repair or remove remaining material.
13. HEPA vacuum ladder and/or any tools used and pass out of the work area.
14. HEPA vacuum all surfaces in the room starting at the top of wall and working downward to the floor. Then start at corner of floor farthest from Work Area entrance and work towards entrance.
15. HEPA vacuum the floor using a floor attachment with rubber floor seals and adjustable floor to attachment height. Adjust the height so that the rubber seals just touch the floor if carpeted and are within 1/16 inch (1.6 mm) of hard surface floors. Vacuum the floor in parallel passes with each pass overlapping the previous by one-half the width of the floor attachment. At the completion of one cleaning vacuum the floor a second time at right angles to the first.
16. Secure area from occupancy until air monitoring results per Section 02 82 77 Project Decontamination indicate that area is safe for reoccupancy.

3.4 CLEANING AND DECONTAMINATING OBJECTS

- A. Perform all work of decontaminating objects wherever possible on a plastic drop sheet installed in conformance with Section 02 82 77.
- B. HEPA vacuum all surfaces of object and immediate area before moving the object.
- C. Pick-up object, if possible, and HEPA vacuum all surfaces.
- D. Hand to off-sheet worker who will wet-clean object, if possible, and place in storage location.
- E. Decontaminate area where object was located by HEPA vacuuming twice, in two (2) perpendicular directions. Wet clean if necessary to remove any debris.
- F. Return object to its original location.

3.5 DECONTAMINATION OF ROOMS:

- A. Shut down all ventilation into space.

SECTION 02 82 83
Cleaning and Decontamination Procedures – Asbestos Abatement

- B. Seal entry to Work Area with 6 mil (0.15 mm) polyethylene. Slit polyethylene for entry. Install a flap to cover the slit automatically; tape slit closed after entry.
- C. Install Differential Pressure System in accordance with Section 02 82 60.
- D. Recirculate HEPA filtered fan units in space by operating them so that discharge from machine is back into room. Use one HEPA filtered fan unit for each 2,500 cubic feet (70.8 cubic meters) of room volume.
- E. HEPA vacuum all surfaces in the room starting at the ceiling, then top of wall and working downward to the floor.
- F. HEPA vacuum the floor using a floor attachment with rubber floor seals and adjustable floor to attachment height. Adjust the height so that the rubber seals just touch the floor if carpeted and are within 1/16 inch (1.6 mm) of hard surface floors. Vacuum the floor in parallel passes with each pass overlapping the previous by one half the width of the floor attachment. At the completion of one cleaning, vacuum the floor a second time at right angles to the first.
- G. Operate HEPA filtered fan unit in space for 96 air changes minimum.
- H. At completion of Decontamination Work workers decontaminate in accordance with Section 02 82 73 Worker Protection.
- I. Secure area from occupancy until air monitoring results per Section 02 82 84 Work Area Clearance indicate area is safe for reoccupancy.

END OF SECTION – 02 82 83

SECTION 02 82 84
WORK AREA CLEARANCE – ASBESTOS ABATEMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to work of this section.
 - 1. Visual Inspection: required as a prerequisite of air testing, is set forth in Section 02 82 81 Project Decontamination.
 - 2. Air Monitoring: performed by the Owner during abatement work, is described in Section 02 82 30 Test Laboratory Services.

1.2 SUMMARY

- A. This section describes work being performed by the Owner's Representative. This work is not in the Contract Sum, except where the initial test results are not satisfactory, then the Contractor shall pay for the cost of all TEM and PCM retesting and analysis of all PCM and TEM samples taken by the Hygienist. Contractor shall pay re-testing costs for samples at laboratory selected by the Owner.
- B. This Section sets forth required post-abatement airborne asbestos concentrations in the Work Area and describes testing procedures the Owner's Representative will use to measure these levels.

1.3 CONTRACTOR RELEASE CRITERIA

- A. The Asbestos Abatement Work Area is Cleared when the Work Area is visually clean and airborne asbestos structure concentrations have been reduced to the level specified below.
- B. VISUAL INSPECTION: Work of this Section will not begin until the visual inspection described in Section 02 82 81 Project Decontamination is complete and has been certified by the Project Administrator.
- C. AIR MONITORING: To determine if the elevated airborne asbestos structure concentration encountered during abatement operations has been reduced to the specified level, the Owner will secure samples and analyze then according to the following procedures.
 - 1. Aggressive sampling procedures as described below will be followed.
 - 2. PCM samples will be secured as indicated below. If the area meets the

SECTION 02 82 84
WORK AREA CLEARANCE – ASBESTOS ABATEMENT

clearance criteria TEM sampling will proceed.

3. Aggressive sampling procedures will be repeated.
4. TEM samples will be secured and analyzed as indicated below.
5. Work Area Clearance: upon meeting the TEM Clearance requirements the work of Section 02 82 81 Project Decontamination can continue.

1.4 AGGRESSIVE SAMPLING

- A. All Air Samples will be taken using aggressive sampling techniques as follows:
1. Before sampling pumps are started the exhaust from forced-air equipment (leaf blower with an approximately 1 horsepower electric motor) will be swept against all walls, ceilings, floors, ledges, and other surfaces in the room. This procedure will be continued for 5 minutes per 10,000 cubic feet of room volume.
 2. One 20 inch diameter fan per 10,000 cubic feet of room volume will be mounted in a central location at approximately 2 meters above floor, directed toward ceiling and operated at low speed for the entire period of sample collection.
 3. Air samples will be collected in areas subject to normal air circulation away from room corners, obstructed locations, and sites near windows, doors, or vents.
 4. After air sampling pumps have been shut off, fans will be shut off.

1.5 SCHEDULE OF AIR SAMPLES

- A. General: The number and volume of air samples taken and analytical methods used by the Owner will be in accordance with the following schedule. Sample volumes given may vary depending upon the analytical instruments used.

1.6 PHASE MICROSCOPY CONTRAST

- A. In each homogeneous Work Area after completion of all cleaning work, a minimum of 7 samples will be taken and analyzed as follows:
- B. Samples will be collected on 25 mm. cassettes with the following filter media:
PCM: 0.8 mixed cellulose ester in a cassette with a conductive extension cowl.

SECTION 02 82 84
WORK AREA CLEARANCE – ASBESTOS ABATEMENT

Location Sampled	Number of Samples	Analysis Method	Detection Limit Fibers/cc.	Minimum Volume (Liters)	Rate LPM
Each Work Area or	5	PCM	0.01	1,200	1-10
Each Room of Work Area	1 (5 min.)	PCM	0.01	1,200	1-10
Work Area Blank	1	PCM	0.01	0	open for 30 seconds
Laboratory Blank	1	PCM	0.01	0	Do not Open

- C. Analysis: Fibers on each filter will be measured using the NIOSH Method 7400 entitled “Fibers” published in the NIOSH Manual of Analytical Methods, 3rd Edition, Second Supplement, August 1987.
- D. Fibers: referred to in this section include fibers regardless of composition as counted by the phase contrast microscopy method used.
- E. Split Sample: One Work Area sample will be split and both halves analyzed separately for duplicate analysis.
- F. Release Criteria: Decontamination of the work site is complete when every Work Area sample is at or below the Detection Limit above. If any sample is above the Detection Limit, then the decontamination is incomplete and recleaning per section 02 82 81 Project Decontamination is required.

1.7 TRANSMISSION ELECTRON MICROSCOPY

- A. In each homogeneous work area after completion of all cleaning work, a minimum of 13 samples will be taken and analyzed as follows:

Location Sampled	Number of Samples	Analysis Method	Analytical Sensitivity Fibers/cc.	Recommended Volume (Liters)	Rate LPM
Each Work Area	5	TEM	0.005	1,300-1,800	1-10
Outside Each Work Area	5	TEM	0.005	1,300-1,800	1-10

SECTION 02 82 84
WORK AREA CLEARANCE – ASBESTOS ABATEMENT

Work Area Blank	1	TEM	0.005	0	Open for 30 sec.
Outside Blank	1	TEM	0.005	0	Open for 30 sec.
Laboratory Blank	1	TEM	0.005	0	Do Not open

- B. Analysis will be performed using the analysis method set forth in the AHERA Regulation 40 CFR Part 763 Appendix A.
- C. Asbestos Structures referred to in this Section include asbestos fibers, bundles, clusters or matrices, as defined by method of analysis.
- D. Release Criteria: Decontamination of the work site is complete if either of the following two (2) sets of conditions are met:
- a. Work Area Samples are below filter background levels:
 - 1) All Work Area samples volumes are greater than 1,199 liters for a 25 mm. sampling cassette.
 - 2) The average concentration of asbestos on the five Work Area Samples does not exceed the filter background level of 70 structures per square millimeter of filter area.
 - b. Work Area Samples are not statistically different from Outside samples:
 - 1) All sample volumes except for blanks are greater than 560 liters for a 25 mm. sampling cassette.
 - 2) The average asbestos concentration of the three (3) blanks is below the filter background level of 70 structures per square millimeter of filter area.
 - 3) Average asbestos concentrations in Work Area Samples are not statistically different from Outside samples, as determined by the Z-test calculation found in 40 CFR Part 763, Subpart E, Appendix A (Z is less than or equal to 1.65)
 - c. If these conditions are not met then the decontamination is incomplete and the cleaning procedures of Section 01710 shall be repeated.
- D. Termination of Analysis: if the arithmetic mean (average) asbestos concentration on the blank filters exceed 70 structures per square millimeter of filter area the analysis will cease and new samples collected.

SECTION 02 82 84
WORK AREA CLEARANCE – ASBESTOS ABATEMENT

1.8 LABORATORY TESTING

- A. PHASE CONTRAST MICROSCOPY: The services of a testing laboratory will be employed by the Owner to perform laboratory analysis of the air samples. A microscope and technician will be set up at the job site, or samples will be sent daily by overnight mail, so that verbal reports on air samples can be obtained within 24 hours. A complete record, certified by the testing laboratory, or all air monitoring tests and results will be furnished to the Owner's Representative, the Owner and the Contractor.
- B. TRANSMISSION ELECTRON MICROSCOPY: Samples will be sent by overnight courier for analysis by Transmission Electron Microscopy. Samples will not be carried on weekends, so that samples shipped on Friday will arrive on the following Monday. Verbal results will normally be available during the 5th working day after receipt of samples by the laboratory. The laboratory is capable of analyzing a maximum of 13 such samples from this project at any one time. All Transmission Electron Microscopy results will be available to the Contractor.

1.9 FINAL AIR CLEARANCE

- A. Final area air clearance samples will be accomplished by TEM. Contractor will plan for approximately five days in the TEM process as well as for any possibilities of TEM failures. A prospective schedule may be as follows:
 - a. 24 hour settling/waiting-period after final visual inspection and written certification by Contractor to proceed with final TEM.
 - b. Air samples taken - several hour.
 - c. Samples directed to laboratory.
 - d. Waiting period for analysis report from laboratory.
 - e. Verbal reporting
 - f. Faxing of information to Industrial Hygienist will serve as preliminary notification for final clearance.
 - g. Final written authorization to encapsulate abated areas.
- B. PCM analysis may be used for final work area clearance when areas are less than 3000 square feet or 1000 linear feet.

2.0 FINAL SOIL CLEARANCE

- A. Final area soil clearance samples will be accomplished by PLM.
 - a. A core sample of soil shall be collected in Lab approved sampling tubes.
 - b. One (1) PLM sample for every 50 linear feet of pipe insulation that has been removed will be required.

SECTION 02 82 84
WORK AREA CLEARANCE – ASBESTOS ABATEMENT

- c. Samples to be sent to laboratory for analysis.
- d. Waiting period for analysis report from laboratory.
- e. Verbal reporting to Project Designer of results.
- f. Email of information to Project Designer will serve as preliminary notification for final clearance.
- g. If samples are above 1% ACM, then an additional 1 inch (1") (25mm) of soil will be required to be removed and retested at contractor's expense to follow for Clearance.

PART 2 - PRODUCTS (NOT APPLICABLE)

PART 3 - EXECUTION (NOT APPLICABLE)

END OF SECTION 02 82 84

SECTION 02 83 30
REMOVAL OF ASBESTOS CONTAINING MATERIALS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to work of this section.

1.2 RELATED WORK SPECIFIED ELSEWHERE

- A. Worker Protection requirements are set forth in Section 02 82 73 Worker Protection - Asbestos Abatement.
- B. Installation of Critical and Primary Barriers, and Work Area Isolation Procedures are set forth in Section 02 82 61 Temporary Enclosures.
- C. Project Decontamination procedures after removal of the Secondary Barrier are specified in Section 02 82 81 Project Decontamination.
- D. Disposal of asbestos-containing waste is specified in Section 02 83 32 Disposal of Regulated Asbestos-Containing Material.

1.3 SUBMITTALS

- A. Before Start of Work: Submit the following to the Designer for review. Do not start work until these submittals are returned with Designer's action stamp indicating that the submittal is returned for unrestricted use.
 - 1. Surfactant: Submit product data, use instructions and recommendations from manufacturer of surfactant intended for use. Include data substantiating that material complies with requirements.
 - 2. Removal Encapsulant: Submit product data, use instructions and recommendations from manufacturer of removal encapsulant intended for use. Include data substantiating that material complies with requirements.
 - 3. NESHAP Certification: Submit certification from manufacturer of surfactant or removal encapsulant that, to the extent required by this specification, the material, if used in accordance with manufacturer's instructions, will wet Asbestos-Containing Materials (ACM) to which it is applied as required by the National Emission Standard for Hazardous Pollutants (NESHAP) Asbestos Regulations (40 CFR 61, Subpart M).

SECTION 02 83 30
REMOVAL OF ASBESTOS CONTAINING MATERIALS

- B. Before Start of Work submit the following to the Designer for review. Do not begin work until these submittals are returned with the Designer's action stamp indicating that the submittal has been "Received - Not Reviewed."
1. Safety Data Sheet: Submit Safety Data Sheets, or equivalent, in accordance with the OSHA Hazard Communication Standard (29 CFR 1910.1200) for the following:
- a. Surfactants.
 - b. Encapsulants.
 - c. Solvents.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Wetting Materials: For wetting prior to disturbance of ACM use either amended water or a removal encapsulant:
- B. Amended Water: Provide water to which a surfactant has been added. Use a mixture of surfactant and water which results in wetting of the ACM and retardation of fiber release during disturbance of the material equal to or greater than that provided by the use of 1 ounce of a surfactant consisting of 50 percent polyoxyethylene ester and 50 percent polyoxyethylene ether mixed with 5 gallons (19 liters) of water.
- C. Removal Encapsulant: Provide a penetrating type encapsulant designed specifically for removal of ACM. Use a material which results in wetting of the ACM and retardation of fiber release during disturbance of the material equal to or greater than that provided by water amended with a surfactant consisting of 1 ounce of a mixture of 50 percent polyoxyethylene ester and 50 percent polyoxyethylene ether in 5 gallons (19 liters) of water.
- D. Polyethylene Sheet: Provide flame resistant polyethylene film that conforms to requirements set forth by the National Fire Protection Association Standard 701, Small Scale Fire Test for Flame-resistant Textiles and Films. Provide largest size possible to minimize seams, 6.0 mil (0.15 mm) thick, frosted or black as indicated.
- E. Duct Tape: Provide duct tape in 2 inch or 3 inch (50 mm or 75 mm) widths as indicated, with an adhesive which is formulated to stick aggressively to sheet polyethylene.
- F. Spray Cement: Provide spray adhesive in aerosol cans which is specifically formulated to stick tenaciously to sheet polyethylene.

SECTION 02 83 30
REMOVAL OF ASBESTOS CONTAINING MATERIALS

- G. Disposal Bags: Provide 6 mil (0.15 mm) thick leak-tight polyethylene bags labeled as required by Section 02 83 32 Disposal of Regulated Asbestos Containing Material.
- H. Fiberboard Drums: Provide heavy duty leak tight fiberboard drums with tight sealing locking metal tops.
- I. Paper board Boxes: Provide heavy duty corrugated paper board boxes coated with plastic or wax to retard deterioration from moisture. Provide in sizes that will easily fit in disposal bags.
- J. Felt: Standard felt approximately 1/16 inch (1.6 mm) thick and 36 inches (900 mm) to 72 inches (1800 mm) in width.

PART 3 - EXECUTION

3.1 SECONDARY BARRIER

- A. Secondary Barrier: Over the Primary Barrier, install as a drop cloth a clear 6 mil (0.15 mm) sheet plastic in all areas where asbestos removal work is to be carried out. Completely cover floor with sheet plastic. Where the work is within 10 feet (3 m) of a wall extend the Secondary Barrier up wall to ceiling. Support sheet plastic on wall with duct tape, seal top of Secondary plastic to Primary Barrier with duct tape so that debris is unable to get behind it. Provide cross strips of duct tape at wall support as necessary to support sheet plastic and prevent its falling during removal operations.
 - 1. Install Secondary Barrier at the beginning of each work shift. Install only sufficient plastic for work of that shift.
 - 2. Remove Secondary Barrier at end of each work shift or as work in an area is completed. Fold plastic toward center of sheet and pack in disposal bags. Keep material on sheet continuously wet until bagged.

3.2 WORKER PROTECTION

- A. Before beginning work with any material for which a Safety Data Sheet has been submitted provide workers with the required protective equipment. Require that appropriate protective equipment be used at all times.

3.3 WET REMOVAL

- A. Thoroughly wet to satisfaction of Designer any ACM to be removed prior to stripping and/or tooling to reduce fiber dispersal into the air. Accomplish wetting by a fine spray (mist) of amended water or removal encapsulant. Saturate material sufficiently

SECTION 02 83 30
REMOVAL OF ASBESTOS CONTAINING MATERIALS

to wet to the substrate without causing excess dripping. Allow time for amended water or removal encapsulant to penetrate material thoroughly. If amended water is used, spray material repeatedly during the work process to maintain a continuously wet condition. If a removal encapsulant is used, apply in strict accordance with manufacturer's written instructions. Perforate outer covering of any installation which has been painted and/or jacketed in order to allow penetration of amended water or removal encapsulant, or use injection equipment to wet material under the covering. Where necessary, carefully strip away while simultaneously spraying amended water or removal encapsulant on the installation to minimize dispersal of asbestos fibers into the air.

1. Mist work area continuously with amended water whenever necessary to reduce airborne fiber levels.
 2. Remove saturated ACM in small sections from all areas. Do not allow material to dry out. As it is removed, simultaneously pack material while still wet into disposal bags. Twist neck of bags, bend over and seal with minimum three (3) wraps of duct tape. Clean outside and move to Wash Down Station adjacent to Material Decontamination Unit.
 3. Evacuate air from disposal bags with a HEPA filtered vacuum cleaner before sealing.
- B. Pipe Insulation: Spray with a mist of amended water or removal encapsulant. Allow amended water or removal encapsulant to saturate material to substrate. If a removal encapsulant is used, use in strict accordance with manufacturer's instructions. Cut bands holding preformed pipe insulation, slit jackets at seams, remove and hand-place in a disposal bag. Remove job-molded fitting insulation in chunks and hand place in a disposal bag. Do not drop to floor. Remove any residue on pipe or fitting with stiff bristle nylon hand brush. In locations where pipe fitting insulation is removed from pipe with straight runs insulated with fibrous glass or other non-asbestos-containing fibrous material, remove fibrous material 6 inches (150 mm) from the point where it contacts the asbestos-containing insulation.

END OF SECTION 02 83 30

**SECTION 02 85 00
SUMMARY OF WORK – REMEDIATION**

SECTION 028500

MICROBIAL REMEDIATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:

- 1. Mold Remediation Procedures

- A. The work shall include remediation and decontamination of the entire structure/building.
 - B. The work shall be done by trained and qualified workers under a project supervisor. Project supervisor must have WRT (Water Restoration Technician) for category 1 & 2. Project supervisor must have AMRT (Applied Microbial Remediation Technician) for category 3.
 - C. All workers shall use the appropriate personal protection equipment. The contractor supervisor shall be responsible for maintaining this level of protection for all workers on this project.
 - D. The contractor shall provide a list of all materials and equipment to be used along with a remediation plan prior to the beginning of work.
 - E. Any suspect materials encountered during scheduled site removal should be tested prior to disturbance or otherwise handled as Presumed Asbestos Containing Materials (PACM) using the same controls and procedures for asbestos abatement. Buildings constructed before 1991 shall be tested for suspect ACM and should be removed or handled by property certified asbestos abatement personnel in compliance with Federal and State regulations.

- 2. Procedures for Post Remediation Testing and Final Treatment

- A. The contractor shall include the cost of the post remediation testing in this project.
 - B. When the work starts the contractor shall report directly to the owner's environmental consultant.
 - C. Let the fogged area settle for twenty-four (24) hours. No fogging shall occur any sooner to testing with in 6 hours. It is preferred that the fogging occur approximately 12 hours before testing.
 - D. Test for post-remediation work success.
 - E. Rebuild all areas with proper material specified and directed by the owner.

1.3 GOVERNING REQUIREMENTS

McNeese President's Residence
Improvements | 1427
19-627-21-01, F.19002606 &
01-107-05B-13, F.01004560 (Supplement)
Site Code: 5-10-004 | State ID : S05519
April 14, 2025

SECTION 02 85 00
SUMMARY OF WORK – REMEDIATION

- A. The work outlined in this specification qualifies as "mold remediation" as that term is defined under Chapter 24-A of Title 37 of the Louisiana Revised Statutes (LRS), also known as the Louisiana Mold Remediation Contracting Act (MRCA). The area within the structure impacted by mold growth exceeds the minimum area exemption of 20 square feet as outlined in MRCA §2185.B(5) and the mold remediation work will not be performed by the Owner or his agent; therefore, the mold remediation work must be performed by a contractor properly licensed by the Louisiana State Licensing Board for Contractors in the field of "Mold Remediation". A list of licensed mold remediation contractors from the Louisiana State Licensing Board for Contractors' website is available at www.lslbc.state.la.us.
- B. Any remediation conducted must comply with the requirements of the MRCA and this specification and is to include a post-remediation assessment overseen by an Environmental Consultant (EC).
- C. As outlined in MRCA §2187.B, an EC may not perform both mold assessment and remediation on the same project or have an ownership interest in both an entity which performs mold assessment services and an entity which performs mold remediation services on the same project. In accordance with this provision the General Contractor shall employ an MRC that is independent of the EC.
- D. The Mold Remediation Contractor (MRC) who utilizes certain antimicrobial products may be subject to the licensing, certification, and supervision requirements as an Antimicrobial Pest Control Applicator, in accordance with Louisiana Department of Agriculture and Forestry (LDAF) regulations, as codified in the Louisiana Administrative Code (LAC), Title 7, Part XXIII. Prior to utilizing any antimicrobial product, the EC shall determine the requirements applicable to the use of that product through coordination with the LDAF.

1.4 BACKGROUND INFORMATION

- A. Purpose. This specification is intended as a standard specification for the remediation of mold/fungi at Cardinal Cove, Mandeville, Louisiana. This specification has been developed to address the components of the structure and associated finishes as well as the contents within the structure. This specification is not approved for any other purpose or project.
- B. Roles of Parties to Remediation: Unless otherwise noted, the work identified in this specification is intended for execution by an MRC retained by the General Contractor. The remediation must be coordinated with, and a post-remediation assessment conducted by an EC. Variations from the procedures identified in this specification shall require the prior approval of the EC and the Owner. Any determination as to whether an item qualifies as contents or as a component of the structure shall be made by the EC.
- C. Additional Hazards. This specification addresses the hazards presented by the identified mold and/or water damage. Additional hazards may exist that are dependent on the specific equipment and procedures used by the contractor to conduct the remediation. In addition to the work practice hazards, Asbestos Containing Materials (ACM), and Lead Based Paint (LBP) may be present within the structure and could be included in some of the materials specified for removal as a part of this mold remediation protocol. It is the responsibility of the Contractor to perform whatever investigation he deems necessary to identify these additional hazards and to take any necessary precautions to protect remediation workers from these and other hazards not addressed in the scope of work. In

SECTION 02 85 00
SUMMARY OF WORK – REMEDIATION

conducting the work, the Contractor shall comply with all Federal, State and Local requirements regarding hazard identification, communication, and worker protection.

- D. Code Compliance. Contractors should be familiar with the impacts that the remediation work will have on the structure's compliance with applicable building code requirements. All repair and replacement work performed on components of the structure should conform to the applicable building codes.

1.5 PERSONNEL REQUIREMENTS

- A. Environmental Consultant (EC). The EC shall have training and experience in mold assessment and remediation, with at least one of the following credentials:
1. A Certified Industrial Hygienist (CIH) as certified by the American Board of Industrial Hygiene,
 2. A Professional Engineer (PE), licensed in the State of Louisiana,
 3. An Architect, licensed in the State of Louisiana,
 4. A Council-Certified Microbial Consultant (CMC) or Council-Certified Microbial Investigator (CMI) or Certified Indoor Environmentalist (CIE), as certified by the American Council for Accredited Certification (ACAC), or Certified Indoor Environmental Consultant (CIEC), as certified by the American Council for Accredited Certification (ACAC)
 5. A State or National Certification in Mold Assessment with comparable education, qualification, and experience requirements, as approved by the Owner.
- B. Microbial Remediation Supervisor. The Onsite supervisor shall have training and experience in mold remediation, with at least one of the following credentials:
1. Council-Certified Microbial Remediator (CMR) or Council-Certified Microbial Remediation Supervisor (CMRS), as certified by the ACAC,
 2. Applied Microbial Remediation Specialist (AMRS), as certified by the Institute for Inspection, Cleaning and Restoration Certification (IICRC), or Applied Microbial Remediation Technician (AMRT)
 3. A State or National Certification in Mold Remediation with comparable education, qualification, and experience requirements, as approved by the Owner.

1.6 SUBMITTALS

- A. Preconstruction Submittals. Within 10 days of the award of the contract and prior to the start of the work, submit to the Contracting Officer six (6) copies of the following items for review and permanent file.
1. Preliminary Visual Assessment Report. A written report to document the pre-remediation condition of the work areas.

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19-627-21-01, F.19002606 &

01-107-05B-13, F.01004560 (Supplement)

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2. Remediation Workplan. The CIE and/or CIEC shall prepare a remediation work plan before starting the remediation project which is to be given to the Owner for approval.
3. The plan shall address the following items at a minimum:
 - a. Description of materials to be remediated, providing location and quantities (map if available), and methods to be used for remediation.
 - b. The timeframe for proposed completion of the work.
 - c. The identification and intended use any of biocides and/or fungicidal agents, including any registration, licensing or certification requirements originating from EPA or LDAF regulations.
 - d. Containment procedures to include description and locations of engineering controls and decontamination unit to include entry and exit procedures (provide sketch of floor plan showing location of containment barriers and decontamination units). Plan shall include locations of AFUs and AFU discharges to the outside.
 - e. Description of personal protective equipment to be used during the remediation.
 - f. Construction barricades and barriers in occupied areas.
 - g. HVAC Shut down and start-up procedures.
 - h. HVAC Evaluation and remediation procedures.
 - i. Moisture and relative humidity control procedures and equipment.
 - j. Packaging and disposal procedures.
 - k. Safety Precautions include lockout/ tag-out, fall protection, confined space entry procedures, and fire protection.
 - l. Description of the method employed to control cross contamination of areas not in the work area. This shall include a risk assessment related to the suitability of people to occupy areas adjoining the remediation area while remediation activities are ongoing.
4. Respiratory Protection Program. Provide written copy of Contractor's Respiratory Protection Program.
5. Worker Records. Provide the following documents for all workers, including supervisory personnel. If new workers are added to the crew, provide the same documentation for them.
6. Employee Instruction and Release Form. Provide documentation showing that each employee has been instructed on the following items:
 - a. Use and fit of respirators (for employees entering and working in the containment).
 - b. Protective clothing.
 - c. Protective measures.
 - d. Safety and Emergency Egress Procedures.
 - e. Site specific fall protection plan and training.
 - f. Microbial remediation hazards and practices including engineering controls and isolation. Training should include "hands-on" training for microbial remediation supervisors.
 - g. Workers' release forms stating the potential hazards involved with the scope of the work.

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7. Microbial Remediation Supervisor Qualifications. Onsite supervisor shall have one of the following certifications:
 - a. Certified Mold Remediator (CMR)
 - b. Certified Mold Remediation Supervisor (CMRS),
 - c. Applied Microbial Remediation Specialist (AMRS), or
 - d. A State or National Certification in Mold Remediation supervision with comparable education, qualification, and experience requirements.
 - e. Water Damage Restoration Technician (WRT)
 - f. Applied Microbial Remediation Technician (AMRT)
- B. Product Data. Within 10 days of contract award, submit product data for items identified for use in Microbial Remediation Plan.
- C. Daily Reports. Prepare a written report for each day that microbial remediation work is being accomplished. Submit this report to the Contracting Officer by 1000 hours of the following day, attached to the Contractor Quality Control Report. Referred to collectively as the Daily Report, the report at a minimum shall include measurements of differential pressure and temperature and relative humidity in work areas and detail any non-compliance issues observed.
- D. Submittals at Completion of Remediation Work. Within 14 days of completion, provide the following information:
 - a. Supervisor Logs.
 - b. Daily Reports.
 - c. Photographic Logs.
 - d. Contractor's Industrial Hygienist Report certifying the microbial remediation is complete.

1.7 RECORD KEEPING

- A. A Daily Project Log shall form a permanent record of the project. Secure and maintain these logs and any other required documentation as part of the permanent project file.
 1. Daily Log. The Microbial Remediation Supervisor shall maintain a Daily Project Log. The Daily Project Log shall be used each day of the project to document the following information.
 - a. Date.
 - b. Name of Microbial Remediation Supervisor.
 - c. Name of Industrial Hygienist monitoring work area.
 - d. Number of workers on site.
 - e. Equipment utilized.
 - f. Brief description of daily work activities.
 - g. Listing of any non-compliance noted, emergencies, stop work orders (with detailed explanation), [exhaust system pressure differential recordings] and descriptions of any other noteworthy events.

1.9 REFERENCE STANDARDS.

- A. "American National Standard for Industrial Head Protection" ANSI, Publication ANSI/ISEA Z89.1.

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- B. "American National Standard for Limited Use and Disposable Coveralls — Size and Labeling Requirements", ANSI, Publication ANSI/ISEA 101.
- C. "American National Standard for Occupational and Educational Personal Eye and Face Protection Devices", American National Standards Institute (ANSI), Publication ANSI/ISEA Z87.1, latest edition.
- D. "Assessment, Cleaning, and Restoration of HVAC Systems", National Air Duct Cleaners Association (NADCA), Publication ACR-2021, 2021
- E. "Bioaerosols: Assessment and Control", American Conference of Governmental and Industrial Hygienists (ACGIH), 2002.
- F. "Guidelines on Assessment and Remediation of Fungi in Indoor Environments; New York City Department of Health and Mental Hygiene, November 2008.
- G. "Mold Remediation in Schools and Commercial Buildings", Publication No. 402-K-01-001, U.S. Environmental Protection Agency (EPA), Washington, D.C., September 2008.
- H. "NIOSH Respirator Selection Logic 2004", National Institute for Occupational Safety and Health (NIOSH), Publication NIOSH 2005-100, October 2004.
- I. "Standard and Reference Guide for Professional Mold Remediation — S520", Institute of Inspection, Cleaning, and Restoration Certification (IICRC), Vancouver, Washington, 2021, Publication No, ANSI/IICRC S520-2015.
- J. "Standard and Reference Guide for Professional Water Damage Restoration — S500", IICRC, Vancouver, Washington, 2021, Publication No. ANSI/IICRC S500-2021.
- K. "Standard Specification for Performance Requirements for Protective (Safety) Toe Cap Footwear", American Society for Testing and Materials (ASTM), Publication F2413, latest edition.

PART 2 - PRODUCTS

2.1 PERSONAL PROTECTION EQUIPMENT

- A. Protective Clothing. Disposable coveralls shall be Tyvek® or equivalent complying with ANSI 101, with hoods.
- B. Head Protection. Head protection should comply with ANSI Z89, latest edition.
- C. Protective Eyewear. Protective eyewear should comply with ANSI Z87, latest edition.
- D. Protective Footwear. Protective footwear should comply with ASTM F2413, latest edition.
- E. Respiratory Protection. All respiratory protection equipment shall comply with the applicable standards of the National Institute for Occupational Safety and Health (NIOSH). Particulate respirators shall be at least N-95. If extensive, exposed mold contamination is present, the respiratory protection level may need to be increased to a NIOSH classification P-100 half face respirator coupled with an air purifying organic vapor cartridge. The specific respiratory protection for the project should be selected based on NIOSH 2005-100 and should address any other potential respiratory threats identified, including oxygen deficient atmospheres.

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- F. Gloves. For destructive work, work gloves (leather or equivalent). For cleaning work, no gloves are required, except for chemical protection.
- G. Splash Protection. For employees applying liquid cleaners/agents and all employees doing material removal and disposal of liquid items, appropriate splash protection shall be provided for the face. This shall include a face shield, or a NIOSH approved full face respirator.
- H. Additional PPE. If using cleaning agents, biocides, solvents or encapsulant materials, the contractor shall utilize any additional PPE (e.g., upgraded respiratory protection, chemical protective clothing, gloves, etc.) that is identified in the product manufacturer's instructional literature available for the products utilized.

2.2 APPROVED MATERIALS

- 1. The contractor shall use the following list of materials on the job site. Materials not listed must be approved prior to their arrival on site for use:
 - a. Aftershock Fungicidal Coating
 - b. Fiberlock IAQ 2000 Cleaner, Fungicide, Mildewstat, Disinfectant, Concentrate
 - c. Fiberlock IAQ 2500 Cleaner, Fungicide, Mildewstat, Disinfectant, Pre-Mixed
 - d. Fiberlock IAQ 6000 Mold-Resistant Coating
 - e. Fiberlock Shockwave Cleaner, Disinfectant, Fungicide, Sanitizer
 - f. Foster 40-20 Fungicidal Protective Coating
 - g. Fiberlock IAQ Advanced Peroxide Cleaner
 - h. Bioesque Solutions Botanical Disinfectant Solution
 - i. Benefect Botanical Decon 30

2.3 REMEDIATION

- A. Fungicidal Coatings. Fungicidal coatings shall be registered with the U.S. Environmental Protection Agency and approved by the EC.
- B. Disinfectants, Biocides, Sanitizing Solutions and Fungicidal Agents. These items shall be registered with the U.S. Environmental Protection Agency and approved by the EC. All products shall be used in accordance with the manufacturer's specifications.

PART 3 – EXECUTION

3.1 PREPARATION

- A. De-energizing Work Areas. Prior to performing any destructive work, the Contractor shall properly de-energize the systems likely to be encountered. These include electricity, natural gas, steam, telephone as well as other energy systems. The Contractor shall follow proper lock-out/tag-out and testing procedures to verify that these systems are properly de-energized.
- B. Examine areas and substrates, with Installer present, and including welded hollow-metal frames, cast-in anchors, and structural framing, for compliance with requirements and other conditions affecting performance of the Work.

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- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 EQUIPMENT

- A. Provide protective clothing and respirators as required by the Microbial Remediation Plan for use by any authorized visitors. Provide manufacturer's certificate of compliance for all equipment used to contain the microbial contamination. Contractors shall not be required to certify that visitors entering work areas be capable of wearing respirators.
1. Respirators. Select respirators from those approved by the National Institute for Occupational Safety and Health (NIOSH), Department of Health and Human Services. Provide personnel engaged in set-up, pre-cleaning, cleanup, handling, and removal of contaminated materials with the appropriate respiratory protection as specified in 29 CFR 1910.134. A microbial remediation plan shall consider Table 17.1 in AIHA IMOM08-679 "Recognition, Evaluation, and Control of Indoor Mold", which lists the minimum levels of respiratory protection based on the activity and size of the remediated area.
 2. Protective Clothing. Provide all workers with protective clothing as appropriate for the work being accomplished, as required by the Microbial Remediation Plan. Do not permit any person to enter the work area without the appropriate protective clothing and equipment.
 3. Warning Signs and Labels. Provide bilingual warning signs printed in English and Spanish at all approaches to the work areas. Locate signs at such a distance that personnel may read the sign and take the necessary protective steps required before entering the area. Warning signs may be in the form of continuous plastic tape. The warning signs shall have black characters on a yellow background.

WARNING

DO NOT ENTER

MICROBIAL REMEDIATION WORK IN PROGRESS

Alternate wording for the warning signs will be approved by the Owner.

4. Dehumidifiers. Install and use dehumidifiers as needed during the remediation to maintain relative humidity below 60 percent in the work area. Drain the condensate water to a permanent drain, or empty as needed to prevent water overflowing from the dehumidifiers.
5. Air Filtration Units (AFU). Install and use AFUs with HEPA filters, and manufacturer specified pre-filters, as part of the exhaust ventilation system to develop and maintain the specified desired air pressure differential inside the enclosed work area relative to the outside areas. The MRC shall be responsible for acquiring and paying for any licenses needed for use of any equipment, including but not limited to, air pressure differential systems and air filtration systems. Replace HEPA filters and pre-filters for AFUs as required to maintain pressurization performance requirements during demolition and cleaning. Do not reuse filters. Bag used filters at a minimum in clear 0.15-millimeter 6 mil polyethylene bags within the containment and disposed as contaminated. Discharge air from any AFUs located in the work area containment to the outside environment when creating a negative pressure containment to create a negative pressure relative to occupied areas of 5 pascals 0.02-inch H₂O to 10 pascals 0.04-inch H₂O. Discharge air more than that required for creating the proper

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negative pressure to the work area. The AFUs shall provide four to six (4 to 6) air changes per hour in the work area. Under no circumstances may air from AFUs discharge to an occupied area. Coordinate location of window sashes or doors required for discharge openings with the Owner. Seal around openings used for discharge of exhaust air airtight. Exhaust discharge openings may be constructed of plywood. Seal all exhaust and intake openings in AFUs with one layer of 0.15 millimeters 6 mil polyethylene sheeting when not in use.

6. Vacuum Cleaners Equipped with HEPA Filters. Provide vacuum cleaners equipped with HEPA filters designed for continuous operation to perform the work in a timely and efficient manner. Provide nozzle attachments as required, to adequately remove all dust. As a minimum, nozzle attachments shall include crevice and extended bristle brush nozzles. Any vacuum that is not equipped with a HEPA filter shall not be used at any time. Provide sufficient vacuum cleaners equipped with HEPA filters designed for continuous operation in the work area during microbial remediation inside the containment area. Provide additional vacuum cleaners equipped with HEPA filters in the enclosed work area during remediation or cleaning work as required by the size (area) of the containment and to maintain timely progress of the work.

3.3 CONTAINMENT

- A. The purpose of remediation is to remove or clean mold-impacted materials in a manner that prevents mold and other residuals from leaving the remediation work area and entering a non-remediation area. Unless otherwise specified, containment shall be implemented as outlined in IICRC S520. The following procedures shall govern the containment to be used in conjunction with the remediation.
 1. Control of Transport of Mold Materials. The two (2) primary mechanisms for mold material leaving the remediation area are tracking and aerial transport. To prevent tracking, all contents and flooring within the remediation zones should be covered with adequate reinforced polyethylene sheeting during the remediation work. Alternatively, items may be cleaned with a High Efficiency Particulate Arresting (HEPA) filtered vacuum and then relocated to prevent them from encountering dust and/or mold from the remediation work. Should the items need to be relocated to another structure, they should be stored in a climate-controlled area. Aerial transport can be prevented by isolating the remediation zone from the rest of the structure and utilizing either source, local or full-scale containment as described below.
 2. Containment Types
 - a. Source Containment. Source containment is used when there are small or limited areas of mold growth and hidden mold growth is not anticipated. Source containment will utilize a critical barrier to isolate the remediation area from other parts of the structure and will typically include "glove-bag" or other techniques that do not involve placing remediation personnel inside the containment area. Source containment does not require maintaining negative pressure within the containment.
 - b. Local Containment. Local containment is used where moderate levels of mold growth are present and/or hidden mold growth is anticipated. Local containment will utilize critical barriers to isolate the remediation area from other parts of the structure and will typically involve only one (1)

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- room or part of one room and will require remediation personnel to work inside the containment area. Local containment will require maintaining negative pressure within the containment. For local containment, a HEPA filtered vacuum may be used if it can sustain negative pressure within the enclosure.
- c. Full Scale Containment. Full scale containment is used where significant or extensive mold growth is present or anticipated. Full scale containment will utilize critical barriers to isolate the remediation area from other parts of the structure and will require remediation personnel to work inside the containment area. Full scale containment will require maintaining negative pressure within the containment, using one (1) or more NEPA filtered negative pressure devices or negative air machines (NAMs). The NAMs should discharge outdoors and should be sized to maintain adequate negative pressure and air change rates (i.e., air changes per hour [ACH]). Exhaust procedures should facilitate in avoiding cross-contamination within the containment and outside the containment.
 - d. Containment Areas with One or More Surfaces Common to the Exterior. In instances where the remediation is to be conducted with one (1) or more surfaces common to the exterior of the structure, and in those instances where there is a continuous, intact wall, ceiling or floor, such intact wall, ceiling, or floor may be considered a critical barrier. In instances where the wall, ceiling, or floor common to the exterior is not intact or is not continuous, a critical barrier may be established by sealing the compromised portion to provide a continuous, intact barrier.
3. Critical Barriers and Isolation. Where critical barriers or isolation are required, the Contractor shall utilize suitable structural materials combined with adequate polyethylene sheeting and sealing tape to erect and maintain the barriers. Unless otherwise specified, the critical barriers will be self-supporting and will only be attached to the structure at locations required to make a satisfactory seal. Where polyethylene sheeting is used, it shall consist of fire-retardant, reinforced polyethylene. All joints, seams and penetrations shall be properly taped and sealed.
4. Ingress/Egress. Ingress/Egress for the remediation work may be outside the negative pressure enclosure but should be isolated from the remainder of the structure. These areas should be covered with polyethylene sheeting, with all joints and penetrations sealed with compatible tapes or sealants, to prevent the possible cross-contamination of structure components and contents. Alternatively, these areas may be cleared of contents prior to the remediation and may be included in the cleaning zone at the completion of the remediation.
- a. The Contractor should implement appropriate decontamination and cross-contamination work practices as necessary. This includes the use of appropriate work area entry/exit procedures and the use of critical barriers, air locks, or seals to ensure proper containment during entry/exit. Mold impacted material should be properly bagged or contained while it is being removed from the remediation zone to prevent contaminating areas outside the remediation zone.
5. Containment and Isolation for HVAC System Components. If the Heating, Ventilating and Air Conditioning (HVAC) systems are to remain on during

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remediation work, any HVAC return air grilles in the work area should be temporarily re-routed to areas outside the work area. All HVAC supply vents in the work area should be blocked or sealed shut. If the HVAC systems are to remain off during remediation work, temporary cooling and/or dehumidification should be installed to maintain the temperature and humidity within the desired ranges. The length of the remediation work will also determine and/or influence the need to maintain appropriate temperature and humidity levels within the work area. Temporary equipment for cooling and/or dehumidification should also be considered in circumstances where the HVAC system has significant contamination and/or when removal of the HVAC unit is required for remediation.

3.4 PROCEDURES

A. Cleaning of Area:

1. ALL WORKERS SHALL BE IN PPE.
2. Properly dispose of all damaged goods.

Contractors shall clean/remove items as follows:

3. All areas to be treated with remediation products if not specifically described below in the approved scope.
4. Gypsum Board/Drywall: Shall be wiped using top to bottom and left to right methods. The wiping shall include any/all insets, windows, door frames, closets, but not limited to these components.
5. Gypsum Board/Drywall Removal: Shall be removed using methods that will keep mold contaminated sections from becoming airborne. This material shall be double wrapped/bagged in 6 mil polysheeting/bags and sealed. This Material is to be considered mold contaminated waste.
6. Gypsum Board/Drywall Ceilings: Shall be removed during asbestos Abatement.
7. Door Sanitization: Shall be wiped using top to bottom and left to right methods. The wiping shall include any/all insets, and door hardware but not limited to these components.
8. Door Removal: Shall be removed using methods that will keep mold contaminated sections from becoming airborne. This material shall be double wrapped/bagged in 6 mil polysheeting/bags and sealed. This Material is to be considered mold contaminated waste.
9. Light Panel Sanitization: Shall be wiped clean using remediation chemicals.
10. Ductwork (Flex Duct) Removal: Shall be removed in 3'-4' sections, double sealed with 6 mil Polysheeting and adhesive tape. Materials shall be considered mold contaminated waste.
11. Ductwork (Sheet Metal) and Plenum Removal: Shall be removed in 3'-4' sections, double sealed with 6 mil Polysheeting and adhesive tape. Materials shall be considered mold contaminated waste.
12. HVAC Grilles/Diffusers Removal: Shall be removed using methods that will keep mld contaminated sections from becoming airborne. This material shall be double wrapped/bagged in 6 mil polysheeting and adhesive tape. This material shall be considered mold contaminated waste.
13. Ceiling Mounted Exhaust Fan: Shall be cleaned and sanitized using remediation chemicals.
14. HVAC Equipment (Air Handling Unit): Shall be removed using methods that will keep mold contaminated sections from becoming airborne. This material

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- shall be double wrapped/bagged in 6 mil polysheeting/bags and sealed. This Material is to be considered mold contaminated waste.
15. HVAC Equipment (Mini Split Units): Shall be cleaned and treated with remediation chemicals by a NADCA Certified Technician.
 16. Remove Remaining Contents: This material shall be double wrapped/bagged in 6 mil polysheeting and adhesive tape. This material shall be considered mold contaminated waste.
 17. Plumbing Fixture: Shall be removed using methods that will keep mold contaminated sections from becoming airborne. This material shall be double wrapped/bagged in 6 mil polysheeting/bags and sealed. This Material is to be considered mold contaminated waste.
 18. Windows: Shall be cleaned and sanitized using remediation chemicals.
 19. Built-in Cabinets: Shall be removed using methods that will keep mold contaminated sections from becoming airborne. This material shall be double wrapped/bagged in 6 mil polysheeting and adhesive tape. This material shall be considered mold contaminated waste.
 20. Sub-Assemblies Attached to Walls: Including but not limited to bulletin boards, dry erase boards, smart boards, peg boards, acoustical panels, shelves, bookshelves, cabinetry, etc. Shall be detached and if restorable, cleaned.
 21. Flooring: Shall be cleaned with remediation chemicals.
 22. Carpet: Shall be removed using methods that will keep mld contaminated sections from becoming airborne. This material shall be double wrapped/bagged in 6 mil polysheeting and adhesive tape. This material shall be considered mold contaminated waste.
 23. Cove Base: Wood and Vinyl cove base shall be removed and double wrapped/bagged in 6 mil polysheeting/bags and sealed. This material shall be considered mold contaminated waste.
 24. Stairs and Stair Components: Shall be wiped down with remediation chemicals.
 25. Kitchen Equipment: Shall be cleaned with remediation chemicals.
 26. Tables and Chairs: Shall be wiped down with remediation chemicals.

3.5 STRUCTURE COMPONENT REMEDIATION PROCEDURES

- A. Drying. Structure components and contents that require drying shall be evaluated and dried using one or more of the procedures outlined in IICRC S500. Excess water shall be collected and removed prior to and/or during the remediation, as it is encountered. Further drying shall be conducted using a combination of air movement, dehumidification, and temperature control, as outlined in Chapters 6 and 7 of the Reference Guide in IICRC S500.
- B. Removal and Cleaning of Mold Growth. All visible molds should be removed during remediation. Unless otherwise specified, mold impacted components of the structure should be addressed using the methods outlined in IICRC S520 and EPA 402-K-01-001.
 1. Non-Porous/Solid Surface Components. Non-porous/solid surface components will only be considered for removal and replacement if they are visibly water damaged. Regardless of whether they are in Condition 1, 2 or 3, nonporous/solid surface components shall have mold removed using appropriate procedures. Wet removal methods are allowed on non-porous/solid surface components provided these methods do not affect adjacent porous or semi-porous

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components. Semi-porous Items. Semi porous components (e.g., wood) in Condition 3 with visible surface mold, but which are not decayed/deteriorated, should be managed as follows:

- a. Remove loose mold using a HEPA filtered vacuum.
 - b. Remove attached mold through sanding, grinding or use of wire brushing, provided the removal will not compromise the structural or functional integrity of the component.
 - c. In lieu of removal of attached mold, semi-porous components in Condition 3 may be removed and replaced, with the permission of the licensed EC and the Owner, if it is more economical to do so. Semi-porous components with no visible mold growth in Condition 2 or items in Condition 1 shall have mold removed using dry methods only.
- C. Porous Items. Porous components in Condition 3 should be removed and discarded. Porous components with no visible mold growth in Condition 2 or in Condition 1 shall have mold removed using dry methods only.
- D. Zones of Remediation. The zones of remediation are defined as those specific areas to be cleaned, repaired and/or replaced due to water damage and the presence of mold contaminants. These zones are based on the visual observations of water stains, visible mold growth, and moisture damage assessment. During the prosecution of the work, areas outside of the zone of remediation may be identified. Following the removal of components within the zone of remediation and before the cleaning of adjacent areas, the exposed area should be inspected to determine if there is any additional water damage and/or any further remediation required. The Contractor may be asked by the EC and the Owner to proceed with additional remediation activities through a properly executed field change.
- E. Cleaning of Structure Components. During remediation, the remediation zone should be maintained in a clean, debris-free manner throughout the remediation process using a combination of HEPA filtered vacuums and HEPA filtered air movers. Following the remediation work, the entire work zone should be cleaned using a HEPA filtered vacuum. Semi-porous and non-porous components may also be cleaned with a lightly damp cloth (clean water only; fungicides or biocides are not recommended). The area identified as the cleaning zone should also be cleaned once all repairs and remediation have been completed. During the cleaning, the HVAC system should remain off and alternative ventilation, if necessary, can be provided using HEPA filtered air movers. The walls, ceilings, and floors in the cleaning zone should be cleaned using a HEPA filtered vacuum.
- F. Cleaning of the HVAC System. If specified, the various components of the HVAC system shall be cleaned. This cleaning should be conducted following all remediation work and repairs, and prior to reinstallation. The cleaning protocol should be conducted by an experienced professional using appropriate equipment and materials for working on HVAC systems. The HVAC cleaning protocol should be consistent with applicable standards and guidelines from ASHRAE and NADCA and specifically NADCA ACR-2006.
- G. Fungicidal Coatings. As required and specified, following the removal and cleaning within the zone of remediation, apply a fungicidal coating to all exposed areas where remediation work was performed. The specific coating product shall be an EPA-registered fungicidal coating (e.g., Foster® 40-30, Fiberlock Aftershock, etc.) approved by the EC. All EPA-registered fungicidal coatings shall be used in strict compliance with labeling and manufacturer instructions. At the discretion of the EC conducting the post-

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remediation assessment, this coating may be applied either before or after authorization is provided to removal the containment. Areas of the structure where fungicidal coatings have been applied may not be occupied by non-remediation personnel until the coatings have properly dried.

H. CONTENTS MANAGEMENT PROCEDURES

1. Custody and Handling of Contents. All contents shall be handled in a manner that, to the maximum extent practical, protects the integrity of the contents and prevents damage to the contents or other items. Under no circumstances will the Contractor be allowed to keep, scavenge or salvage for his own use any of the contents of the structure. Prior to beginning the remediation, the Contractor shall provide the following written notifications to all employees, subcontractors, vendors, and visitors:

“There is personal information present within the structure that is subject to all applicable federal, state and local privacy laws. The Contractor and his personnel are strictly forbidden to review and/or divulge any personal information. They are to handle all contents in a manner that, to the maximum extent practical, protects the integrity of the contents and prevents damage to the contents or other items. They are to refrain from confiscating, keeping, scavenging, salvaging or otherwise inappropriately removing any contents from the structure. Any of the Contractor's employees, agents, sub-contractors, vendors or visitors who are discovered to have inappropriately kept, scavenged, salvaged or otherwise removed any contents from the structure shall be discharged from the project and removed from the project site immediately.”
2. Initial Inventory and Photo-Documentation. The Contractor shall photo-document the placement and condition of all contents, for each room in the work area (remediation zones, ingress/egress area, and cleaning zones), prior to moving. Make a general video of the entire room for every room in the work area, or Matterport Imaging.
3. Contents Manipulation. The Contractor shall set up the following contents manipulation areas:
 - a. Dirty Staging Area. A “Dirty Staging Area” (DSA) for items to be evaluated for disposal (discarding). The DSA is for holding items which the EC believes need to be discarded and disposed of.
 - b. Cleaning Area. A “Cleaning Area” (CA) for items to be cleaned. Proper engineering controls (e.g., positive pressure to prevent cross-contamination) should be incorporated into the design of the CA.
 - c. Finished Storage Area. A “Finished Storage Area” (FSA) for items that have been cleaned and are to be returned to their original room following remediation.
 - d. The preferred method is to locate the DSA, CA and FSA within the confines of the structure undergoing remediation. The Contractor shall execute and schedule his work to prepare the contents management areas (DSA, CA & FSA) as soon as possible in the process. If there is not enough space for the Contractor to establish the DSA, CA and FSA within the confines of the structure, the Contractor may establish any or all of these areas in temporary structures (trailer, portable building, etc.) on-site.

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4. Handling of Contents to Remain in the Work Area. Contents which are to remain in the work area (remediation zones and cleaning zones) during the remediation and/or cleaning work shall be properly protected and isolated from the work using appropriate barriers (polyethylene sheeting, bags, etc.) and seals (ties, tape, etc.). The contents may be relocated within the room to accommodate the work. Following remediation work, the contents shall be appropriately cleaned, as outlined below.
5. Handling of Contents to be Removed from the Work Area. Every item that leaves its original room shall be tagged with a durable permanent tag that will survive the handling outlined herein. Each tag shall be clearly labeled, in permanent ink with the building designation (name and/or number), the room number, and the date and time the item was removed. Similar items or groups of items may be placed into a common container, provided the container is tagged and labeled with the information required above. All items (whether intended to be cleaned or discarded) shall be bagged to prevent the item from being contaminated or from contaminating other contents or portions of the structure under remediation. Bags used to transport contents shall be appropriately cleaned before leaving a contained area, to prevent cross contamination. Contents which are to be cleaned shall be stored in the FSA until the remediation is completed and cleared in their originating room.
6. Contents Cleaning Procedures. The default management strategy for all contents in the work areas will be to clean them. Contents with no visible mold growth in Condition 2 or items in Condition 1 shall be vacuumed with a device whose air discharge is fitted with a HEPA filter (HEPA vacuuming). Additional cleaning for Condition 2 or 3 items shall be based on item types as specified in EPA 402-K-01-001 and/or IICRC S520 and shall be implemented alone or in combination to restore contents to Condition 1.
 - a. Soft Goods. Soft goods should be professionally cleaned or washed in hot water (minimum 55°C or 131°F) with a detergent, as applicable. Clothing with deposited spores from airborne mold sources can be washed in this manner. Dry cleaning is not a requirement and may not be the most effective cleaning/removal method for washable fabrics. Usually, only soft goods with actual damage from being in contact with water and/or that have visible growth would need to be considered for replacement. Active mold growth that has penetrated the fibers of fabric items can leave stains and is more difficult to remove than spores deposited on the surface. Prior consultation with professionals engaged in the cleaning of upholstery, furniture, clothing, or other materials is recommended to identify the appropriate cleaning method and prevent damage from the cleaning procedure.
 - b. Hard Goods/Other Items. All other hard goods, personal effects, etc. can be cleaned with warm, sudsy water. Photographs or paper items with mold growth can be discarded or restored using appropriate document or art restoration measures. Alternative cleaning methods shall have the prior approval of the EC. Cleaning of contents shall be conducted in the CA. The EC may review and observe the Contractor's cleaning procedures. At the EC's sole discretion, sampling and or testing may be conducted to determine the effectiveness of the contents cleaning.
7. Criteria for Identifying Items to Be Discarded. The EC shall work with the Contractor to identify items which are eligible for discarding. The Contractor shall

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not have any independent authority to determine that contents are to be discarded. However, this restriction shall not apply to components of the structure and associated finishes. For the Contractor's information in pre-screening contents which may be eligible to be discarded, the following criteria are provided. If the Contractor believes that the contents items meet these criteria and should be discarded and disposed of, the items should be managed as outlined in Section 10, below.

- a. Non-Porous/Solid Surface Items. Examples of non-porous/solid surface items include, but are not limited to:
 - 1) Hard furniture with no upholstery.
 - 2) Computer and electronic equipment
 - 3) Chalkboards, message boards, with solid surfacesNon-porous/solid surface items will only be considered for disposal if they are visibly water damaged. Regardless of whether they are in Condition 1, 2 or 3, non-porous/solid surface items shall be cleaned using appropriate procedures, as outlined in Section 9.6.
- b. Semi-porous Items, Examples of semi-porous items include, but are not limited to:
 - 1) Painted/finished wood products and furniture.
 - 2) Furniture with vinyl upholstery
 - 3) Trophies, decorations, framed/mounted pictures, etc.Semi-porous items in Condition 3 or visible deposited mold in Condition 2 will be considered for disposal. Semi-porous items no visible mold growth in Condition 2 or items in Condition 1 will be referred to the Contractor for cleaning.
- c. Porous Items, Examples of porous items include, but are not limited to:
 - 1) Furniture with cloth upholstery
 - 2) Paper, cardboard, pictures
 - 3) Clothing, linens, draperies, etc.Porous items in Condition 3 or visible deposited mold in Condition 2 will be considered for disposal. Porous items with no visible mold growth in Condition 2 or items in Condition 1 will be referred to the Contractor for cleaning.
- d. Incidental Food Items. All incidental food items encountered in remediation areas shall be discarded, following the procedures outlined in Section 10.

3.6 POST REMEDIATION ASSESSMENT AND CLEARANCE CRITERIA

- A. Following the remediation of the structure and contents, the EC should perform a post-remediation assessment to document the completion of the remediation work. This post-remediation assessment will consist of a combination of visual observations, moisture measurements, and sampling, as determined by the EC.
 - 1. Post-Remediation Objectives. The objective of the remediation is to remove all areas of identified and discovered mold impact. The objectives of the post-remediation assessment include verification of the following:
 - a. All mold impacted materials (including those specified and those discovered during the prosecution of the remediation work) have been removed.

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- b. The structure components and contents in the remediation area have been properly cleaned.
 - c. The remediation work area is free from visible mold growth and wood rot.
 - d. The remediation areas have been returned to Condition 1 (normal mold ecology), as outlined in IICRC S520.
 - e. The underlying cause of the mold impact for the project has been remediated so that it is reasonably certain that mold growth will not return from that same cause.
 - f. A determination that post-remediation objectives have been met will require acceptable visual observations, moisture measurements and sampling results.
2. Visual Observations. The EC shall utilize visual observations as a part of the post-remediation assessment. Visual observations are sufficient to determine that the post-remediation objectives have not been met; however, visual observations alone are not sufficient to confirm that the post-remediation objectives have been met.
3. Moisture Measurements. The EC shall utilize moisture measurements as a part of the post-remediation assessment. Moisture levels in the structure components and contents should be within the normal to low range, based on the type of material and the specific measurement device utilized.
4. Sampling. Acceptable sampling results are required to demonstrate that the post-remediation objectives have been met and that the remediation area has been returned to Condition 1. In accordance with the TMARR, at least one nationally recognized analytical method must be used to verify that each area has been remediated as outlined in the mold remediation protocol. The specific sampling to be conducted shall be selected by the licensed EC based on the post-remediation objectives and visual observations.
- a. Air Sampling. The Air Monitoring Firm shall utilize air sampling as a part of the post-remediation assessment. Air samples shall be collected using either spore trap cassettes or impactor plates, with laboratory analysis using either direct or cultured microscopic examination, as appropriate. Indoor air samples shall be collected while containment is erected. Air scrubbing equipment must have been turned off at least two (2) hours before the air samples are collected. At least one (1) outdoor air sample shall be collected for comparison purposes, preferably at an outdoor location near the remediation zone (not immediately at the ingress/egress point, but close enough to represent the composition of the influx air near the zone).
 - b. Surface Sampling. The Air Monitoring Firm may utilize surface sampling as a part of the post-remediation assessment. Surface samples may be collected using either tape lifts or swabs. Tape lifts shall be analyzed using direct microscopic examination, while swabs may be analyzed using either direct or cultured microscopic examination.
 - c. Bulk Sampling. The Air Monitoring Firm may utilize bulk sampling as a part of the post-remediation assessment. Bulk samples may be analyzed using either direct or cultured microscopic examination.
 - d. Sample Data Interpretation. As a part of assessing normal mold ecology", water-indicator species (e.g. *Stachybotrys*, *Chaetomium*, *Fusarium*, *Memnoniella*) and significant mold growth structures should

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not be present; however, trace occurrences may be acceptable (at the discretion of the EC if visual conditions are adequate, hyphal fragments and particulate debris in samples are low, and the trace occurrences do not appear to be related to an identified indoor source. Airborne mold spores in the remediation area should be lower than outdoor counts collected at the same time of day, and the distribution of mold spore types should be relatively similar between indoor and outdoor samples.

5. Post-Remediation Clearance

- a. The licensed EC will use visual observations, moisture measurements and sampling results to determine if the post-remediation assessment indicates that the remediation has achieved Post-Remediation Clearance (Clearance) by meeting the post-remediation objectives. The licensed EC may use a combination of his own visual observations and tests, along with observations and tests conducted by professionals from other disciplines to verify that the underlying cause(s) of the mold impact have been remedied.
- b. The remediation zones may be cleared in any number or combination, as agreed between the Contractor and the EC. If the EC determines that Clearance has not been achieved, the EC shall direct the Contractor, at the Contractors expense, to utilize additional remediation and/or cleaning procedures as outlined in the mold remediation protocol or other document referenced in the mold remediation protocol to achieve Clearance. If the EC determines that Clearance has been achieved, the EC shall notify both the Contractor and the Owner.
- c. Removal of Containment. Containment is to remain in place (including any requirement to maintain negative pressure) until authorization to remove the containment is issued by the EC.

END OF SECTION 028500